Durham University

Durham E-Theses

The provision of infrastructure services in Rohtak and Bhiwani districts, Haryana, India, 1981-98: a geographical analysis

Naresh Kumar

How to cite:

Kumar, Naresh (1999) The provision of infrastructure services in Rohtak and Bhiwani districts, Haryana, India, 1981-98: a geographical analysis. Doctoral thesis, Durham University.

Use policy

The full-text may be used and/or reproduced, and given to third parties in any format or medium, without prior permission or charge, for personal research or study, educational, or not-for-profit purposes provided that:

- a full bibliographic reference is made to the original source
- a https://etheses.durham.ac.uk/id/eprint/4396/ is made to the metadata record in Durham E-Theses
- the full-text is not changed in any way

The full-text must not be sold in any format or medium without the formal permission of the copyright holders.

Please consult the full Durham E-Theses policy for further details.

Academic Support Office, The Palatine Centre, Durham University, Stockton Road, Durham, DH1 3LE
e-mail: e-theses.admin@durham.ac.uk Tel: +44 0191 334 6107
https://etheses.durham.ac.uk

The Provision of Infrastructure Services in Rohtak and Bhiwani Districts, Haryana, India, 1981-98: A Geographical Analysis

The copyright of this thesis rests with the author. No quotation from it should be published without the written consent of the author an information derived from it should be acknowledged.

Naresh Kumar

University of Durham

Department of Geography

Thesis submitted for the degree of Doctor of Philosophy

August 1999

17 JAN 2000

Declaration

I confirm that this thesis is my original work and contains nothing which is the result of work done in collaboration. I further confirm that no part of the material presented in this thesis has previously been submitted by me or any other person for a degree in this or any other university,

The copyright of this thesis rests with the author. No quotation from it should be published without prior consent of the author and information derived from it must be acknowledged.

Signed:

Naresh Kumar

Date: **04.08.1999**

The Provision of Infrastructure Services (Education, Health and Transport) in Rohtak and Bhiwani Districts, Haryana, India, 1981-98: A Geographical Analysis

Abstract: Provision of three basic infrastructure services (namely education, health and transport) in Rohtak and Bhiwani Districts (India) is examined using three types of data:

1. 507 households spreading in 8 villages,
2. Informal discussion with villagers and services providers in both districts, and
3. Secondary data for 921 villages and 14 towns and cities.

These data were analysed using both statistical and GIS techniques. The analysis reveals that quantitatively there has been considerable expansion of education and health services over a period of fifteen years (1981 to 1996), and the average distance people have to travel to access these services has also declined significantly. But little evidence was found of any logical criterion being followed for the location of new services and the upgrading of existing services. Consequently, there was no improvement in the efficiency level (measured in terms of demand and geographical distance) of existing infrastructure services (both public and private); moreover, the efficiency level of private services was significantly lower than that of public services. It was further observed that the poor and women had relatively poor access to education, health and transport; and income, caste, gender, education level and village location had significant impact on access to and utilisation of basic services. In the study area, public services were functioning sub-optimally and service users were not satisfied with the quality of services; a significant proportion of clients had to rely on private services.

Although public services may not be available in all the villages, the main focus should now be on improving the quality of existing services. Therefore, a solid transport network is needed in rural areas so that the availability of frequent and reliable transport services facilitate villagers' access to quality services even if located at distant places. Thus far, the role of the public in service provision has been minimal, which may be one of the reasons for poor quality of public services. Therefore, the active involvement of clients (service users) is essential in the operation, maintenance and monitoring of basic services in order to improve their quality and efficient functioning, and to effectively cater for people's needs in general and deprived sections of the society in particular.

Table of Contents

Abstract		iii
Table of Contents		iv
List of Figures		vii
List of Tables		x
List of Figures		xv
List of Plates		
Chapter-1	**INTRODUCTION AND STUDY AREA**	
1.1	Introduction	1
1.2	Aims and Objectives	8
1.3	Study Area	10
1.4	Selection of Villages	16
1.5	Brief Description of Villages Selected	19
1.5.1	Kehrawar	19
1.5.2	Chuliana	22
1.5.3	Diwana	22
1.5.4	Brahana	23
1.5.5	Bapora	25
1.5.6	Patodi	27
1.5.7	Bhera	31
1.5.8	Dhani Mansukh	32
1.6	Chapter Scheme	32
Chapter-2	**CONCEPTUAL FRAMEWORK**	
2.1	Introduction	50
2.2	Definition of Key Terms	50
2.3	Infrastructure and Development	53
2.4	Infrastructure and its Impact	65
2.5	Conceptual Basis	76
Chapter-3	**DATA SOURCES AND METHODOLOGY**	
3.1	Introduction	80
3.2	Data Source, Collection and Type	81
3.2.1	Secondary Data	81
3.2.2	Primary Data	83
3.3	Methodology	92
3.3.1	Secondary data analysis	92
3.3.2	Primary data analysis	101
Chapter-4	**AVAILABILITY AND SPATIAL EFFICIENCY OF MIDDLE, HIGH AND SENIOR SECONDARY SCHOOLS, 1981, 1991 AND 1996**	
4.1	Introduction	111
4.2	Development Revenue and Capital Expenditure, and School Statistics	114
4.3	School Education	120
4.3.1	Middle Schools	121
4.3.2	High Schools	127

	4.3.3	Senior Secondary Schools	131
	4.3.4	Government Versus Non-Government Schools	136
4.4		Expenditure on Education in Rohtak and Bhiwani Districts, and Quality of Education	139
4.5		Summary of Results and Discussion	143
	4.5.1	Summary of Results	143
	4.5.2	Discussion	145
Chapter-5		**ACCESS TO AND UTILISATION OF EDUCATIONAL SERVICES**	
5.1		Introduction	191
5.2		Expectation from the Education of Children	192
5.3		Accessibility to and Utilisation of Educational Institutions	198
5.4		Geographical Distance and Access to Educational Institutions	220
5.5		Reasons for the Utilisation of Government and Private Educational Institutions	225
5.6		Education Level	227
5.7		Reasons for Drop-out from Education	241
5.8		Summary of Results and Discussion	248
	5.8.1	Summary of Results	248
	5.8.2	Discussion	250
Chapter-6		**AVAILABILITY AND SPATIAL EFFICIENCY LEVEL OF GENERAL HEALTH SERVICES, 1981, 1991 AND 1996**	
6.1		Introduction	259
6.2		Health Statistics in Haryana	263
6.3		Provision of Health Services in Rohtak and Bhiwani	264
	6.3.1	Primary Health Centres and Sub-Centres	265
	6.3.2	Community Health Centres	272
6.4		Private Health Services	276
6.5		Government Versus Private and Quality of Health Services	280
6.6		Summary of Results and Discussion	283
	6.6.1	Summary of Results	283
	6.6.2	Discussion	285
Chapter-7		**ACCESSIBILITY TO AND UTILISATION OF HEALTH SERVICES**	
7.1		Introduction	312
7.2		Type of Services People Use for Minor Illness	313
7.3		How Many People Fall Ill?	320
7.4		Sources of Treatment	322
7.5		Reasons for Using Different Sources of Treatment	328
7.6		Distance and Health Services Used	331
7.7		Patients Accompanied to Treatment	332
7.8		Expenditure on the Utilisation of Health Services	335
7.9		Outcome from Treatment	336
7.10		Summary of Results and Discussion	337
	7.10.1	Summary of Results	337
	7.10.2	Discussion	338

Chapter-8 **TRANSPORT, EMPLOYMENT AND LITERACY**

8.1 Introduction 347
8.2 Availability of Transport Services 349
8.3 Transport and Town and/or City Access, Education Level and Non-Agriculture Employment 354
8.4 Summary of Results and Discussion 367
8.4.1 Summary of Results 367
8.4.2 Discussion 368

Chapter-9 **ACCESS TO AND UTILISATION OF TRANSPORT SERVICES**

9.1 Introduction 379
9.2 Availability of Private Conveyances 380
9.3 Number of Vehicles Available in the Household 391
9.4 Visits During the Last 30 Days 394
9.5 Places Visited 404
9.6 Purpose of Visits 407
9.7 Distance Travelled 410
9.8 Mode of Transportation Used 412
9.9 Time of Arrival and Departure 414
9.10 Accompanied by Someone 416
9.11 Summary of Results and Discussion 417
9.11.1 Summary of Results 417
9.11.2 Discussion 419

Chapter-10 **SUMMARY AND DISCUSSION**

10.1 Introduction 421
10.2 Availability and Accessibility to Services 422
10.3 Functioning of Infrastructure Services 426
10.4 Discussion and Policy Implications 433

Appendix-1 437
Appendix-2 438
Appendix-3 445
Appendix-4 455
Bibliography 457

List of Figures

Figure	Title	Page
1.1	Administrative divisions, India, 1991	37
1.2	Administrative divisions, Haryana, 1984	38
1.3	Location map of the study area, Rohtak and Bhiwani districts	39
1.4	Population, Rohtak and Bhiwani districts, 1981	40
1.5	Population, Rohtak and Bhiwani districts, 1991	41
1.6	Population density, Rohtak and Bhiwani districts, 1981	42
1.7	Population density, Rohtak and Bhiwani districts, 1991	43
1.8	Population growth, Rohtak and Bhiwani districts, 1981-91	44
1.9	Village Kehrawar	45
1.10	Village Chuliana	46
1.11	Village Diwana	46
1.12	Village Brahana	47
1.13	Village Bapora	48
1.14	Village Patodi	48
1.15	Village Bhera	49
1.16	Village Dhani Mansukh	49
2.1	Conceptual bases of infrastructure availability and accessibility and their impacts	78
2.2	Accessibility to and utilisation of education and health: their controlling variables and effects	79
3.1	Caste and size of land holding	86
4.1	Middle schools, 1981	152
4.2	Middle schools, 1991	153
4.3	Middle schools, 1996	154
4.4	Middle schools, 1981-96	155
4.5	1981 middle school locations	156
4.6	1991 middle school locations	157
4.7	1996 middle school locations	158
4.8	Modelled middle schools for 1981	159
4.9	Modelled middle schools for 1991	160
4.10	Modelled middle schools for 1996	161
4.11	Actual and modelled middle schools, 1981	162
4.12	Actual and modelled middle schools, 1991	163
4.13	Actual and modelled middle schools, 1996	164
4.14	High schools, 1981	165
4.15	High schools, 1991	166
4.16	High schools, 1996	167
4.17	High schools, 1981-96	168
4.18	1981 high school locations	169
4.19	1991 high school locations	170
4.20	1996 high school locations	171
4.21	Modelled high schools for 1981	172
4.22	Modelled high schools for 1991	173
4.23	Modelled high schools for 1996	174
4.24	Actual and modelled high schools, 1981	175
4.25	Actual and modelled high schools, 1991	176
4.26	Actual and modelled high schools, 1996	177

4.27	Senior secondary schools, 1981	178
4.28	Senior secondary schools, 1991	179
4.29	Senior secondary schools, 1996	180
4.30	Senior secondary schools, 1981-96	181
4.31	1981 senior secondary school locations	182
4.32	1991 senior secondary school locations	183
4.33	1996 senior secondary school locations	184
4.34	Modelled senior secondary schools for 1981	185
4.35	Modelled senior secondary schools for 1991	186
4.36	Modelled senior secondary schools for 1996	187
4.37	Actual and modelled senior secondary schools, 1981	188
4.38	Actual and modelled senior secondary schools, 1991	189
4.39	Actual and modelled senior secondary schools, 1996	190
5.1	Age and illiteracy rate, 1997-98	232
5.2	Age and high school education, 1997-98	232
5.3	Age and post-high schooling, 1997-98	235
5.4	Age and post-high school education, 1997-98	235
6.1	1981 primary health centre locations	288
6.2	1991 primary health centre locations	289
6.3	1996 primary health centre locations	290
6.4	Modelled primary health centres, 1981	291
6.5	Modelled primary health centres, 1991	292
6.6	Modelled primary health centres, 1996	293
6.7	Actual and modelled primary health centres, 1981	294
6.8	Actual and modelled primary health centres, 1991	295
6.9	Actual and modelled primary health centres, 1996	296
6.10	1981 community health centre locations	297
6.11	1991 community health centre locations	298
6.12	1996 community health centre locations	299
6.13	Modelled community health centres, 1981	300
6.14	Modelled community health centres, 1991	301
6.15	Modelled community health centres, 1996	302
6.16	Actual and modelled community health centres, 1981	303
6.17	Actual and modelled community health centres, 1991	304
6.18	Actual and modelled community health centres, 1996	305
6.19	1981 private doctors	306
6.20	1991 private doctors	307
6.21	Modelled locations for private doctors, 1981	308
6.22	Modelled locations for private doctors, 1991	309
6.23	Actual and modelled locations for private doctors, 1981	310
6.24	Actual and modelled locations for private doctors, 1991	311
8.1	Rail and road facilities, 1991	372
8.2(a)	Male literacy rate, 1981	373
8.2(b)	Male literacy rate, 1991	374
8.3(a)	Female literacy rate, 1981	375
8.3(b)	Female literacy rate, 1991	376
8.4(a)	Non-agriculture workers, 1981	377
8.4(b)	Non-agriculture workers, 1991	378
8.5(a)	Distance from Delhi and female literacy rate, 1981	359
8.5(b)	Distance from Delhi and female literacy rate, 1991	360

8.6(a)	Distance from Delhi and male literacy rate, 1981	361
8.6(b)	Distance from Delhi and male literacy rate, 1991	362
8.7(a)	Distance from Delhi and non-agriculture workers, 1981	363
8.7(b)	Distance from Delhi and non-agriculture workers, 1991	365
8.8(a)	Distance from Delhi and non-agriculture workers (with lowess), 1981	365
8.8(b)	Distance from Delhi and non-agriculture workers (with lowess), 1991	366

List of Tables

Table	Title	Page
1.1	Population statistics	13
1.2	Population and distance from Delhi border, 1991	14
1.3	Distribution of population size of villages	15
1.4	Population density and number of villages	16
1.5	Provisionally selected 10 villages for pilot study	17
1.6	Summary of village statistics of sample villages	19
1.7	Population and accessibility index of Sample Villages	19
3.1	Households surveyed (number of households)	86
3.2	Castes and agriculture Land	88
3.3	Correlation matrix (income related variables)	106
4.1	Number of schools in India, 1951-95 (thousands)	113
4.2(a)	Development revenue and capital expenditure (Rs. 10,000,000)	116
4.2(b)	Development revenue and capital expenditure (%)	116
4.3	Annual growth in development revenue and capital expenditure at 1980-81 constant prices(%)	117
4.4(a)	Government and non-Government primary, middle, high and senior secondary schools	118
4.4(b)	Annual growth in Government and non-Government primary, middle, high and senior secondary schools (%)	118
4.5(a)	Number of students in primary, middle, high and senior secondary Government and non-Government schools	118
4.5(b)	Annual exponential growth rate of school children (%)	119
4.6(a)	Number of teachers in primary, middle, high and senior secondary Government and non-Government schools	119
4.6(b)	Annual exponential growth rate of school teachers	119
4.7	Student/pupil ratio in Government and non-Government schools	120
4.8	Annual exponential growth rates 1980-81 to 1990-91 (%)	120
4.9(a)	Number of middle schools	121
4.9(b)	Number of middle schools (%)	121
4.10	Population per middle school	122
4.11(a)	Distribution of middle schools, 1981, 1991 and 1996	123
4.11(b)	Distribution of middle schools, 1981, 1991 and 1996 (%)	124
4.12	Average distances (km) for middle schools	126
4.13	Actual and modelled locations of middle schools	127
4.14(a)	Number of high schools	127
4.14(b)	Number of high schools (%)	127
4.15	Population per high school	128
4.16(a)	Distribution of high schools, 1981, 1991 and 1996	128
4.16(b)	Distribution of high schools, 1981, 1991 and 1996 (%)	129
4.17	Average distances (km) for high schools	130
4.18	Actual and modelled locations of high schools	131
4.19(a)	Number of senior secondary schools	132
4.19(b)	Number of senior secondary schools (%)	132
4.20	Population/senior secondary school	133
4.21(a)	Distribution of senior secondary schools, 1981, 1991 and 1996	133
4.21(b)	Distribution of senior secondary schools, 1981, 1991 and 1996 (%)	134
4.22	Average distances (km) for senior secondary schools	135

4.23	Actual and modelled locations of senior secondary schools	135
4.25(a)	Government and private schools, 1992	137
4.25(b)	Government and non-Government schools, 1992 (%)	137
4.26(a)	Government and non-Government schools, 1996	138
4.26(b)	Government and non-Government schools, 1996	138
4.27	Expenditure on Government Schools in Rohtak and Bhiwani districts, 1996-97	142
4.28	Government boys high school expenditure in Kehrawar and Chuliana villages, 1996-97	143
5.1	Expectations from educating girls	194
5.2	Caste and expectations from educating girls (number of households)	195
5.3(a)	Income and expectations from educating girls (number of households)	196
5.3(b)	Income and expectations from educating girls (% households)	196
5.4	Expectations from educating boys	197
5.5	Caste and expectations from educating boys (number of households)	198
5.6	Income and expectations from educating boys (number of households)	198
5.7	People who never attended any educational institution	200
5.8	Percentage of people who never attended any educational institution	201
5.9	Number of people using/used different educational institutions	204
5.10	Percentage of people using different educational institutions	206
5.11	People aged 5 years and above using/used different educational institutions.	209
5.12	Percentage of people aged 5 years and above using/used different educational institutions.	209
5.13	Percentage of people in younger generation (5 to 20 years) using/used different educational institutions.	210
5.14	Percentage of people in older generation (20 to 50 years) using/used different educational institutions.	210
5.15	Caste and access to educational institutions	212
5.16	Income and access to educational institution	212
5.17	Village accessibility level and accessibility to educational institutions	214
5.18	Sex and accessibility to educational institutions	214
5.19a	Coding for binary variables	216
5.19b	Coding for multi-category variables	216
5.20	Accessibility to educational institution and controlling variables	216
5.21	Location of educational institution and controlling variables	217
5.22	Type of educational institution and controlling variables	218
5.23	Multi-categories of educational institutions and controlling variables	219
5.24(a)	Distance from educational institutions	221
5.24(b)	Distance from educational institutions	221
5.25	Distance from educational institutions and controlling variables	222
5.26	Distance from educational institution and its association with controlling variables	223
5.27	Controlling variables and access to educational institutions located at different distances	224
5.28	Reasons and utilisation of educational institutions for girls	226
5.29	Reasons and utilisation of educational institutions for boys	227
5.30(a)	Education level (number of people)	228
5.30(b)	Education Levels (% of people)	229
5.31	Education Levels in younger generation (% of people)	230

5.32	Education Levels in the older generation (% people)	233
5.33	Sex and education level (% of people)	235
5.34	Education level and controlling variables	236
5.35	Caste and education level (% of people)	237
5.36	Income and education level (% of people)	238
5.37	Village accessibility and education level (% of people)	239
5.38	Education level and controlling variables	240
5.39	Reasons for dropping out from education	246
5.40	Reasons for dropping out from education for Rohtak & Bhiwani Districts	247
5.41	Association between reasons of drop-out and controlling variables	247
6.1	Health Statistics, 1966-67 and 1995-96	264
6.2	Sub-centres in rural areas, Rohtak and Bhiwani District	266
6.3	Availability of sub-centre by village population, 1981	266
6.4	Availability of sub-centre by village population, 1991	267
6.5	Availability of sub-centre by village population, 1996	267
6.6	Actual and modelled distance from sub-centres (kilometres)	268
6.7	Distance from a health sub-centre (number of villages)	268
6.8	Primary health centres in rural areas, Rohtak and Bhiwani District	269
6.9	Availability of PHCs and village population, 1981	270
6.10	Availability of PHCs and village population, 1991	270
6.11	Availability of PHCs and village population, 1996	270
6.12	Actual and modelled distance from PHCs (kilometres)	271
6.13	Distance from PHCs (number of villages)	272
6.14	Actual and modelled locations of PHCs	272
6.15	Number of CHCs and population size in rural and urban Areas	273
6.16	Availability of CHCs in rural and urban areas	274
6.17	Actual and modelled distance from CHCs (kilometres)	275
6.18	Distance from a CHCs (number of villages)	275
6.19	Actual and modelled locations of CHCs	276
6.20	RMPs and population size in rural areas	277
6.21	Availability of RMPs, 1981 (Rural and Urban)	277
6.22	Availability of RMPs, 1991(Rural and Urban)	278
6.23	Availability of RMPs and distance from the nearest town, 1981	278
6.24	Availability of RMPs and distance from the nearest town, 1991	279
6.25	Actual and modelled distance from RMPs (kilometres)	280
6.26	Actual and modelled locations of RMPs	280
6.27	Expenditure on general Government health services, 1996-97	283
6.28	Expenditure on general Government health services, 1997-98	283
7.1(a)	Source of treatment and minor illness (Number of households)	315
7.1(b)	Source of treatment and minor illness (% households)	316
7.2(a)	The first reason for using health service	317
7.2(b)	The first reason for using health service	318
7.3(a)	The second reason and source of treatment	319
7.3(b)	The second reason and source of treatment	319
7.4	Illness during the last six months	321
7.5	Type of disease people suffered from during the previous six months	322
7.6(a)	Treatment source	323
7.6(b)	Treatment source	324
7.7	Sex and source of treatment	325
7.8	Caste and source of treatment	325

7.9	Income and source of treatment	327
7.10	Village accessibility and source of treatment	328
7.11	Source of treatment and controlling variables	328
7.12(a)	Reasons and source of treatment (number of patients)	330
7.12(b)	Reasons and source of treatment (% of patients)	330
7.13(a)	Distance from the source of treatment used (kilometres)	332
7.13(b)	Distance from the source of treatment used (kilometres)	332
7.14(a)	Accompanied to treatment source (number of patients)	333
7.14(b)	Accompanied to treatment source (% of patients)	334
7.15	Distance from treatment source and patients' company (number of patients)	334
7.16	Distance from treatment source and patients' company (% of patients)	335
7.17	Patient's company and controlling variables	335
7.18	Expenditure and treatment source	336
7.19	Treatment outcome.	336
8.1	Availability of bus and rail stations.	350
8.2	Distance from the nearest main road	352
8.3	Distance from the nearest rail station	353
8.4	Distance from the nearest town with more than 25,000 people	353
8.5(a)	Average literacy rate (%)	354
8.5(b)	Average literacy rates (%)	355
8.6	Workforce participation rate (%)	356
8.7	Non-agricultural workers (%)	357
8.8	Controlling variables and literacy rates and non-agricultural workers	358
8.9	Female literacy rate and controlling variables	360
8.10	Male literacy rate and controlling variables	362
8.11	Non-agricultural workers and controlling variables	364
8.12	Average non-agricultural workers and availability of rail and bus station (Per cent)	366
9.1(a)	Availability of private conveyance	381
9.1(b)	Availability of private conveyance	381
9.2(a)	Number of vehicles in each household (Number of households)	382
9.2(b)	Number of vehicles in each household (% households)	382
9.3(a)	Income and private conveyance (Number of households)	383
9.3(b)	Income and private conveyance (% households)	384
9.4	Private conveyance and controlling variables	385
9.5(a)	Land and private conveyance (households)	386
9.5(b)	Land and private conveyance (% households)	387
9.6(a)	Caste and private conveyance (households)	388
9.6(b)	Caste and private conveyance (% households)	388
9.7	Private conveyance and controlling variables	389
9.8	Private conveyance and controlling variables (when bicycle is included in non-availability)	389
9.9	Private conveyance and controlling variables (multinomial logistic regression)	390
9.10(a)	Number of vehicles (households)	392
9.10(b)	Number of vehicles (% households)	392
9.11(a)	Income and number of vehicles	393
9.11(b)	Income and number of vehicles	393
9.12(a)	Caste and number of vehicles per household	394

9.12(b)	Caste and number of vehicle per household	394
9.13	Number of vehicles and controlling variables (regression results)	394
9.14	Age and frequency of visits (% people)	396
9.15(a)	Frequency of visits during the last 30 days (number of people)	396
9.15(b)	Frequency of visits during the last 30 days (% of people)	397
9.16	Frequency of visits and its association with gender, education level, village accessibility and income	398
9.17(a)	Gender and frequency of visits (number of persons)	399
9.17(b)	Gender and frequency of visits (% of persons)	399
9.18(a)	Education levels and frequency of visits (Number of people)	400
9.18(b)	Education levels and frequency of visits (% of people)	401
9.19(a)	Village accessibility and frequency of visits (Number of people)	402
9.19(b)	Village accessibility and frequency of visits (% of people)	402
9.20(a)	Income level and frequency of visits (number of people)	402
9.20(b)	Income level and frequency of visits (% of people)	403
9.21	Frequency of visits and controlling variables	404
9.22(a)	Place visited (number of visitors)	405
9.22(b)	Place visited (% of visitors)	405
9.23	Gender and place visited (% of visitors)	406
9.24(a)	Gender and purpose of visits (number of visitors)	407
9.24(b)	Gender and purpose of visits (% of visitors)	408
9.25(a)	Purpose and place of visit (number of visitors)	409
9.25(b)	Purpose and place of visit (% of visitors)	409
9.26(a)	Frequency and purpose of visit (Number of visitors)	410
9.26(b)	Frequency and purpose of visit (% of visitors)	410
9.27(a)	Distance travelled (number of visitors)	411
9.27(b)	Distance travelled (number of visitors)	411
9.28(a)	Mode of transportation used (number of visitors)	413
9.28(b)	Mode of transportation used (% of visitors)	414
9.29(a)	Time of departure and arrival (number of visitors)	415
9.29(b)	Time of departure and arrival (% of visitors)	415
9.30	Gender and time of departure and arrival (% of visitors)	416
9.31	Gender and company during the visit (% of visitors)	417

List of Plates

Plates	Title	Page
1.1	Rail station, village Kehrawar	21
1.2	Government girls senior secondary school, Kehrawar	21
1.3	Primary Health Centre, Kehrawar	24
1.4	Fertiliser and cement store, Kehrawar	24
1.5	Degraded approach road between Diwana and Chuliana	26
1.6	Passengers waiting for a private bus to start	26
1.7	An abandoned Government dispensary, Brahana	28
1.8	Private clinic, Bapora	28
1.9	Gramin (rural) bank, Bapora	29
1.1	A chemist store, Bapora	29
1.11	Main village road, Bapora	30
1.12	Open sewer, Bapora	30
1.13	Overflowing tap water, Bapora	33
1.14	Unmade street, Dhani Mansukh	33
3.1	Village headman and villagers, Bhera	87
3.2	Villagers playing cards, Bapora	87
4.1	A private three wheeler on Bapora-Bhiwani road	149
4.2	A private bus and a jeep on Kehrawar-Rohtak	149
5.1	A woman and a girl fetching drinking water	243
5.2	A woman bringing fodder, Bapora	244
5.3	Government boys high school, Chuliana	255
5.4	Private school Bapora	255
7.1	Open space, Bapora	343
7.2	Tap-water supply, Bapora	343
8.1	Damaged road (under construction) on Bhiwani-Loharu Road	351
9.1	A private three wheeler on Bapora-Bhiwani road	351

ACKNOWLEDGEMENT

This work has been possible from the financial support received from Overseas Research Student Award of Committee of Vice-Chancellors and Principals of the Universities of United Kingdom, Durham University (through Research Studentship), Department of Geography, University of Durham, The Harold Hyam Wingate Foundation, Sir Richard Memorial Trust and The Dudley Stamp Memorial Trust.

I place on record my sincere thanks to the Government of Haryana, Deputy Commissioners, Chief Medical Officers and District Education Officers at Rohtak and Bhiwani districts for their direct and indirect support for primary and secondary data collection. I am also grateful to Dr. Ramehar Singh Punia, Mr. Raj Kanwar Bhardwaj, Ms. Kamlesh for assisting me in primary data collection and organising my informal discussion with villagers. My sincere thanks go to the villagers Kehrawar, Chuliana, Diwana, Brahana, Bapora, Bhera, Patodi and Dhani Mansukh for their open hearted welcome and active support in primary data collection.

I express my deep gratitude to my three supervisors Dr. Peter J. Atkins, Dr. Ian S. Evans, and Dr. Chris Dunn for their consistent and prompt support, guidance, and criticism. They were available to me any time I needed their help. I am grateful to Dr. Nicholas J. Cox for his advice in data analysis and for installing the latest version of Stata on my laptop.

Thanks are also due to Chris Mullaney, Mark Scot and Jody Welsh for extending me IT support. I would also like to thanks all other teaching and non-teaching members of Geography Department for their direct and indirect support.

I wish to thank my Mum and Dad for their moral and family support. My thanks are also due to my friends, Satish Kumar and Jayati Sinha for academic assistance. I also thank Ms. Punitha and Mr. Paul for being good friends in Durham.

Finally, my special thanks to Ms. Angelina M. Bailey for extending moral and emotional support.

Chapter-1

INTRODUCTION AND STUDY AREA

1.1 INFRASTRUCTURE AND DEVELOPMENT

This research focuses on the provision of three basic infrastructure services, namely education, health and transport, in Rohtak and Bhiwani Districts of Haryana (INDIA) with different levels of development. Secondary data (for three points of time; 1981, 1991 and 1996) are used to examine the availability of and geographical accessibility to education, health and transport. However, social and economic accessibility to and utilisation of these services is based on primary data collected in the field from August 1997 to May 1998. Extensive informal discussions with villagers and service providers were also organised in order to understand the operation, maintenance and monitoring of the available services. Before we proceed further it will be useful to discuss the importance of infrastructure services in a development context.

The term infrastructure[1] was used widely by military strategists to indicate the wide ranging war logistics in use during the Second World War (Ahmed and Donovan, 1992). At present, this term is used quite frequently and connotes different meanings in different contexts. Johnston et al (1996, 489) define infrastructure as 'the underlying structure of services and amenities (social overhead capital) needed to facilitate directly productive activities' such as public services, transport, public utilities, public environmental institutions, public environment installations, human capital investment and social and community facilities[2]. The provision of infrastructure services is considered to have a wider role to play in the overall process of development, and some researchers argue that infrastructure is essential for development (Wanmali and Islam, 1995). Therefore, the investigation of development literature helps to understand infrastructure development.

---

[1] The term infrastructure was also discussed in classical Marxism to emphasise the significance of material practice and the structures of production of material life in giving rise to political and legal systems and in shaping ideas (see Marx, 1968; Godelier, 1978).

[2] See Chapter-2 for a detailed discussion of the type of infrastructure services and their impact on social and economic conditions of people.

Sen (1996) raises two questions 'why do we seek development'? And 'what can it achieve if fruitful'? Human welfare is usually considered to be the ultimate objective of any development process. After the Second World War (even until recently), the lower income countries were and are characterised by the low levels of per capita income, low resource productivity, non-availability of modern technology, lack of skill and training, and burgeoning population. The outcome of this is seen in the widespread existence of illiteracy, poor health, unemployment and hence poverty. Under the influence of international funding organisations, the process of development based on the experiences of the West was initiated in the Developing Countries in the 1950s, with the major emphasis on economic growth because that was seen as the only remedy for poverty alleviation.

The provision of infrastructure services was considered a precondition for economic development[3] (Hirschman, 1958; Hodder and Lee, 1974). Infrastructure development can 'deliver major benefits in economic growth, poverty alleviation, and environmental sustainability, but only when it provides services that respond to effective demand and do so efficiently' (World Bank, 1994, 2). It is clear from the existing literature that (in the 1950s, 60s and 70s) the ultimate objective of infrastructure provision[4] was economic development and economic growth was seen as 'an activist interventionist strategy' to eradicate poverty; economic growth would enable the Government to mobilise resources out of incremental income for further investment on social expenditure on health, education and other basic services. During the last two decades, social scientists have started to examine the impact of the development approach by asking the questions: 'what has been happening to poverty, to unemployment, and to inequality?' Seers (1979) argues that if the three of these have become less severe, then it is beyond doubt that this has been a period of development; but if one or

[3] Williamson and Milner (1991) define economic development as the process by which a traditional society employing primitive techniques and therefore capable of sustaining only a modest level of per capita income is transformed into a modern, high technology, high-income economy. The process involves the replacement of labour intensive subsistence production by techniques that use capital, skilled labour, and scientific knowledge to produce the wide variety of different products consumed in an affluent society (p.283).

[4]Provision of infrastructure services generates external economies and widespread benefits. The cost reduction occurs through the interaction of infrastructure with directly productive inputs of firms or farms...numerous discrete studies have concluded that infrastructure has always played an indirect (role) in economic growth and the overall development process (Wanmali and Islam, 1995). Infrastructure plays a strategic role in producing large multiplier effects in the economy with agricultural growth, for example, in India (Mellor, 1976).

two of these central problems has grown worse it would be strange to call this a period of development, even if per capita income has soared.

In most of the Developing Countries, poverty, hunger, unemployment, and inequalities in opportunities have grown along with economic growth, and this has challenged the process of 'development'. Some researchers explain development failure in terms of a lack of public access to basic infrastructure services such as education, health and social security (Drèze and Sen, 1995; World Bank, 1990). The widespread effects of development compelled the policy makers and social scientists to rethink their planned priorities and development strategies. Recently, various 'development approaches' have been suggested and followed, extending from the bottom-up approach to people's empowerment.

Growth with equity was set as one of the major themes of the development approach[5], which started with the 'basic needs approach' at the beginning of the 1980s. Drèze and Sen (1995) link the strategy of development to something fundamental, say, equitable social and economic development. While discussing 'some fundamental ends of development', they quote Pandit Jawaharlal Nehru's (the first Prime Minister of India) famous speech 'tryst with destiny' on the eve of independence where he emphasised that '***the task ahead for the nation includes ending of poverty, ignorance, disease and inequality of opportunities***'[6]. Sen argues that successes and failures of the development process in India must be examined by evaluating the tasks Nehru set for the country five decades ago. The central feature of the development process must be the expansion of real freedom that citizens enjoy to pursue the objectives they value and that bring the expansion of human capability[7] and real opportunities, which can further be associated with people's empowerment[8].

---

[5] The bottom-up approach (also known as the basic needs approach) was recognised as an appropriate strategy for meeting the needs of the poor as against the top down strategy, which has limited linkage-effects and impact on poverty eradication (Stohr, 1981).

[6] Jawaharlal Nehru's speech at Constituent Assembly, New Delhi on 14th August, 1947; reprinted in Gopal (1983), 76-77.

[7] Capability refers to the alternative combinations of functionings from which a person can choose. The notion of capability is essentially one of freedom- the range of options a person has in deciding what kind of a life to lead (Nussbaum and Sen, 1993).

[8] In a real sense, empowerment means giving power to the people to choose the kind of development they want and to choose the support and services they need for themselves (Menike, 1999).

Here, we need to raise another important question: do all people have real opportunities, and are they capable of choosing what they need?' The answer to this question can be traced in Drèze and Sen's (1995) evaluation of the development process in India. They argue that even with some of the remarkable achievements (such as a declining death rate, improved nutrition characteristics, better protection from illness and declining poverty) India has a long way to go, as a large section of the society is still illiterate, living below the poverty line, lacks access to health and social security; and hence is deprived of real opportunities and real freedom. This leads us to raise another question: 'how can the real opportunities and capability be expanded?' Poverty is considered to be one of the important determinants of capability deprivation[9]. Economic growth (through the expansion of gross national product, GNP) will increase average income. Rapid growth should succeed in 'pulling up' the poor through widening the production base and through the provision of productive employment[10]. Lewis (1955) concentrated on the growth of per capita income as an appropriate objective of development, because this will provide people with greater control over their environment and thereby increase their freedom. Drèze and Sen (1995) argued that the impact of economic growth on human capabilities can be extremely variable (between the 'haves' and 'have-nots') depending on the nature of that growth; he emphasizes the need to judge the different policies and their impact on the enhancement of human capabilities that the citizens enjoy (whether or not this comes about through the growth of real incomes). The success of development programmes cannot be judged merely in terms of their effects on incomes and outputs, and must, at a basic level, focus on the lives that people can lead.

Accessibility to education and health can contribute (directly and indirectly) to enhance people's capabilities and expanding the opportunities and hence freedom of choices. Drèze and Sen (1995, 14-15) list five ways in which education and health can expand people's freedom:

- Being educated and healthy are valuable achievements and to have them can be of direct importance to a person's effective freedom.

[9] Drèze and Sen's (1995) refers to a deprivation of capabilities in the lack of freedom to live a normal span of life (i.e. premature mortality), or lack of freedom to read or write.

[10] Bhagwati (1988) prefers to use the term 'pull-up' rather than 'trickle down', because improvement in the status of poor is not a favour as implied in the trickle down (benign neglect), but it is the process that enables them to participate in the production process through the availability of gainful employment.

- A person's education and health can help him/her to do many other things such as getting a job and making use of economic opportunities; and income expansion can add to a person's freedom to function in the way he/she values.
- Education can facilitate discussion of social needs and encourage informed demands for other services, such as health care and social security; these in turn can help to expand facilities that the public enjoys and contribute to the better utilisation of the available services.
- Expansion of schooling can reduce the distressing phenomenon of child labour.
- Greater educational achievements of disadvantaged groups can increase their ability to resist oppression and to organise politically, and to get a fairer deal. Education may also contribute to the reduction of gender-based inequalities.

Many of the ingredients of a good quality of life, including education, health, and elementary freedoms, clearly do have instrumental roles in making us more productive and helping us to generate more outputs and incomes. Sen (1996) argues that:

> *Economic success must be valued only as means to deeper ends. It would, therefore, be a mistake to see the development of education, health care and other basic achievements only or primarily as expansions of 'human resources'- the accumulation of 'human capital'- as if people were means of production and not its ultimate end. The bettering of human life does not have to be justified by showing that a person with a better life is also a better producer* (p. 6).

Recent development literature reveals that people's empowerment is an inseparable objective of the development process. People's empowerment requires poverty alleviation, increases in income and the expansion of their capabilities and freedom of choice, which cannot be attained without the effective provision of basic infrastructure services, such as education, health and social security; and *these services can be said to be a means to an end i.e. people's empowerment.*

This research will focus on the role of availability of, accessibility to, and utilisation of basic public infrastructure services[11] (education, health and transport). The terms availability, accessibility and utilisation of services are inter-related and are used frequently. Therefore, it is necessary to define them here. ***Availability*** of a public service implies its physical existence over space; and its utilisation by one individual does not restrict utilisation by another individual. For example, if a service is available at a distance of 150 kilometres and people are not able to use it due geographical distance or some other reasons, it means that this service is available but not accessible. ***Accessibility*** can be defined in terms of people's capability to use an available service as and when they need it. Based on the factors governing access to services, accessibility can be divided into two categories: (a) geographical accessibility (measured in terms of topological distance, travel time and travelling cost) and (b) social and economic accessibility (measured in terms of social status and paying capacity). Accessibility is closely associated with utilisation. The utilisation of a service is possible only if it is accessible geographically, economically and socially. Although both terms differ in a literal sense, they have been used inter-changeably in the context of economic and social accessibility.

The chosen study areas are two districts, namely Rohtak and Bhiwani, of Haryana State in north west India. It may be remarked that various factors produce geographical variations in the distribution of public services such as variations in the population's needs and demands for services, locational variations in political ideology, and jurisdictional partitioning, etc. (Johnston, et al, 1996). Economically more developed regions and urban areas (even in the Developing Countries) enjoy a sustained level of infrastructure investment compared to those of less developed and rural areas (Binswanger et al, 1989; Bromley, 1983; Epstein, 1962; Schatzberg, 1979; Wanmali and Islam, 1995). Therefore, the study of public services over space is an important aspect of the 'geography of public services'[12]. The public services most

[11] Public services differ from non-public services (provided by the independent or 'private' sector) because they are part of the collective consumption through which services are organised and managed by the state-operated system. They are financed at least partly by the consumer according to non-market criteria such as the need for services, rather than by market criteria such as the ability to pay (Johnston, et al, 1996, 489). Government services and public services are used interchangeably in the present work. Private services are also included in this work, but not in detail.

[12] A large number of studies in the Geography of Public Services deal with the questions of spatial, economic and social accessibility. This must be seen in the context of the wider social and economic structure of society and explanations of the geography of public services as informed by theories concerning social process, such as the mode of production, gender and race relations (Johnston, et al, 1996).

widely studied by geographers are: education and health, the non-medical caring services and public housing, and the major public utilities such as roads, railways, power systems, etc. (Johnston et al, 1996).

Although the major focus of the present study is on public (Government) services in rural areas, due attention will also be paid to private services. For private services, especially education and health, cater to the needs of a significant proportion of the population in rural as well as in urban areas. Moreover, there is a sharp contrast between public and private provision of services. Public services should aspire to (1) a just distribution of resources and opportunities (equality and equity) for all members of a society and (2) the extent to which the distribution of public resources and the level of public-service provision, accessibility and use correspond to socially acceptable definitions of need and eligibility (Johnston et al, 1996). Unlike public services, private services are generally available in the developed and urban areas and are accessible to richer people. These services respond effectively to the demand of those who can afford to pay for the cost of utilisation of these services.

In the Developing Countries, the public services are often in a more basic state, and the important issues are concerned with how the limited state resources can be appropriately used and developed to protect and improve the welfare of the population. One of the important tasks of the planning process in India has been to provide basic infrastructure services, but these are concentrated more in urban as compared to rural areas (especially in remotely located villages).

In Haryana State (selected for the present study), much attention has been paid to the provision of transport, electricity and irrigation[13] in rural areas (especially after the state's separation from Punjab in November 1966), that gave a great boost to Haryana's economy after the 'Green Revolution', but it had a limited impact on poverty reduction and inter-regional disparities. Inter-personal income disparities widened; and still a large number of villages are deprived of the effective provision of basic services such as education, health, transport and drinking water. Provision (which generally refers to availability) of public

[13] Availability of these three services was very important for the introduction of high yielding variety seeds (HYVS), fertiliser, pesticides and insecticides.

services does not necessarily mean that people are able to utilise them as and when they require them. Therefore, another important focus of the present work will be on the utilisation patterns of these services. Keeping this in mind, two important questions are addressed in detail: (1) whether there is an adequate provision of public/private services (education, health and transport) in the study area, and if there is then (2) are these services catering for the needs of the people effectively and efficiently? The major issues of the present study are outlined in Section 1.2.

1.2 AIMS AND OBJECTIVES

A number of issues related to the availability of, accessibility to, and/or utilisation of the basic infrastructure services are dealt with in the present research. The major focus of the present study relates to the following issues:

- The pattern of public expenditure on the infrastructure services reveals the State's commitment to social welfare. An attempt will be made to examine development revenue expenditure on infrastructure services from 1980-81 to 1995-96 at 1980-81 (constant) and current prices. Per capita expenditure on these services will also be calculated to help in understanding the increase/decrease of expenditure in relation to population growth.
- Due to a rapid increase in population[14], the demand for public goods and services is increasing, but the number of services is not always increasing proportionately. Therefore, an assessment of per capita availability of selected infrastructure services for 1980-81, 1985-86, 1990-91 and 1995-96 is an important aspect of this study, and this may reveal the mismatch between the demand for and supply of services.
- Availability of the basic infrastructure services is considered to be a key foundation of the overall development process (both social and economic development), but many of the basic services are not available in rural areas even after five decades of planned development, because insufficient attention is paid to the provision of these services in India (even in some of the developed states of the country such as Haryana and Punjab). The availability (distributional pattern) of infrastructure services will be examined in sample villages of two selected districts for three points in time (1981, 1991, and 1996) and changes in their

[14] Annual exponential growth rate in Haryana State was 2.45 per cent during the decade 1981-91, which was above the national growth of population i.e. 2.3 per cent (Calculated from Census Data, 1991).

distribution from 1981-91 to 1991-96, with the focus on understanding the factors governing these changes.

- In many of the Developing Countries, the demand for basic (public) services exceeds supply and these services cannot be provided at each demand point, especially when the Government is suffering from a resources squeeze[15]. In such a situation, some rational criterion has to be followed for the location identification. The major thrust of the public provision of services is to make them as accessible as possible. Among other factors, geographical distance can be considered as one important measure of accessibility (Rushton, 1991; Johnston, 1996). Geographical accessibility of selected services for 1981, 1991 and 1996 is examined and an attempt is also made to work out changes in the accessibility level from 1981 to 1991 and 1991 to 1996.
- Village accessibility (measured in terms of distance from town/city, and availability and frequency of transport services) is considered to be the key determinant of social and economic conditions of the population. Examination of the impact of village accessibility on literacy rates and non-farm employment in the study area is another important aspect of the present research.
- The availability of services (even if most efficiently organised over space) does not necessarily mean that needy people are able to utilise them. Some people have better access to these services as compared to others; some others are not even capable of utilising them at all. The utilisation pattern of the selected services will be examined across different castes and income groups and for both sexes based on household survey data.
- Besides location and geographical distance, household income, caste, sex and village location are considered to have a significant impact on the frequency and type of service utilisation which will be examined in the present research.
- Another important issue under investigation is to understand people's expectations in educating their children, as these may vary. And if these expectations are not fulfilled, this may lead to frustration among educated young people.
- Different people use different types of services for the same purpose, for example some children go to Government schools and others to private schools. There could be different

[15] The Indian Government passed through a phase of economic crisis in 1991, and the Government had to adopt various measures to tackle this (economic reform in terms of liberalisation and globalisation of the economy) (A Survey of India, *The Economist*, 4 May 1991; Government of India 1995).

reasons for the utilisation of the different types of services. We will attempt to answer the questions 'what are the reasons for the utilisation of different types of services'? And 'what is the role of income, caste, sex and village accessibility in the utilisation of the different types of services'?

- The emergence of private services is a recent phenomenon in the rural parts of the study area. These services (especially school education and health) cater to the needs of a significant proportion of the population. This raises a few more questions: (1) 'why are private services becoming popular'? (2) 'Have the Government services failed to cater to the needs of the population'? (3) 'What are the differences between Government and private services'? Answers to these questions are other important objectives of this research.
- Service providers cannot be isolated from the service users, who can play an important role in the operation, maintenance and monitoring of services (particularly Government services). Based on service users' and providers' views, an attempt will also be made to answer the question: 'what could be the service users' role in the effective and efficient operation, maintenance and monitoring of the existing public services'?

1.3 STUDY AREA

Haryana has been selected for the present study (Figure – 1.1 and 1.2). The selection of this state arises mainly from two observations. Firstly, there has been tremendous economic growth[16] in Haryana since the introduction of the Green Revolution in the 1960s and this state is now considered to be one of the most economically developed states of the country (Bhalla et al, 1990 and 1999; Kumar, 1993). On examining the performance of infrastructure development, it is clear that there has already been a major emphasis on the development of economic infrastructure, particularly transport and electricity. Out of the total: 99.6 per cent and 55 per cent of villages of Haryana have electricity and transport services, respectively. Despite economic growth, a large section of the population (comprising the poor and many women) is still deprived of education and health services; and their educational level and health conditions are relatively poor as compared to other strata of society. The position of women in Haryana compares poorly with the other socially developed states of the country, such as Kerala (Kumar,

[16] In Haryana, Gross State Domestic Product grew at the rate of 5.9 per cent per annum from 1980-81 to 1995-96 (at 1980-81 prices) (Calculated from *Statistical Abstract of Haryana, 1995-96*, p. 202-03).

1993; Sen, 1996). This reflects relatively poor access of women to infrastructure services, especially to health and education.

At the time of India's independence the region of Haryana (reported 'Hariana' in the *Imperial Gazetteer* [Government of India, 1908]) was a part of Grand Punjab (a composite of three current states Haryana, Himachal Pradesh and Punjab). On 1st November 1966, Haryana was declared as a separate state under the Punjab Reorganisation Act, 1966. The name Haryana is derived from the term 'Hari' (green), as this area was always considered to be a rich and fertile green tract (Imperial Gazetteer of India, 1908). The geographical extent of this state is 27° 39' to 30° 55' 5'' north and 74° 27' 8" to 77° 36' 5" east, covering about 44,212 square kilometres and inhabited by 16.5 million people in 1991 (Census of India, 1991).

Haryana State accounts for 1.3 per cent of the total geographical area and 1.9 per cent of India's population (Census of India, 1991). Except for some hills of the Siwalik system in the north and the Aravalli system in the south, Haryana is a physiographical plain. The Haryana plain is a part of the Indo-Gangetic Plain, which was formed by the deposition of alluvial sediments transported by the Himalayan rivers. This plain includes the water divide between the Indus (flowing south west) and Ganges (flowing south east) systems. The river Yamuna, which is the western most major tributary of the Ganga system, forms the eastern border of Haryana.

On the basis of local topography and the distribution of sandy and calcareous sierozemic soils, Haryana can be divided into three broad sub-divisions: (a) Eastern Haryana Plains (northern east districts including Rohtak), (b) Western Haryana Plains and (c) Southern Haryana plains (almost all of the southern and southern-east districts) (Census of India, 1988). The soils of this plain are riverborne sand, silt and clay. The soil of the eastern districts of the state are very fertile. The climate of Haryana is semi-arid in the south-west and of 'Gangetic' type in the rest of the state. Monsoons bring rain from July to September while from October to June the weather is almost dry except for some western cyclonic depression. The southern and south-western half of Haryana State is on the dry side of the 500 millimetres isohyet. Rainfall gradually increases to 1100 millimetres towards the Siwalik Hills. The contrast in rainfall has an explicit effect on agricultural practices in different parts of Haryana. There are clear geographical diversities in this state. In the present study, two adjacent districts are

selected namely, Rohtak and Bhiwani which encompass different geographical, social and economic characteristics (Figure-1.3).

Rohtak is a part of the Eastern Plains, which are relatively fertile, while Bhiwani is located in the Western Plains, which are less fertile and are also known as 'Bhiwani Bagar', and are characterised by the 'Bagari' dialect spoken in this area. The western plains are semi-arid and less fertile as compared to the eastern plains. The western plains also include sand dunes in Bhiwani. The north-east part of Rohtak District experiences more than 500 millimetres of annual rainfall, while the whole of Bhiwani District has less than 500 millimetres. This brings contrasts in the agricultural patterns and also in the economic conditions of the two districts.

Both the districts are located to the west of Delhi Union Territory (the capital of India). Rohtak is immediately to the west of Delhi UT, while Bhiwani is to the west of Rohtak District. Selection of these two districts also arose from the need to examine the impact of the Delhi Metropolitan City on the availability of and accessibility to infrastructure services and their impact on the socio-economic conditions of people.
Socially and economically Rohtak is an advanced district, while Bhiwani is less developed. Moreover, social and cultural variations (such as dialect spoken, education among males and females, marriage practices etc.) between Rohtak and Bhiwani Districts are considerable.

Rohtak District: The history of Rohtak town dates back to AD 920 (traced from the archaeological site at *Khokra Kot* located in the north of the present town). The latitudinal and longitudinal extent of Rohtak District is 28° 19' 30" to 29° 06' 3" north and 76° 12' 45" to 76° 58' 15" east respectively, which covers an area of about 4,411 km^2 (Table-1.1). In 1901, the population of the District of Rohtak was 630,672 (*Imperial Gazetteer of India*, [Government of India, 1908]), which had increased to 1,808,606 by 1991 (Census of India, 1991).

The geographical area of Rohtak District has declined considerably, due to significant changes in the administrative jurisdictions of Rohtak since 1966. The 1991 Census states that the population density in Rohtak District is 410 people per km^2 and the sex ratio as only 851 women for every 1000 men.

Table-1.1: Population statistics

District/State	Area (km^2)	Population		1991		Annual Exponential Growth, 1981-91 (%)
		1981[17]	1991	Density (people/km^2)	Sex Ratio	
Bhiwani	5140	927338	1139718	222	880	2.08
Rohtak	4411	1516275	1808606	410	851	1.78
Haryana	44212	12922618	16463648	372	865	2.45
India	3287263	683329097	846302688	257	927	2.16

Source: Census of India, 1981 and 1991

Rohtak District is a part of the National Capital Region (NCR), which altogether has 10 districts surrounding Delhi Union Territory. This district is well developed infrastructurally. It is well connected with the national capital through rail and road transport, and National Highway no. 10 passes through this district. It has a large number of educational institutions including a Medical College, a University, degree colleges, and technical institutions. According to the 1991 census, there were five *tahsils*[18], seven towns and one city in Rohtak District (Table-1.2). Only Rohtak City and Bahadurgarh town (located nearer to the Delhi UT[19] border) had more than 50,000 people (1.3.2).

Bhiwani District: Bhiwani is located in the western part of Haryana State. The latitudinal and longitudinal extent of this district is 28° 22' to 29° 04' 35" north and 75° 28' to 76° 28' 45" east respectively. This covers an area of 5,140 km^2 and was inhabited by 1.139 million people in 1991. Before 1972, Bhiwani was a tahsil of Hissar District. It was a commercially important town of this district even before independence. This tahsil was inhabited by 124,429 people in 1901 (Imperial Gazetteer, 1908). In 1991, the population density in Bhiwani District was 222 against 410 per km^2 in Rohtak and 372 in Haryana State (Table-1.1). This district is a part of the Bhiwani 'Bagar' plains, which are relatively dry and less fertile. Therefore, agricultural

[17] 1981 population figures for Rohtak and Bhiwani Districts are adjusted according to administrative boundaries of the districts as on 1.1.1990 (*Statistical Abstract of Haryana, 1995-96*, 34).

[18] Tahsil is an administrative unit, smaller than the district. One district can have one or more than one tahsil. There is a hierarchy of administrative divisions in India. The village is the lowest administrative unit, followed by tahsil, district, state and nation (India).

[19] The total area of Delhi UT is 147.5 km^2, and approximate radius is 21.6 km. A major proportion of industries is located on peripheral areas of Delhi UT, which is further stretched to the neighbouring states. A large number of people from the neighbouring states commute to Delhi by three modes of transport, namely rail, bus and their personal conveyance. Roughly, it takes about 45 to 60 minutes to reach from the border to the Centre of Delhi by bus and about 25 minutes by train.

productivity in Bhiwani District is relatively poor as compared to Rohtak District. There were 6 tahsils in Bhiwani District in 1991. Only Bhiwani City has a population of more than 50,000 people. Bhiwani is relatively less developed infrastructurally and that might have resulted in the relatively low income, higher illiteracy and poor health. This district is located near to the border of Rajasthan State, where female education is the lowest in the whole country. In Rohtak, women's access to education and health services has helped them in revising their status, while in Bhiwani the major proportion of women still continue their traditional role. Despite considerable economic infrastructure development, the major proportion of the female population is deprived of access to basic infrastructure services.

Table-1.2: Population and distance from Delhi UT border, 1991

Town/City	Population	People/km^2	Distance[20] from Delhi (km)
Bahadurgarh (Rohtak)	**57235**	**5724**	**2.7**
Gohana (Rohtak)	32496	4946	44.2
Maham (Rohtak)	15083	4502	67.5
Beri (Rohtak)	14508	5602	29.8
Kalanaur (Rohtak)	7838	805	51.6
Jhajjar (Rohtak)	27693	4616	18.5
Sampla (Rohtak)	14524	1533	16.7
Rohak City	**216096**	**7628**	**36.5**
Bawani Khera (Bhiwani)	14159	2360	89.9
Tosham (Bhiwani)	8545	219	97.2
Bhiwani City	**121629**	**4400**	**75.1**
Loharu (Bhiwani)	9031	3487	100.7
Siwani (Bhiwani)	16107	151	125.6
Dadri (Bhiwani)	35253	6504	55.8

Source: Census of India, 1991

In 1991, there were 14 towns and cities[21] in the study area (8 in Rohtak and 6 in Bhiwani District). Out of a total of 921 villages, 31 were uninhabited[22]. The average village population was 2702 in the 1981 Census, which increased to 3263 in the 1991 Census. A great deal of variation was noticeable in the size of villages. In the 1991 Census, population varied from 5

[20] Straight line distance from the centre of town to the nearest border of Delhi Union Territory.

[21] An urban area with more than 100,000 inhabitant is defined as a city and an urban area with less than 100,000 inhabitants as a town (Census of India, 1991).

[22] Uninhabited villages may have some 'geographical area', but no population at all.

people in Para village of Rohtak tahsil to 18,305 people in Barsi village of Bawani Khera tahsil of Bhiwani District. Although the village with the largest population was located in Bhiwani District, the average village population in Bhiwani was only 2663 as compared to 3806 in Rohtak District. Figures-1.4 and 1.5 show the population distribution in both districts, for the Census years 1981 and 1991 respectively. It is interesting to observe that the majority of larger villages are located in the northern and north-eastern parts of the study area, especially in vicinity of the National Highway number 10 and along the major roads.

In 1991, there were 372 people per km^2 in Haryana State, against the national average of 257. Inter-district variations are also observable in population density. Rohtak District is densely populated as compared to Bhiwani District. In Rohtak, there were 410 people/km^2 against only 222 in Bhiwani District. Figures-1.6 and 1.7 show population density for the Census years 1981 and 1991 respectively. Within Rohtak District, the north eastern parts are more densely populated as compared to the south west.

Table-1.3: Distribution of population size of villages

People	1981		1991	
	Rohtak	Bhiwani	Rohtak	Bhiwani
	Number of villages			
Below 500	23	45	22	33
501 to 1,000	65	89	40	53
1,001 to 2,500	185	212	167	221
2,501 to 5,000	144	56	159	84
5,001 to 10,000	46	20	71	29
Above 10,000	4	1	8	3
Total	467	423	467	423

Source: Census of India, 1981 and 1991

Villages along the major roads and in the vicinity of Delhi UT show a higher population density. Almost all of the western parts of Bhiwani District report less than 280 people/ km^2, except for Loharu town. Population growth in Bhiwani was higher than in Rohtak District (Figure-1.8), which may be the result of a higher fertility rate in Bhiwani District. In Rohtak District, annual exponential growth of population was less than 2 per cent, while the figure for Bhiwani was 2.08, lower than the state and national averages.

Table-1.4: Population density and number of villages

People/km^2	1981		1991	
	Rohtak	Bhiwani	Rohtak	Bhiwani
	Number of villages			
Below 100	29	68	21	27
101 to 170	27	153	18	114
171 to 280	171	152	110	184
281 to 460	210	44	240	83
Above 460	30	6	78	15
Total	467	423	467	423

Source: Census of India, 1981 and 1991

1.4 SELECTION OF VILLAGES

The selection of Rohtak and Bhiwani Districts, which experience different levels of infrastructure development, geographical conditions and gender - and - income-based access to infrastructure services, provided some interesting results from the planning point of view. As discussed earlier, the major thrust of the present study is to examine the availability of and accessibility to infrastructure services. The data on availability came from secondary sources such as the Census of India, the Economic and Statistical Organisation (ESO) and other Government organisations. But data on infrastructure accessibility (which can be measured in various ways[23]) were not available from secondary sources. There were more than 900 villages in the two selected districts and it was not viable to conduct field surveys in all of the villages. Therefore, a sample was selected for an intensive field survey. The field survey was conducted in three stages: (a) a pilot survey, (b) a questionnaire testing survey, and (c) a structured household survey[24]. In the first stage, 10 pilot villages (5 each from Rohtak and Bhiwani Districts) were selected on the basis of a stratified random sampling technique. A development index[25] was prepared for all the villages of both districts; and then these villages were cross-classified by population size and development index; 5 villages each from Rohtak and Bhiwani Districts were then chosen randomly (Table-1.5).

[23] See chapter-2 on measures of accessibility to infrastructure services.
[24] See Appendix-1 for detailed field survey programme.
[25] See Chapter-3 for the calculation of the development index.

Table-1.5: Provisionally selected 10 villages for pilot study

Village Name	Tahsil	Development Index	Population (1991)
Rohtak			
Asauda Sewan	Bahadurgarh	62.36	2,751
Kultana	Rohtak	46.46	3,279
Chimni	Jhajjar	45.05	3,831
Birdadri	Jhajjar	21.74	68
Singhwa Khas	Maham	39.94	4,298
Bhiwani			
Rawaldi	Dadri	52.66	4,114
Dhani Mansukh	Loharu	26.61	373
Patodi	Tosam	35.25	2,062
Kitlana	Bhiwani	49.76	3,673
Bhera	Siwan	49.46	2,308

Source: Author's calculation

The 10 villages provisionally selected were visited in the first phase of the field survey. Rapid rural appraisal (RRA)[26] was used to assess the relevance of the infrastructure-related issues raised in the proposed research work. Exploratory visits[27] to the selected villages had the following objectives:

- To assess the suitability of the selected villages for an intensive field survey and rapid rural appraisal.
- To understand the priority order of infrastructure services felt by the villagers using rapid rural appraisal. This helped in structuring the scheduled questionnaire and also in determining the weights allocated to each of the selected infrastructure services.
- To make practical arrangements for the second stage intensive field survey and participatory rural appraisal.
- To conduct meetings with district planners and bureaucrats to discuss the problems, priorities and planning perspectives of infrastructure services.

[26] RRA leads to learning by outsiders in a cost-effective manner; Participatory Rural Appraisal involves effective interaction with communities and enables rural people to unravel and analyse their own situation in the ways they do not normally do (Chambers, 1992).

[27] Exploratory trips into the field can help to focus dialogue with parties concerned with regard to relevant research problems (Mikkelsen, 1995)

A pilot study was useful for the final selection of villages and for questionnaire structuring. While I was travelling and halting in villages located on National Highway number 10 and on its approach roads, I realised that the availability of main road and rail transport has a great impact on the availability of other infrastructure services. Then I came across a village, 'Kehrawar', which was located on National Highway 10 and rail transport was also available in this village. An approach road from this village leads to another three villages, 'Chuliana' at a distance of three kilometres, 'Diwana' a further two kilometres south to Chuliana, and Brahana a further three kilometres to the south of Diwana. It was noticed that the availability of infrastructure services declines rapidly as distance from the national highway increases. Besides, the availability of a rail facility (especially when it connects to a metropolitan area) has a tremendous impact on a village's economy. Keeping these two things in mind, and also population size, an effort was made finally to select four new villages, namely Kehrawar, Chuliana, Diwana and Brahana[28] in Rohtak District, along one transect.

In the case of Bhiwani District, out of the five provisionally selected, three villages (Patodi, Bhera and Dhani Mansukh) were found to be suitable for the final survey. A further village 'Bapora' was chosen from the point of view of its proximity to Bhiwani City and its population size. Keeping in mind my time and resource constraints, finally, the eight villages were selected (given in Table-1.6). During the pilot study it was realised that issues relating to the operation, maintenance and monitoring of infrastructure services were also important, along with their availability and accessibility.

The population of the selected villages varied from 373 in Dhani Mansukh to 8,553 in Bapora (Table-1.6). The villages selected can be grouped into three categories in terms of population size: small (less than 1000), medium (1000 to 5000) and large villages (more than 5000). A village accessibility index[29] was also derived. Based on this index only two villages, namely Kehrawar and Bapora were declared as 'more accessible' and the rest as 'less accessible'.

[28] See Chapter-1 for a detailed description of these villages

[29] Village accessibility index is discussed in detail in the section on methodology.

Table-1.6: Summary of village statistics of sample villages

Code	Residential Households (1991)	Population (1991)	Distance From D.H. (km)	Road Type[30]
Rohtak District				
Kehrawar	999	6383	16	4
Chuliana	651	4668	19	1
Diwana	105	810	21	1
Brahana	1152	7862	24	2
Bhiwani District				
Bhera	308	2308	48	1
Patodi	260	2062	37	2
Bapora	1293	8553	7	3
Dhani Mansukh	50	373	57	1

Source: Census of India, 1991

Table-1.7: Population and accessibility index of Sample Villages

Code	Residential Households	Population*	Accessibility Index[31]
Rohtak District			
Kehrawar	999	6383	1.517
Chuliana	651	4668	-0.035
Diwana	105	810	-0.802
Brahana	1152	7862	0.192
Bhiwani District			
Bhera	308	2308	-0.761
Patodi	260	2062	-0.502
Bapora	1293	8553	1.443
Dhani Mansukh	50	373	-1.052

* According to 1991 Census

1.5 BRIEF DESCRIPTION OF THE VILLAGES SELECTED

1.5.1 Kehrawar: The village of Kehrawar is located on National Highway number 10. This village is 16 kilometres to the east of Rohtak City and 59 kilometres to the west of the centre of Delhi metropolitan. From this village, it takes 20 minutes to reach Rohtak City by bus and 1 hour and 30 minutes to Delhi by rail or bus (Figure-1.9). This is the only village that has a

[30] Road type can be grouped in to four categories namely- 1= approach road, 2 = district highway, 3= state highway, 4 =national highway.

[31] A composite index of village accessibility was worked out (see methodology section in Chapter-3 for details). Only two villages, namely Kehrawar of Rohtak District and Bapora of Bhiwani District, have a value of more than 1. Only these two villages were considered as infrastructurally developed, while rest of the six villages were considered as less accessible.

rail facility among all of the eight selected villages (Plate-1.1). According to a key informant there were about 1600 households in this village in 1997, out of which 1000 belong to Jat, 120 to Brahmin, 100 to Backward and about 380 to Scheduled Castes. This village has a Government Girls Senior Secondary School (Plate-1.2) and a Government Boys High School. There are two recognised and two unrecognised private schools. Although this village is located along the National Highway, only two Government buses a day are available to villagers. Private transport services are available at almost any time of the day. One has to wait hardly 5-10 minutes for private transport.

One Government primary health centre (PHC) is available in this village (Plate-1.3). It has a trained MBBS (Bachelor of Medicine and Bachelor of Surgery) doctor and other necessary staff. But this facility is available to the villagers during working days only, i.e. Monday through Friday from 9 am to 5 pm. This facility does not cater for the needs of the whole village. The majority of patients have to rely on private doctors either in the village or in the towns. There are 5-6 registered medical practitioners (RMP) in the village, but these kind of doctors are not fully trained and qualified.

The availability of a rail facility has had a great impact on the economy of Kehrawar. More than 200 people from the village commute daily to Delhi Metropolitan as paid employees (either in the Government or private sector). Many other people from Kehrawar and neighbouring villages supply milk and some other perishable goods to Delhi Metropolitan (Plate-1.1). Moreover, many other services are also available in this village, such as a cooperative bank, a fertiliser, seed and pesticide store, cement and other grocery stores (Plate-1.4); and people do not have to travel to a city or a town for these items.

While surveying this village the most common problems reported by the respondents are- no sewerage system, poor sanitation, muddy and damaged streets, no street lights, water logging, shortage of common land for grazing cattle, and open field latrines. The pond water is highly contaminated and cannot be used for cattle. Earlier this was the only source of drinking water for cattle. People do not use tap-water for drinking as the water is contaminated due to the breakage of pipes in several places. In the rainy season the major proportion of the agricultural land of this village is flooded and *Kharif* (crop sown at the time of *Monsoon* rain) crops have failed for the last three years.

Plate-1.1: Rail station, village Kehrawar (people taking milk to sell in Delhi)

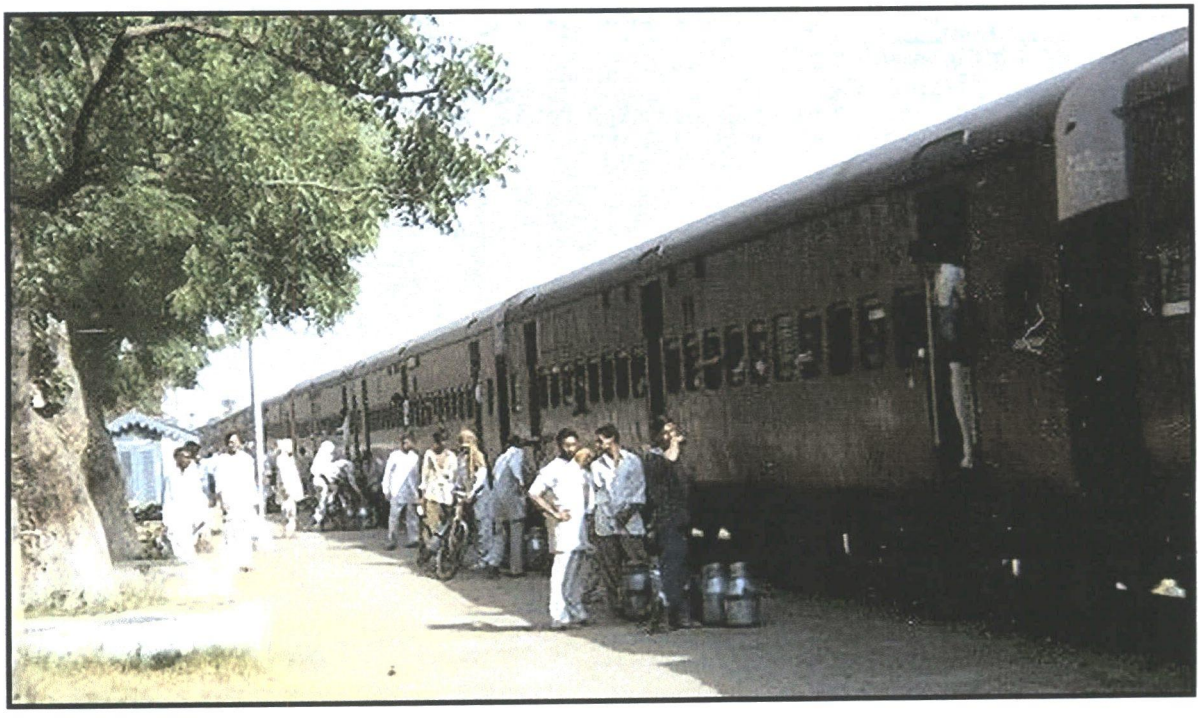
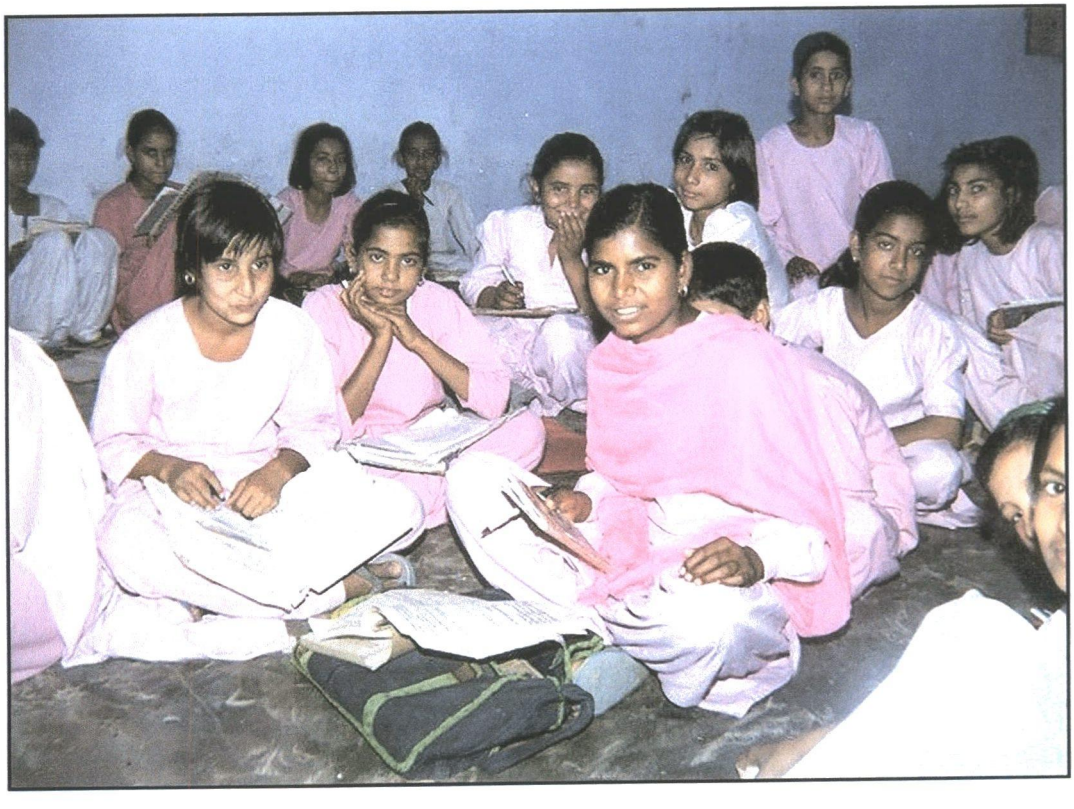


Plate-1.2: Government girls senior secondary school, Kehrawar, 1998



1.5.2 Chuliana: Chuliana is a medium sized village, with 651 residential households in the 1991 Census; out of which 358, 91 and 202 belonged to General, Backward and Scheduled Castes respectively (According to a key informant, 1997). This village is 3 kilometres to south east of Kehrawar. An approach road connects Chuliana to National Highway 10 (Figure-1.10). At the time of the survey for the present research in 1998, no Government transport facility was available in this village. People had to rely either on their own private conveyances or on private transport facilities such as three wheelers, jeeps etc. But, people often have to wait for a long period of time for private transport, or cover a distance of three kilometres on foot if they do not possess a personal conveyance.

The village has a Government high school. But a school is not available separately for girls. There are two private schools in this village and the strength of these schools is greater than Government schools. There is one Government health sub centre (HSC), which is generally engaged in family welfare, malaria programmes etc., and this centre does not cater for the needs of general patients. Only one male and one female health workers are available and there is no trained MBBS doctor. There are two RMP doctors in this village. The majority of patients have to rely on either RMP doctors within the village or Government/private doctors in a town/city.

The major problems that villagers identified were that there was no sewerage system in the village, and that streets were damaged and muddy. Pond water in the village was highly contaminated and cannot be used for cattle. This village has also experienced a scarcity of common grazing land for cattle. It was reported that some influential people have encroached some of the village's common land. People reported that 'tap water supply is not controlled and it flows uninterruptedly', which in turn causes mud in village streets. There is pipe leakage in several places. Therefore, people do not use this water for drinking purposes as it is contaminated. Villagers also reported a severe shortage of electricity supply; they hardly had 5-6 hours of electricity supply in a day.

1.5.3 Diwana: Diwana is relatively a small village. According to the 1991 Census it has only 105 residential households. According to a key informant there were 110 households in this village in 1997, out of which 65 belong to Brahmin, 20 to Jat, 5 to Backward and 20 to Scheduled Castes. Diwana is located to the south of Chuliana village (Figure-1.11). It is

connected with the same approach road that connects Chuliana to the National Highway. The distance between the National Highway and Diwana village is about 5 kilometres.

There is no mode of transport available in this village. People have to rely primarily on personal conveyances. If people do not have their own private conveyance, they either have to rely on using someone else's or walk for a distance of 2 kilometres to Chuliana. Otherwise they have to cover a distance of 5 kilometres on foot in order to reach the village of Kehrawar for transport to town or the district headquarters or to Delhi metropolitan. Many people have their own personal bicycle. They can reach Kehrawar village by bicycle and then use the bus or train to go further (Plate-1.5). Diwana has a Government primary school, but no private school. No Government health service or private doctor is available in this village. Therefore, people have to go out of the village for medical treatment.

The non-availability of health and education services (after primary education) and the non-availability of public transport are major problems for the villagers. The approach road is severely damaged (Plate-1.5). It is very difficult to use private conveyances on this road during the rainy season. Again the villagers reported that the tap water is highly contaminated and cannot be used for drinking purposes. People also reported that there was a shortage of common grazing land in the village, and people cannot rear many cattle; this has ruined the dairy farming of this village.

1.5.4 Brahana: Brahana is the second largest populated village among the eight selected villages. There were 1152 residential households in Brahana in the 1991 Census and the Jat community predominantly inhabits this village. More than 400 households belong to Scheduled Castes and only 50 households to Brahmin and 40 households to Backward Castes.

Brahana is located on the district highway between Dighal and Sampla towns. The approach road from National Highway 10 connecting Diwana also joins Brahana (Figure-1.12). The distance between Brahana and Kehrawar is about 7 kilometres. The condition of this approach road (between Brahana and Kehrawar) is very poor. That is why many people do not use this road. They generally prefer to go Sampla or Dighal towns. The Sampla road also merges into the same National Highway number 10 and it is 12 kilometres between Sampla and Brahana. Although this road is also badly damaged, it is still better than the approach road to Kehrawar.

Plate-1.3: Primary health centre, Kehrawar

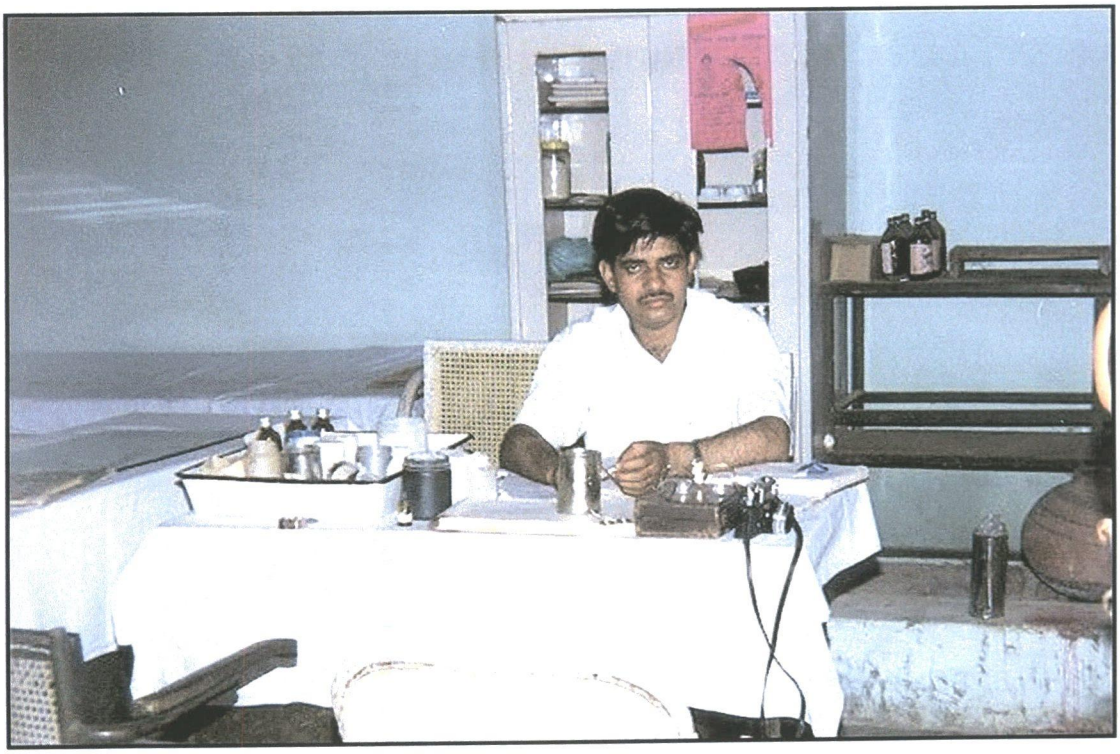


Plate-1.4: Fertiliser and cement stores, Kehrawar

Surprisingly, no Government bus service is available in this village. Although private transport services (bus, jeep and three-wheelers) are available, they are not reliable. Sometimes, people have to wait for a long time (maybe more than an hour and a half). Secondly, a private bus/jeep will not start its journey if an adequate number of passengers is not available (Plate-1.6). Generally, no mode of transport is available after 7.00 pm, which limits the villagers' accessibility to urban areas.

There are separate Government high schools for boys and girls in Brahana, and three private recognised schools. Although this is the second largest village and even bigger than Kehrawar, there is no single senior secondary school.

A Government dispensary was built two years ago, but at present it is abandoned and there is no doctor or medicine in this building (Plate-1.7). About six RMP doctors cater for the needs of the majority of patients. Some patients also visit the Government PHC at Dighal, which is about six kilometres away.

Some of the major problems of this village are a badly damaged main road, the lack of a sewerage system, and the shortage of electricity supply. Trained MBBS doctors are available but people have to travel to nearby towns to access quality health services whether Government or private. This village suffers from a shortage of canal irrigation supply and farmers have to rely on tube well irrigation. Like the other three villages, tap water is contaminated in Brahana.

1.5.5 Bapora: Bapora is the largest village in terms of the number of households and the size of its population. There were 1293 households in this village according to the 1991 Census, but the village headman reported 2000 households in this village in 1997; 850 belong to Brahmin, 700 to Rajput, 60 to Backward and 310 to Scheduled Castes. It is interesting that no households belong to the Jat caste and this is the only village with some Rajputs.

This village is located on a state highway and it is just 7 kilometres away from the district headquarters at Bhiwani (Figure-1.13). This village, therefore, enjoys an accessible location. Government and private transport facilities are frequently available until the late hours of the evening. People have to wait for 10-15 minutes for transport.

Plate-1.5: Degraded approach road between Diwana and Chuliana

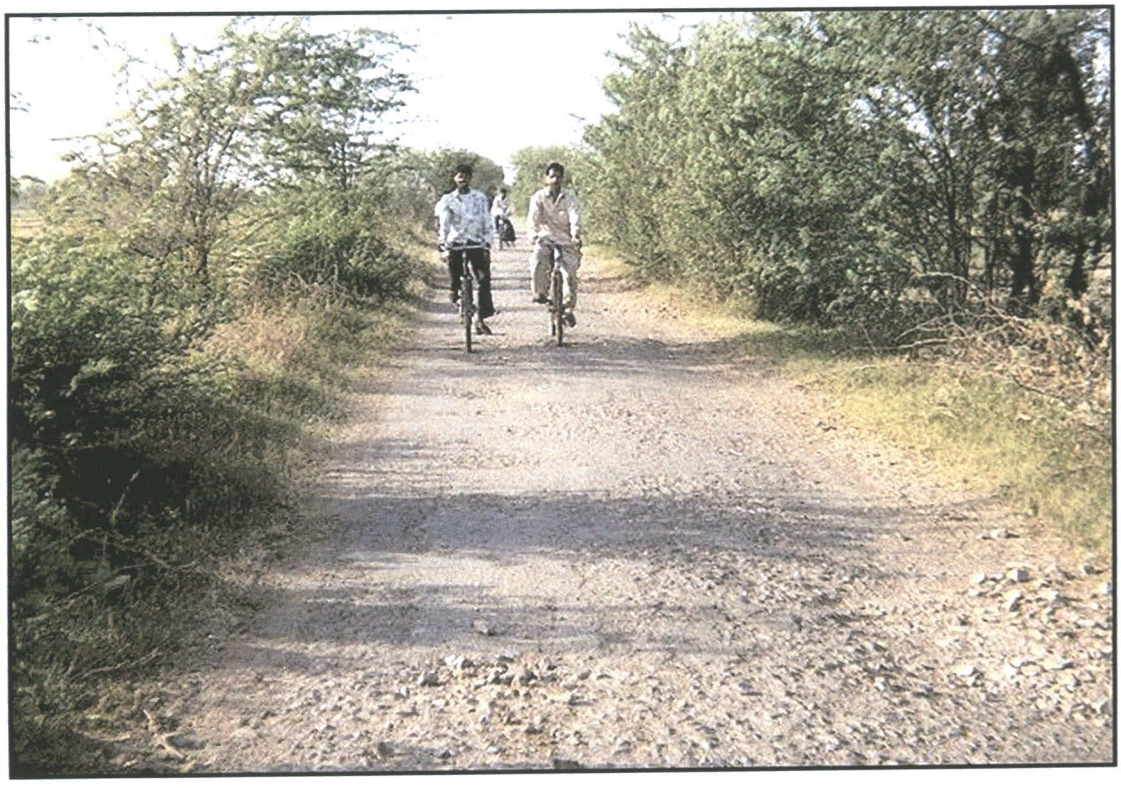
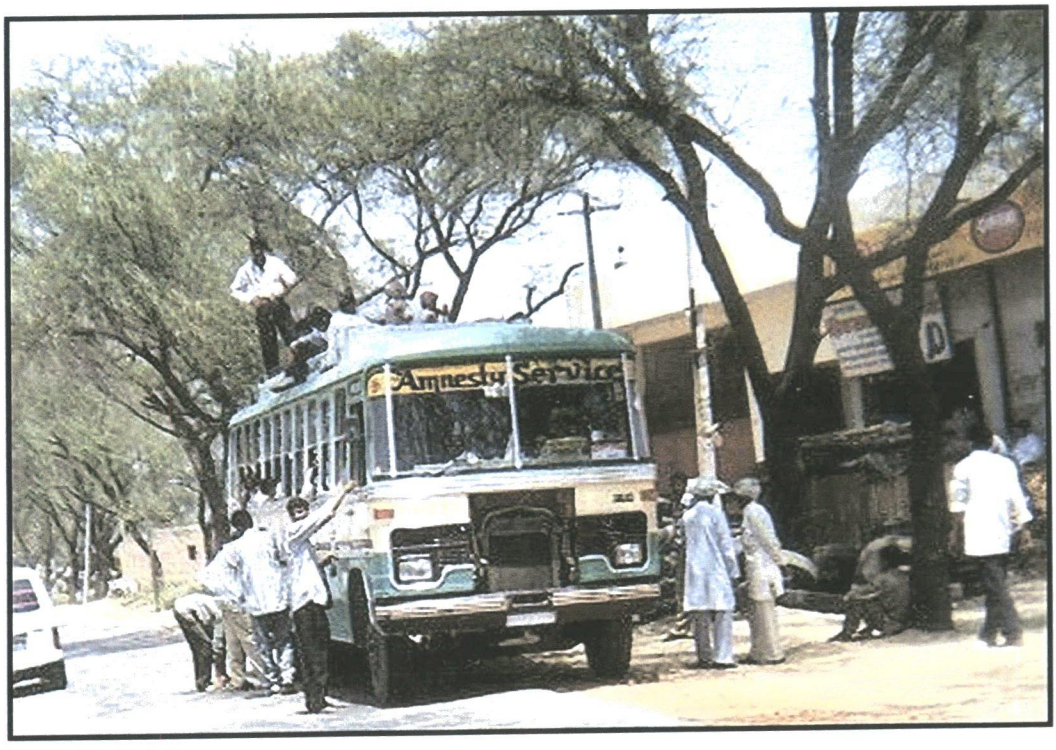


Plate-1.6: Passengers waiting for a private bus to start



There are two Government schools in this village: a senior secondary for boys and a high school for girls. Another four private schools (recognised by the Government) are also available. There is no Government-provided health facility available to the villagers, although the Chief Medical Officer at Bhiwani reported two health sub-centres in the village. Five RMPs and two trained doctors in the village cater for the needs of the majority of patients (Plate-1.8). Other services, such as a *Gramin* (rural) bank (Plate-1.9), Cooperative and grocery stores, are also available in this village. Among the eight surveyed villages, this is the only village where two Chemist stores (Plate-1.10) and a Subscriber Trunk Dialling (STD) and International Subscriber Dialling (ISD) facility is available. Moreover, a number of satellite disk antennas (for television [Plate-1.11]) are available in this village.

The villagers reported that only half of the village enjoys a sewerage facility. In the part without any sewerage, streets are degraded and full of mud (Plate-1.12). Villagers reported an uninterrupted flow of tap-water (Plate-1.13) as the main cause of damaged streets and the mud on them. Water accumulates in the low-lying areas and leads to the spread of many water-borne diseases. People in this village also suffer from the shortage of electricity and canal water supplies.

1.5.6 Patodi: This is a medium sized village, with 260 households (according to the 1991 Census). The village headman reported 349 households in this village in 1997, of which 209 belong to Upper, 68 to Backward and 72 to Scheduled Castes. This village is located on a district highway (Figure-1.14). Tosham tahsil centre is only 17 kilometres from this village and Bhiwani District headquarters is 37 kilometres away. Government bus and other private transport services on this route are available. People have to rely on private modes of transport if they need to go out of the village after 7.00 pm.

No Government health services are available here. People have to rely on the PHC at Tosham in order to access a Government health service: that is located at distance of about 17 kilometres. But many people who cannot travel out of the village have to rely on the 3 RMP doctors located within the village. One Government middle school is also available in the village; this is co-educational. There is no private school in the village, and people (who can afford) prefer to send their children to private schools located at Tosham.

Plate-1.7: An abandoned government dispensary, Brahana

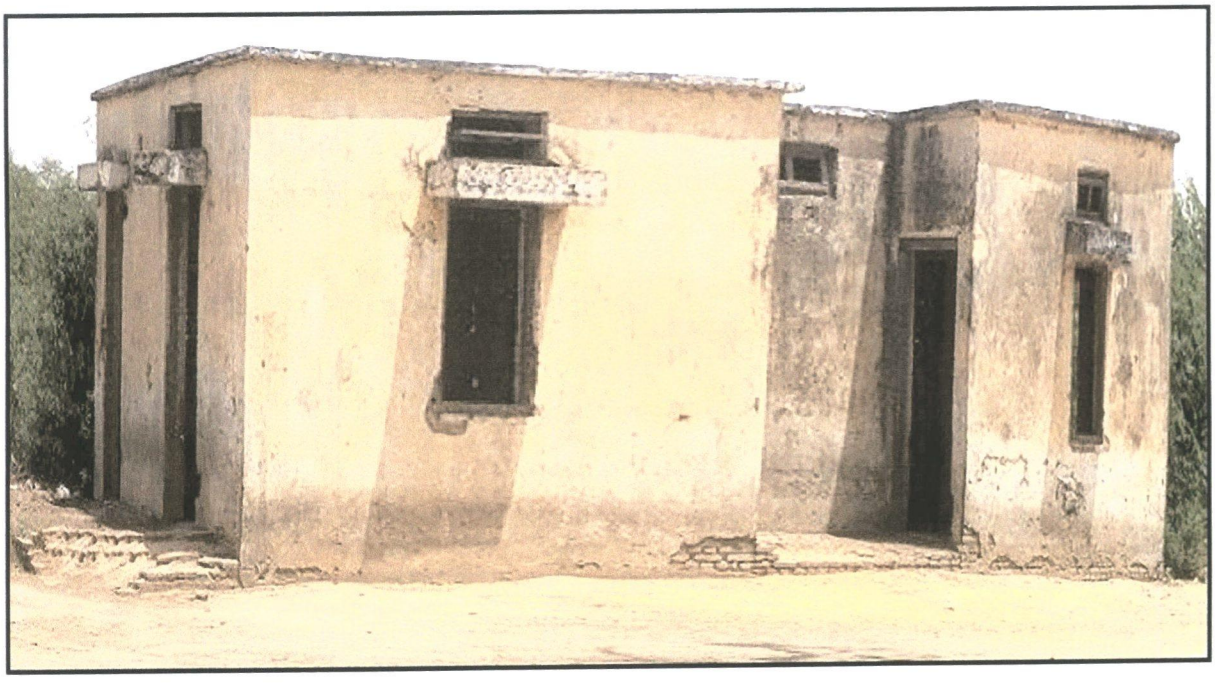


Plate-1-8: Private clinic (BMS, doctor), Bapora

Plate-1.9: Gramin (Rural) Bank, Bapora

Plate-1.10: A Chemist store, Bapora

Plate-1.11: Main village road, Bapora

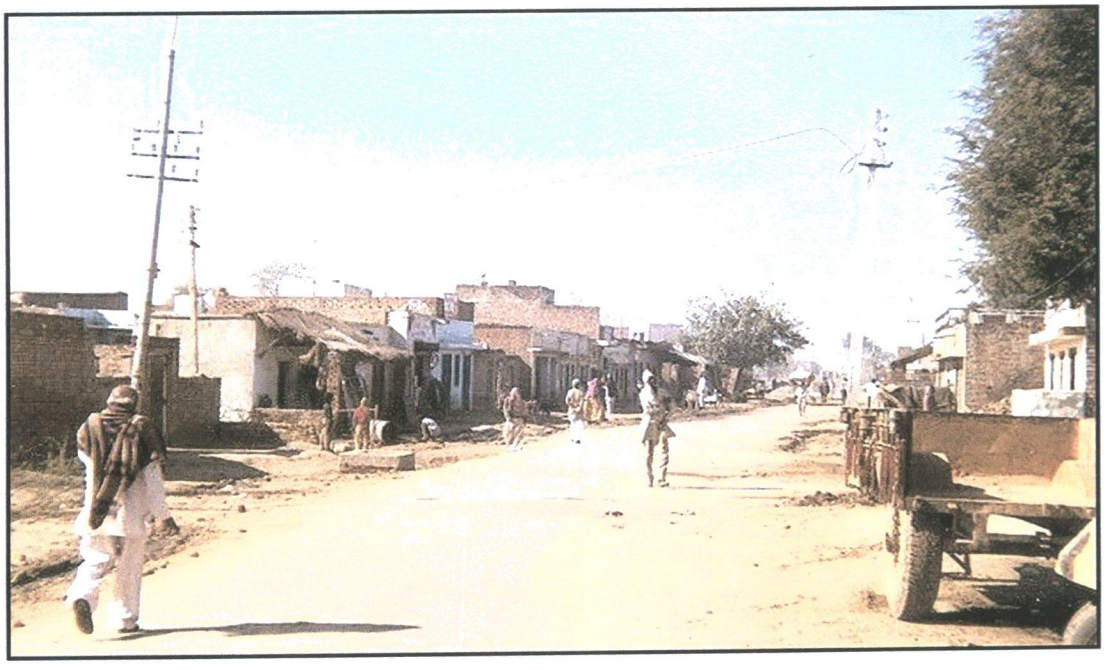
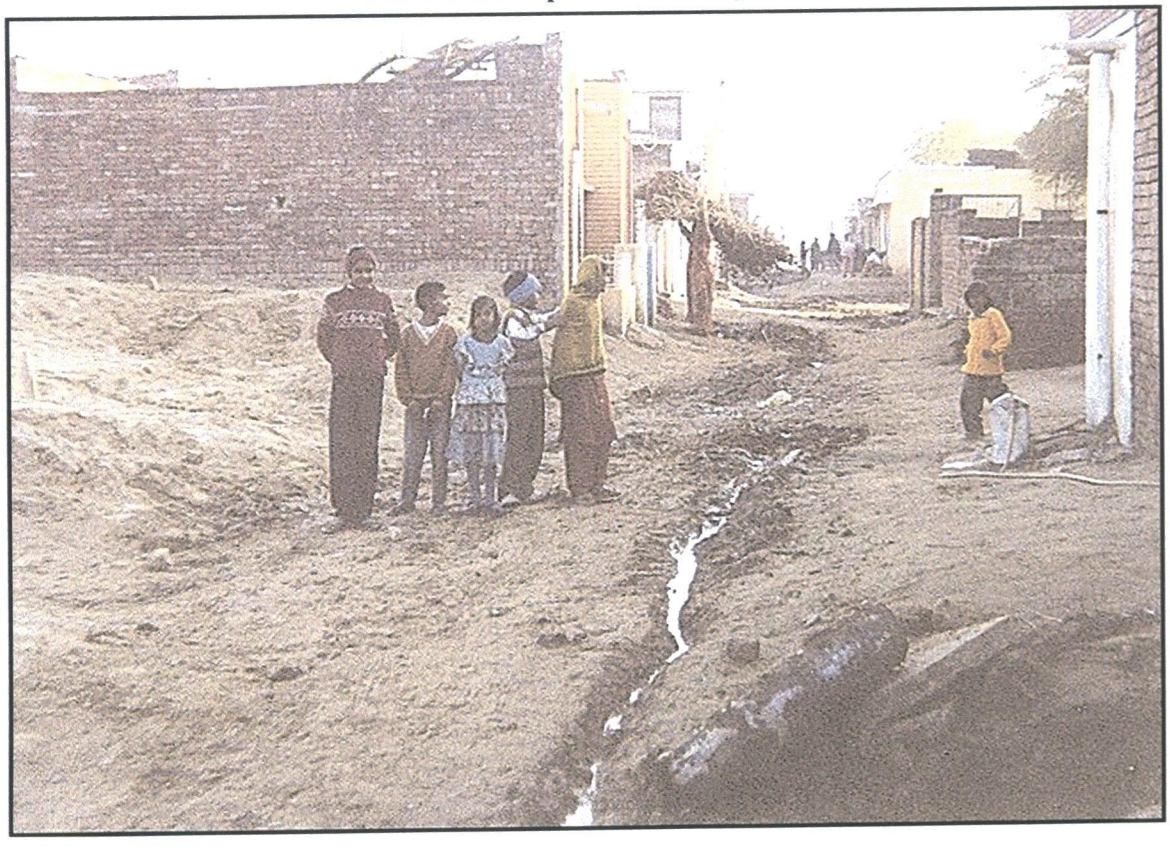


Plate-1.12: Open sewer, Bapora



Villagers reported that the school is not fully staffed. Two posts are kept lying vacant permanently. Teachers in the school do not pay much attention to the studies of the children. There is no trained MBBS doctor, and villagers have to go out of the village to access a trained doctor. This village is suffering from a shortage of electricity and the supply is not at the full voltage. There is also a shortage of drinking and irrigation water. Streets in the village are not bricked and they are muddy especially during the rainy season. There is not much common land available for villagers to graze their cattle.

1.5.7 Bhera: Bhera is a medium sized village. There were 308 residential households in Bhera in the 1991 Census. The village headman reported 475 households in 1997, of which 345 belong to the Upper, 50 to the Backward and 80 to the Scheduled Castes.

Bhera is located in Siwani tahsil of Bhiwani District. It is connected to Siwani and Tosham towns by an approach road (Figure-1.15). Bhera is 14 kilometres from Siwani Town and the distance between Bhera and the district headquarters at Bhiwani is about 48 kilometres. Both Government and private transport facilities are available in this village, but Government bus services are available only 2-3 times a day. Most people, therefore, have to rely on private transport such as three wheelers or jeeps. But there is no fixed timetable for private transport facilities. Generally no transport facility is available after 7.30 pm.

There is a Government high school for boys and girls. There is also a recognised private school in this village, but no school is available separately for girls. Bhera lacks a Government health service and people have to go either to Miran (a village located at a distance of 5 kilometres) or Siwani for health services or they have to rely on two RMP doctors in the village.

The major problem in the village is that the Government school is not fully staffed. The posts of many teachers have been lying vacant for the last two years, which forces people (who can afford it) to send their children to private schools. Secondly, people are also concerned about the lack of a Government high school for girls. Private and Government transport facilities are not reliable in Bhera. The streets are not bricked and are muddy. There is no proper arrangement for sewerage in the village.

1.5.8 Dhani Mansukh: Dhani Mansukh is the smallest of the eight selected villages. There were only 50 households in the 1991 Census. According to a key informant, there were 70 households in this village in 1997. Of these, 54 belong to the Upper and 15 to Scheduled Castes and only 1 to Backward Castes.

Dhani Mansukh is located 2 kilometres away from the state highway between Bhiwani and Loharu (Figure-1.16). The total distance between this village and Loharu is only 4 kilometres. No transport facility is available in this village. Village streets are not bricked (Plate-1.14) and these are muddy during the rainy season. Generally people have to go on foot if they do not have their own personal conveyance. In this village, only a Government primary school was available which has had only one teacher for the last two years. Villagers reported that this teacher is unavailable.

Therefore, people have to depend on either the Government or the private school located at Loharu (town). They have to travel to Loharu to access any health services.

1.6 CHAPTER SCHEME

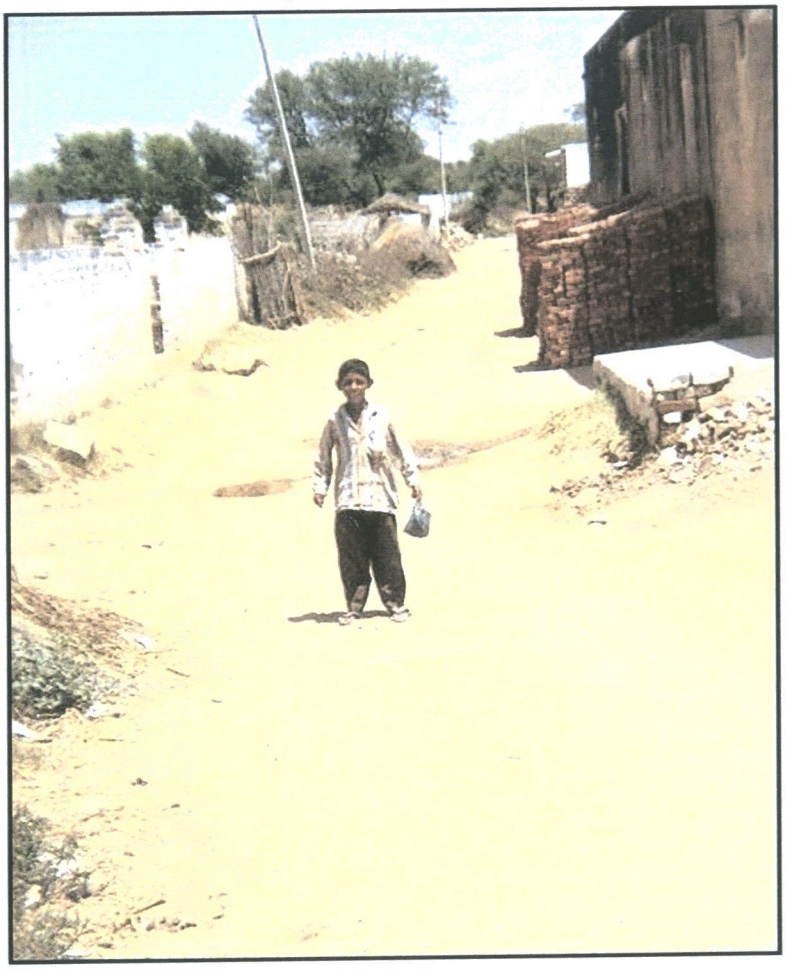
This thesis is arranged in ten chapters, which can be grouped into five sections, namely introduction, education, health, transport and conclusion. The first section comprises three chapters, namely introduction, theoretical framework, and database and methodology. The first chapter has outlined the major objectives, followed by a detailed introduction to the study area. The conceptual framework of this research and key terms used in the thesis are discussed in the second chapter.

Database and methodological issues are discussed in the third chapter, which is divided into two parts. The first part deals with the sources and types of primary and secondary data employed in the thesis. Methods used for sample selection, and for secondary and primary data analysis, are discussed in the second part of this chapter.

The second section, dealing with education, consists of two chapters. The first chapter is based on secondary data, and begins with a statistical summary of infrastructure services in Rohtak and Bhiwani Districts separately and Haryana State as a whole. This chapter begins with an introduction to the importance of education in the development process in India and the

Plate-1.13: Overflowing tap-water, Bapora

Plate-1.14: Unmade (un-bricked) street, Dhani Mansukh



Government's attempts to provide school education in rural areas (through the Five Year Plans (FYP)). The trend of development revenue and capital expenditure on education and health services is analysed in the second part. Pupil/teacher ratios are also analysed in this part (from 1980-81 to 1995-96) both for the districts and the state. The availability of and geographical accessibility to middle, high and senior secondary schools are examined in detail in the third part of this chapter. The latest data on expenditure on education are analysed in the fourth part.

The fifth chapter considers the primary data collected for the research. Both scheduled questionnaires and informal discussions are utilised in this chapter. The introduction deals with the significance of access to education. This chapter is divided into six parts. Respondents' expectations in educating their children are discussed in the first part, followed by a detailed discussion on the accessibility to and/or utilisation of school education for males and females for different age groups and castes in the surveyed villages. The type of educational institutes used and the role of income, caste and village accessibility in determining accessibility to school education are also examined in this part. Accessibility to educational institutions located at different distances and the controlling variables governing them is discussed in the third part. The reasons behind the utilisation of different educational institutions are described in the fourth part. Education levels (considered as the duration of access to education) and their controlling variables are examined in the fifth part for different age groups. Reasons for dropping out of education (which helps in understanding the constraints for accessibility/utilisation to/of education) are described in the sixth part, which is followed by some concluding remarks on accessibility to education.

The third thesis section is concerned with health, with two chapters, which are based on secondary and primary data respectively. Chapter-6 begins with an introduction to the development of modern health services, followed by the State's responsibility for the provision of essential health services (specified in the Constitution of India). Brief health statistics (number of trained doctors, health centres and expenditure) from 1980-81 to 1995-96 for Rohtak and Bhiwani Districts (separately) and for Haryana State are described in the second part of this chapter. In the third part, the focus is on the provision of and geographical accessibility level to Government provided health services, namely: Primary Health Centres (PHC) and Community Health Centres (CHC). The provision of private Registered Practitioners (RMP) in rural areas is examined in the fourth part, and private health services are compared with the Government

health services in the fifth. The latest expenditure on health services (with the break down into salaries, medicines, maintenance and other) is also analysed in this part. This is followed by concluding remarks on the provision of health services in the study area.

Chapter-7 is based on primary data and begins with an introduction to access/utilisation of health services. The type of health services used for minor illnesses (based on users' responses) and the reasons behind their utilisation are discussed in the first part. This is followed by the examination of the type of illnesses people suffered during the six months preceding the interview date. The actual source of treatment is examined in the third part, where the impact of income, caste, gender and village accessibility on the sources of treatment is examined. Reasons for the utilisation of different types of health sources are discussed in the fourth part. The utilisation of health services in relation to physical distance is analysed in the fifth part. The patient's companions to the treatment source, expenditure on the utilisation of health services and the outcomes of treatment are examined in the sixth, seventh and eighth parts, respectively of Chapter-7, followed by a conclusion.

The fourth section, which again comprises two chapters, is on the provision of transport and village distance from the nearest market, town, city and the district or state highways, and their impact on literacy and non-agricultural employment. The eighth chapter is based on secondary data and begins with an introduction to the significance of transport services in the rural economy. The availability of transport services, namely rail and road, is examined the second part. Village distance from the nearest main road and rail stations is also analysed in this part. The third part starts with the examination of the availability of transport services (rail and road) and distance from the nearest road, rail station and Delhi UT, and their impact on literacy rates and non-agricultural employment. Among these variables, distance from Delhi was found to have the most significant impact on male and female literacy rates and non-farm employment, which is examined in the third part. The final part contains a review of the findings of this chapter.

The ninth chapter is based on primary data on the utilisation of transport services. After the introduction, some basic questions are then raised to be answered in its subsequent parts. In the first part, the availability of private conveyances (in the surveyed households) is discussed. The impact of controlling variables, namely income, caste and village accessibility on the

availability of these personal conveyances is examined. The number of vehicles and the impact of controlling variables on them are examined in the second part. In the third part, an attempt is made to explore the frequency of male and female visits out of the village during the month before the survey date: this can be considered as a measure of access to transport. The impact of controlling variables on the frequency of visits is examined in the same part. The places visited and the purposes of visits are analysed for both sexes in the fourth and fifth parts respectively. Distance travelled and the mode of transport used during the last visit are discussed in the sixth and seventh parts. The time of arrival and departure is analysed in the eighth section, followed by the investigation of 'whether the subject was accompanied by someone during the visit or not'.

The fifth section has only one chapter, where the findings of the results are summarised and discussed. Issues related to the qualities of services are also discussed in this chapter, followed by a detailed discussion of the operation, maintenance and monitoring of Government/private services from the point of view of service users and providers. The policy implications of the present research are discussed in the final part of this chapter.

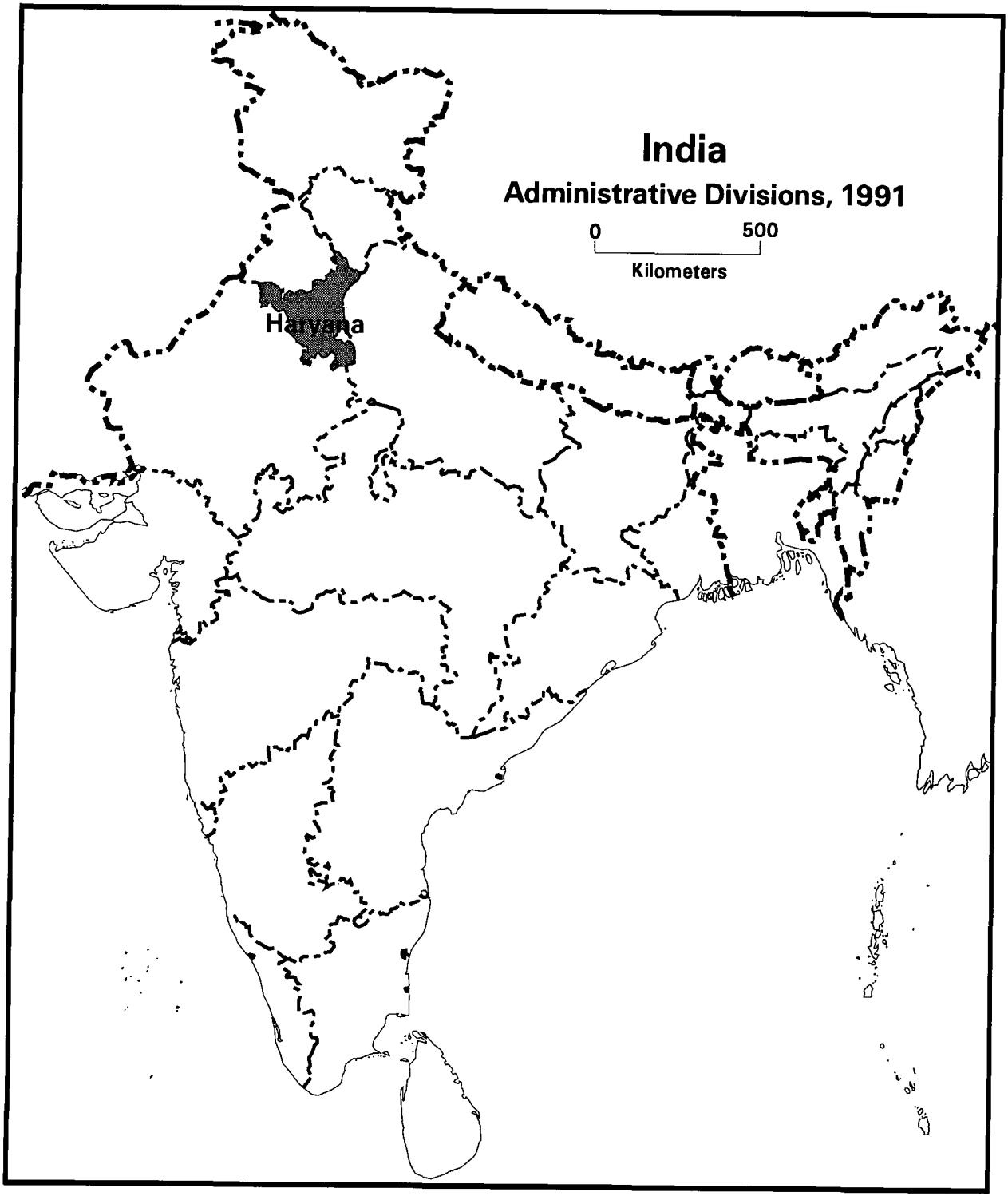


Figure-1.1 (Source: Survey of India)

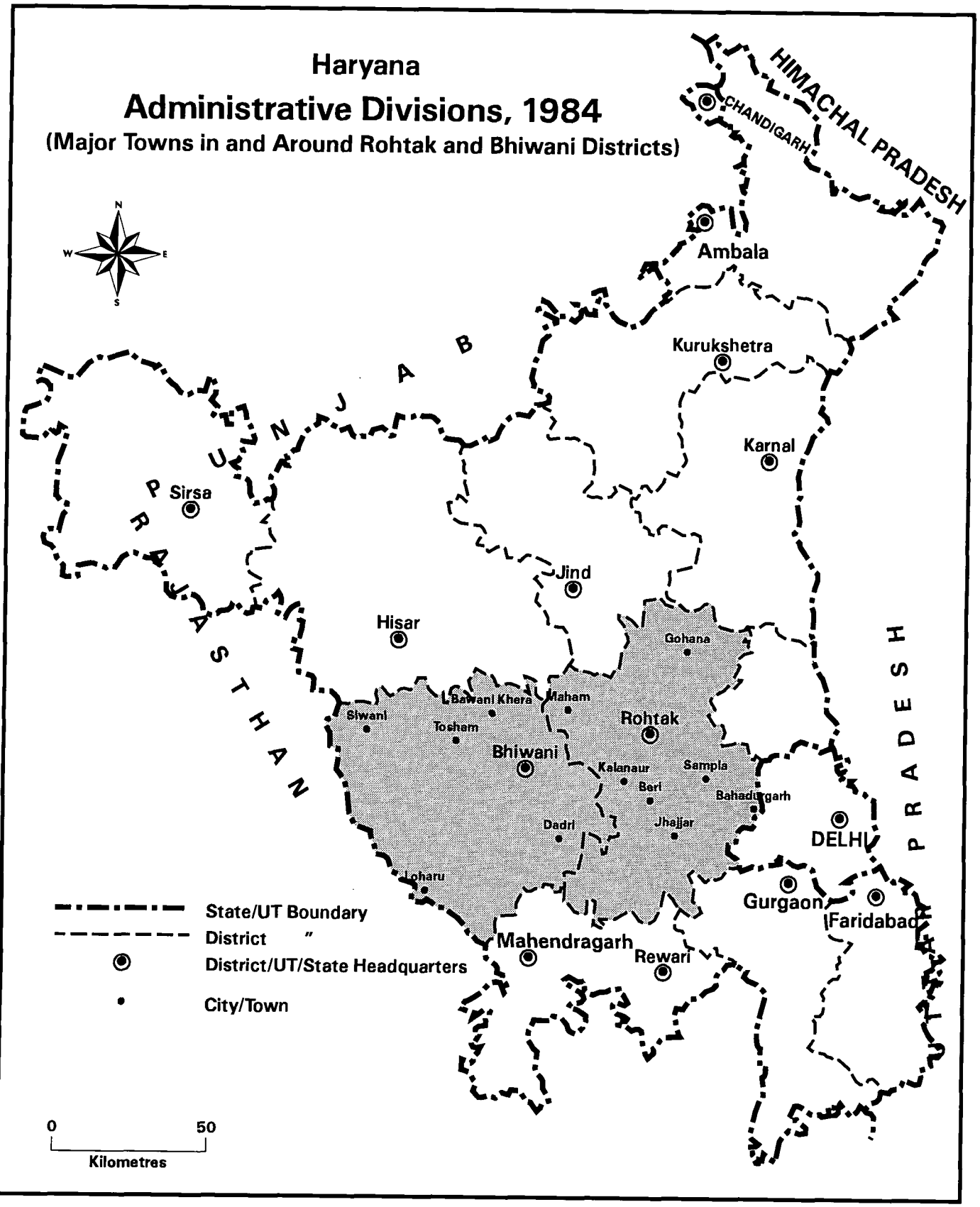


Figure-1.2 (Source: Survey of India, 1984)

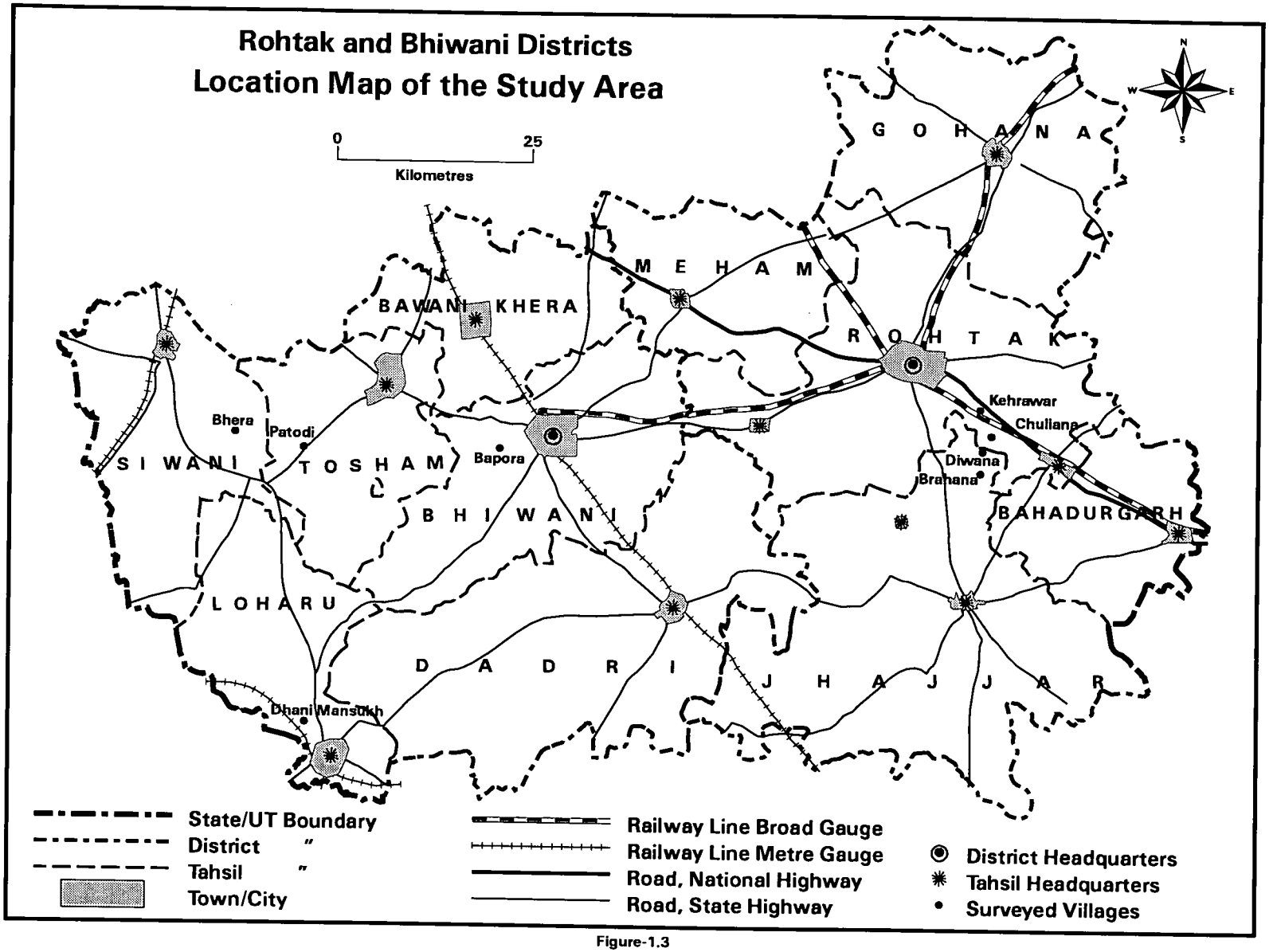

Rohtak and Bhiwani Districts
Location Map of the Study Area
0
25
Kilometres
N
W
E
S
G O H A N A
M E H A M
BAWANI KHERA
R O H T A K
Kehrawar
Chuliana
Bhera
Patodi
Bapora
S I W A N I
T O S H A M
Diwana
Brahana
B H I W A N I
BAHADURGARH
L O H A R U
D A D R I
J H A J J A R
Dhani Mansukh
State/UT Boundary
District "
Tahsil "
Town/City
Railway Line Broad Gauge
Railway Line Metre Gauge
Road, National Highway
Road, State Highway
District Headquarters
Tahsil Headquarters
Surveyed Villages

Figure-1.3

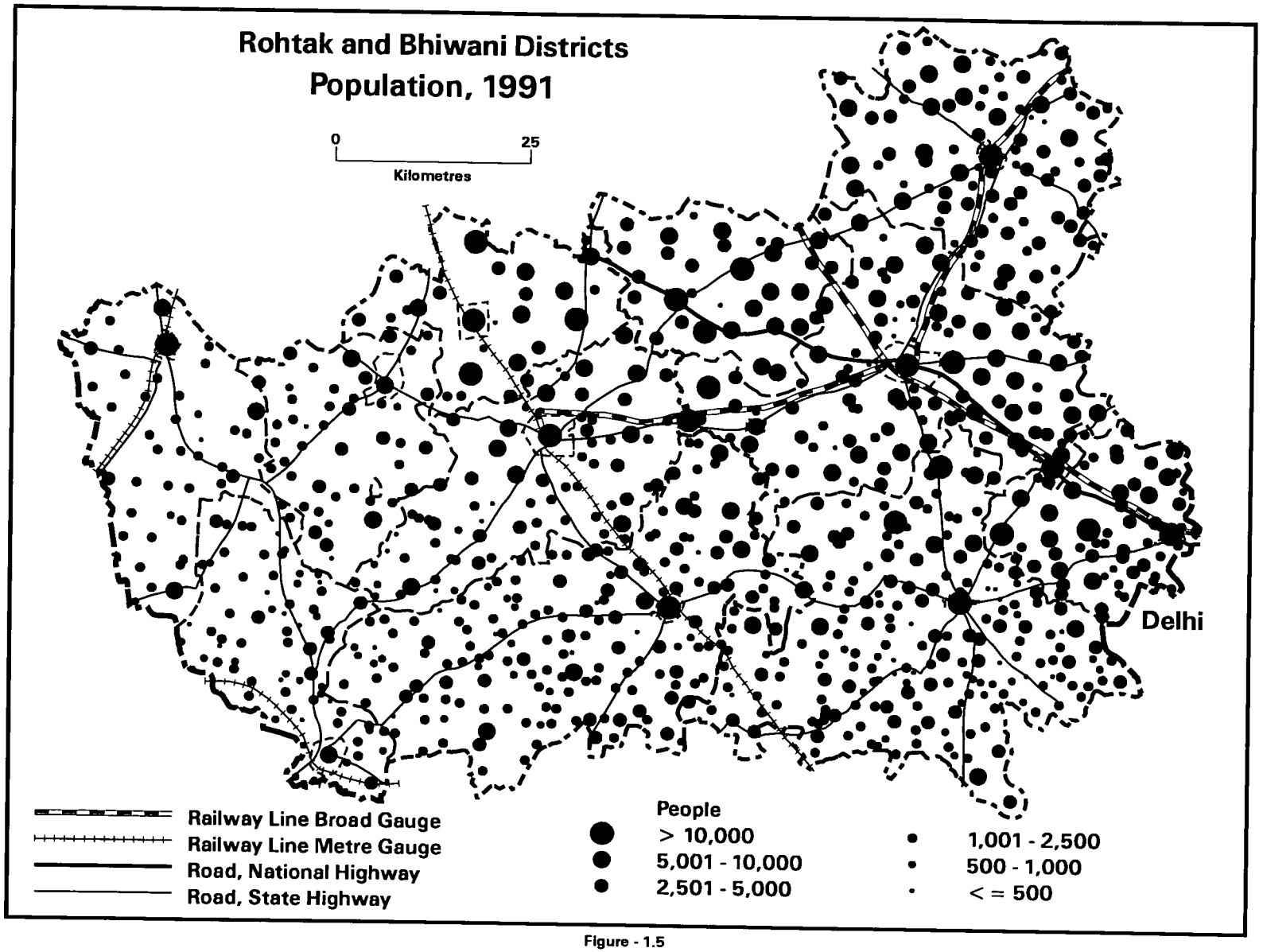

Rohtak and Bhiwani Districts
Population, 1991
0
25
Kilometres
Delhi
Railway Line Broad Gauge
Railway Line Metre Gauge
Road, National Highway
Road, State Highway
People
> 10,000
5,001 - 10,000
2,501 - 5,000
1,001 - 2,500
500 - 1,000
< = 500

Figure - 1.5

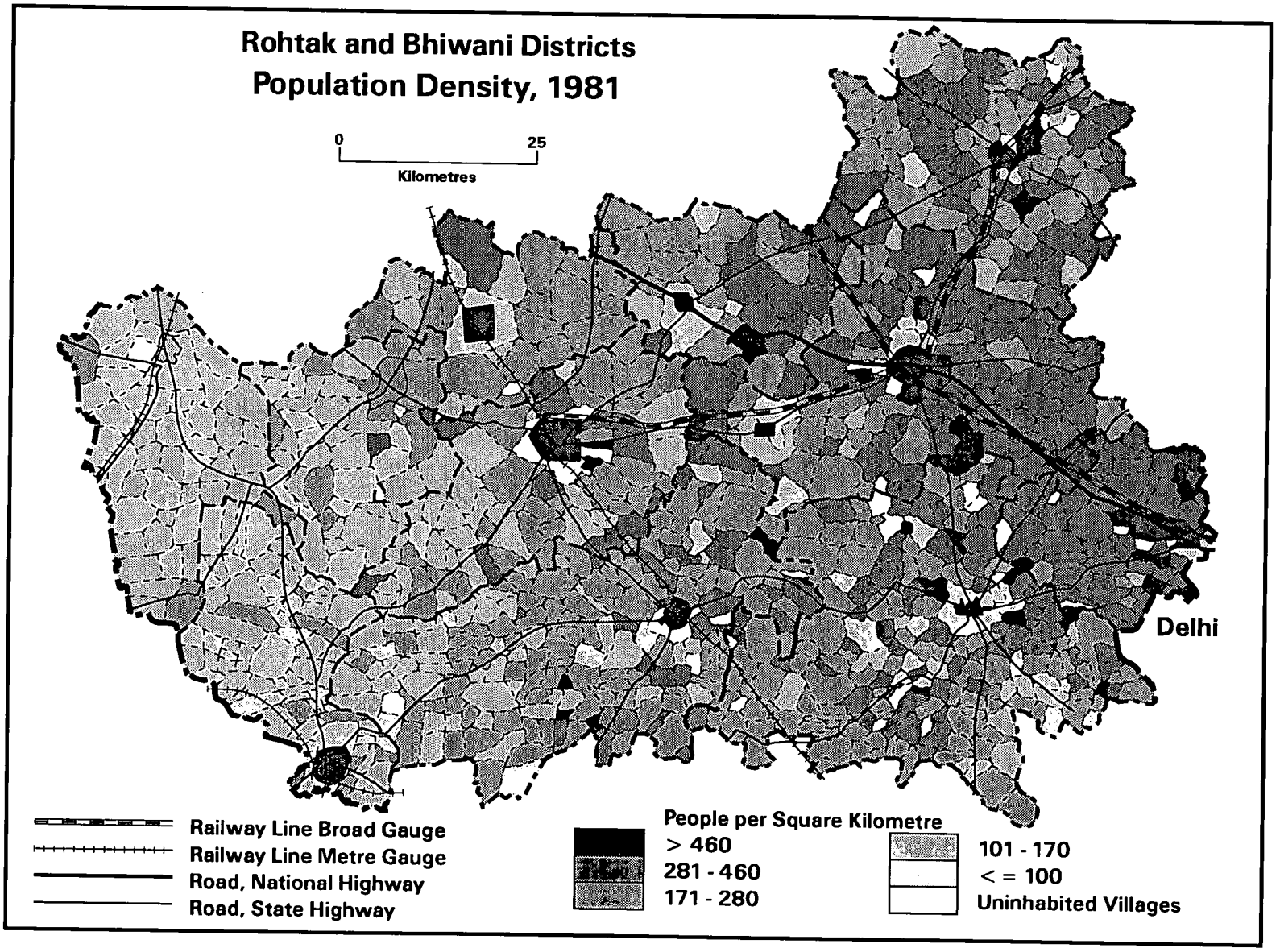

Rohtak and Bhiwani Districts
Population Density, 1981
0
25
Kilometres
Delhi
Railway Line Broad Gauge
Railway Line Metre Gauge
Road, National Highway
Road, State Highway
People per Square Kilometre
> 460
281 - 460
171 - 280
101 - 170
< = 100
Uninhabited Villages

Figure - 1.6

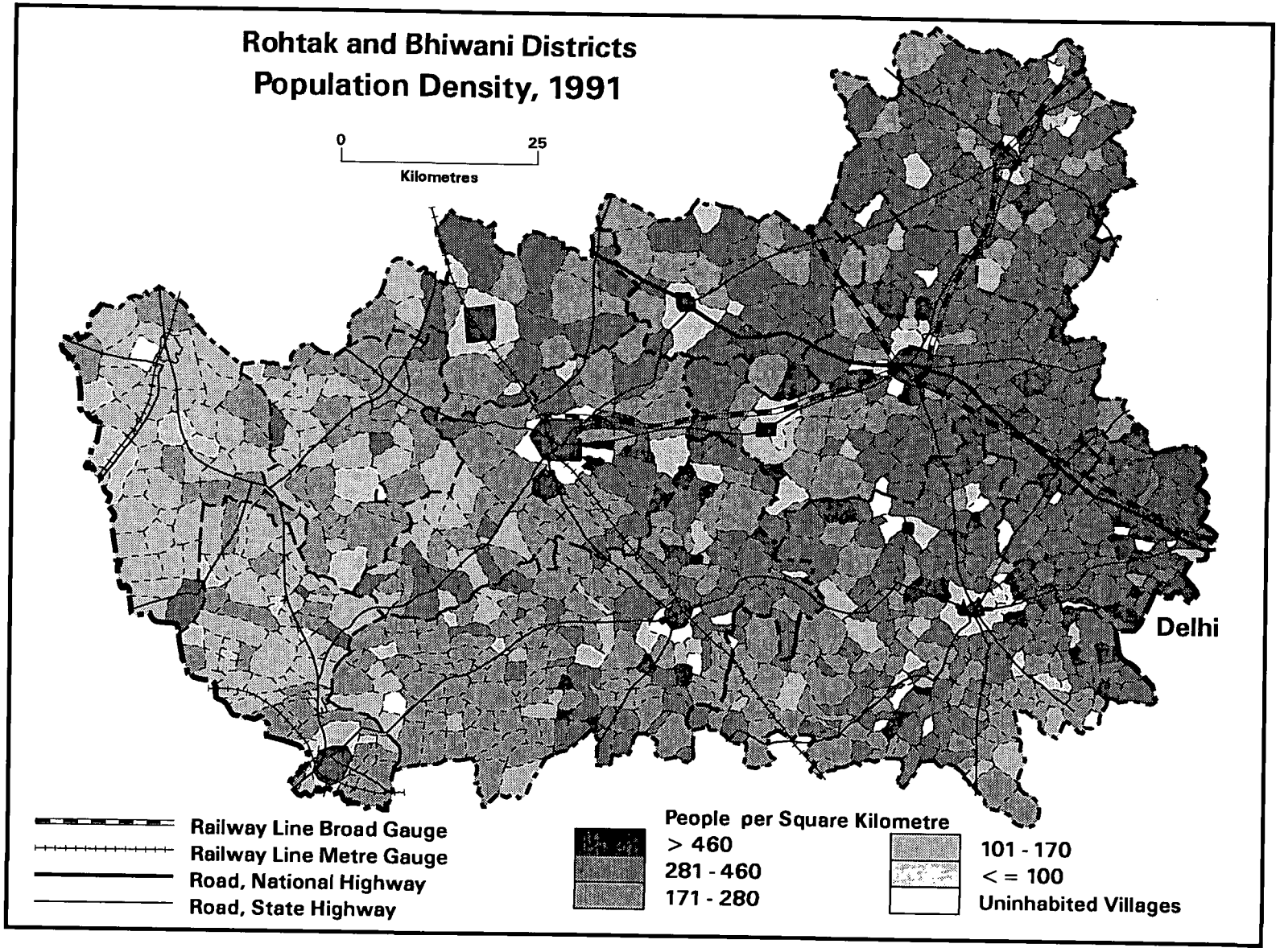

Rohtak and Bhiwani Districts
Population Density, 1991
0
25
Kilometres
Delhi
Railway Line Broad Gauge
Railway Line Metre Gauge
Road, National Highway
Road, State Highway
People per Square Kilometre
> 460
281 - 460
171 - 280
101 - 170
< = 100
Uninhabited Villages

Figure - 1.7

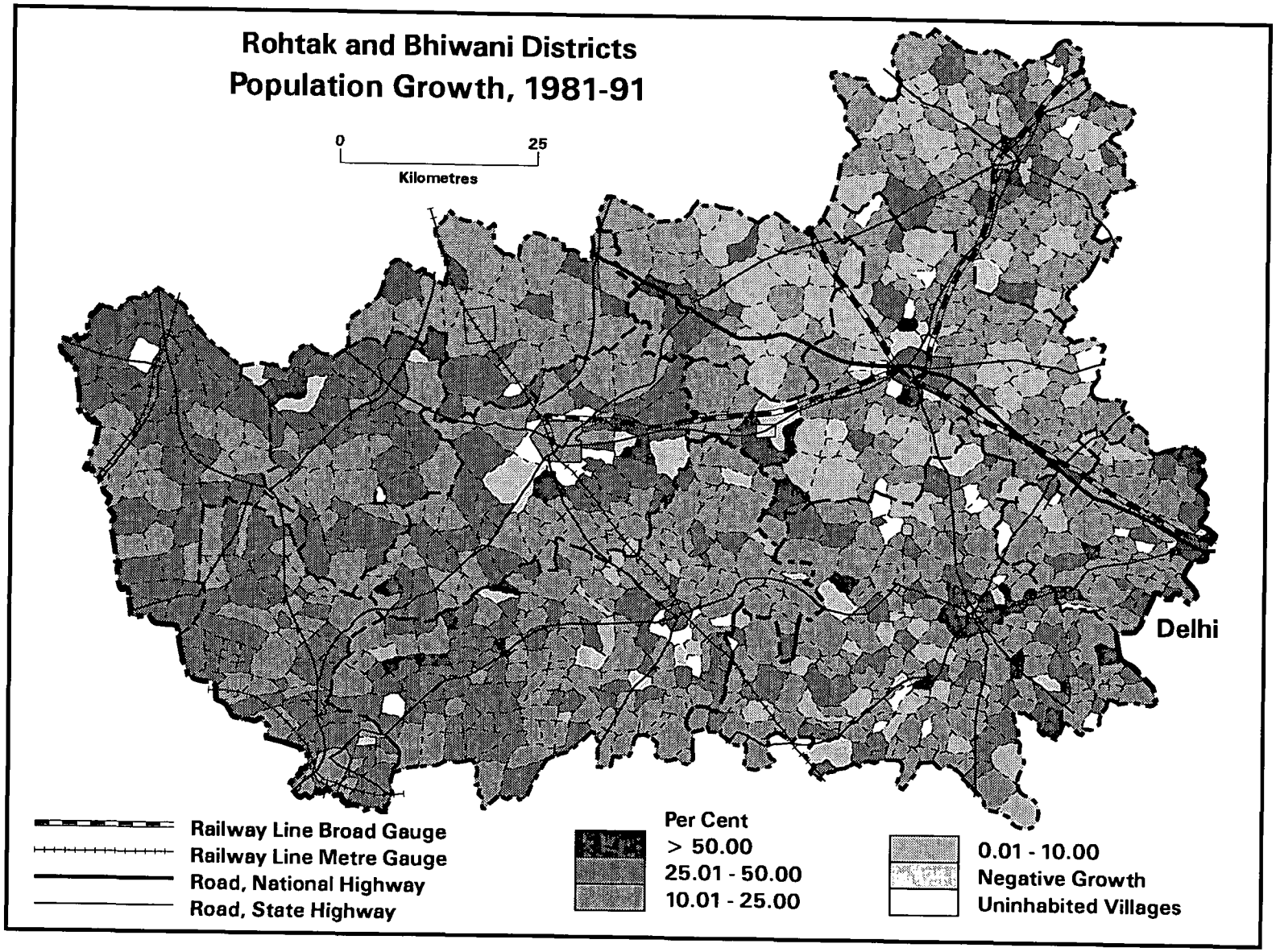
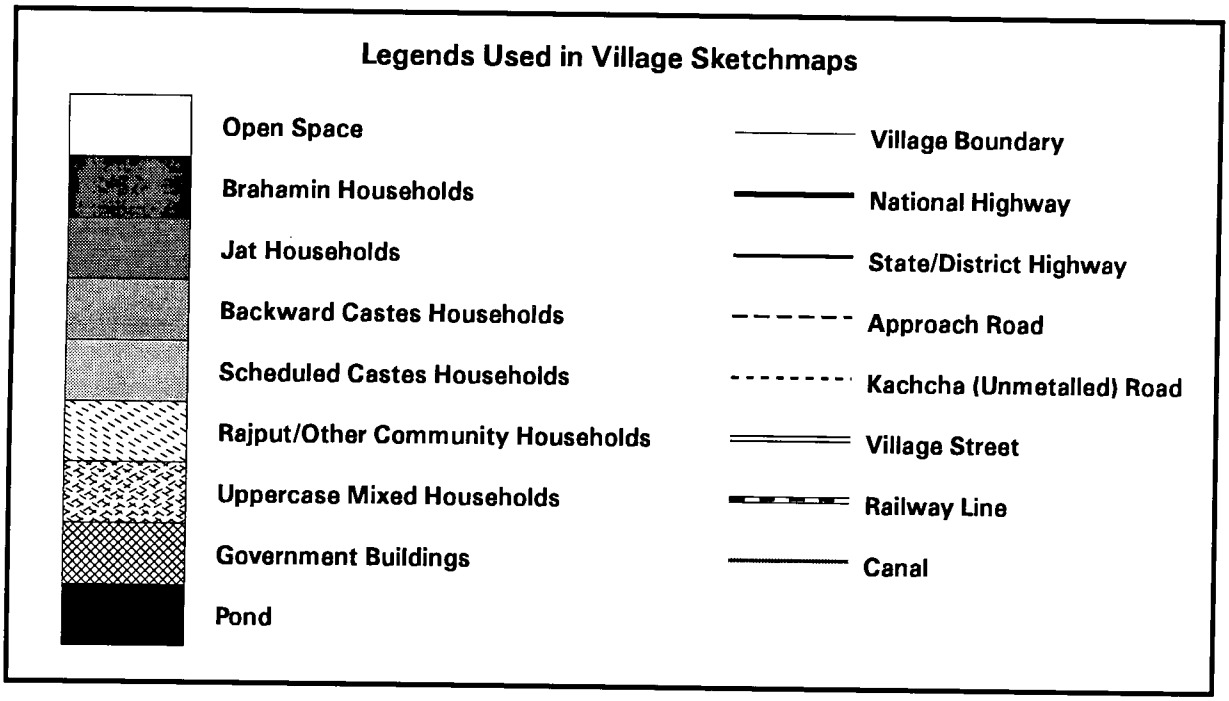

Rohtak and Bhiwani Districts
Population Growth, 1981-91
0
25
Kilometres
Delhi
Railway Line Broad Gauge
Railway Line Metre Gauge
Road, National Highway
Road, State Highway
Per Cent
> 50.00
25.01 - 50.00
10.01 - 25.00
0.01 - 10.00
Negative Growth
Uninhabited Villages

Figure - 1.8


Legends Used in Village Sketchmaps
Open Space
Brahamin Households
Jat Households
Backward Castes Households
Scheduled Castes Households
Rajput/Other Community Households
Uppercase Mixed Households
Government Buildings
Pond
Village Boundary
National Highway
State/District Highway
Approach Road
Kachcha (Unmetalled) Road
Village Street
Railway Line
Canal

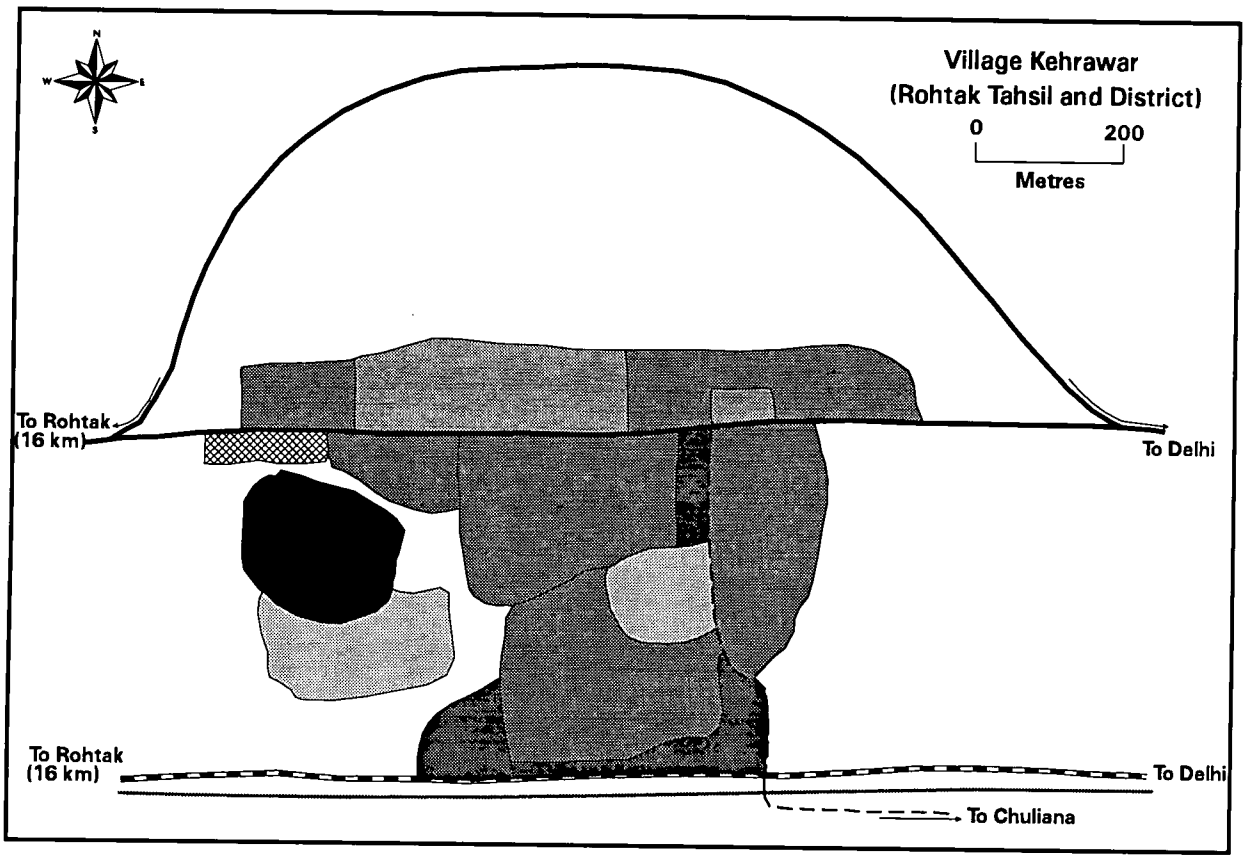
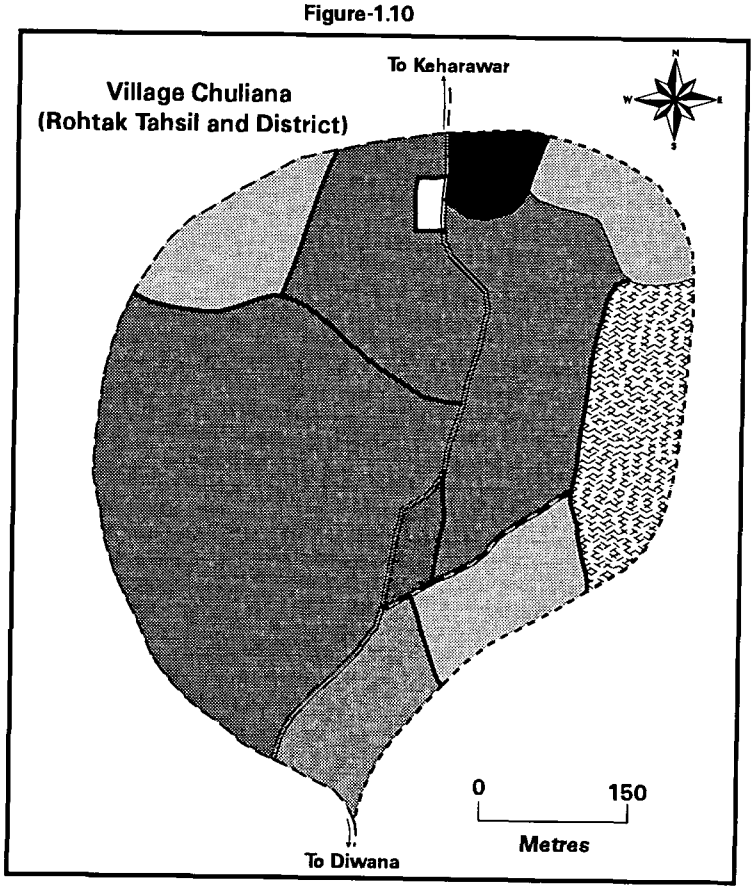

Village Kehrawar
(Rohtak Tahsil and District)
0
200
Metres
To Rohtak
(16 km)
To Delhi
To Rohtak
(16 km)
To Delhi
To Chuliana

Figure-1.9

Figure-1.10



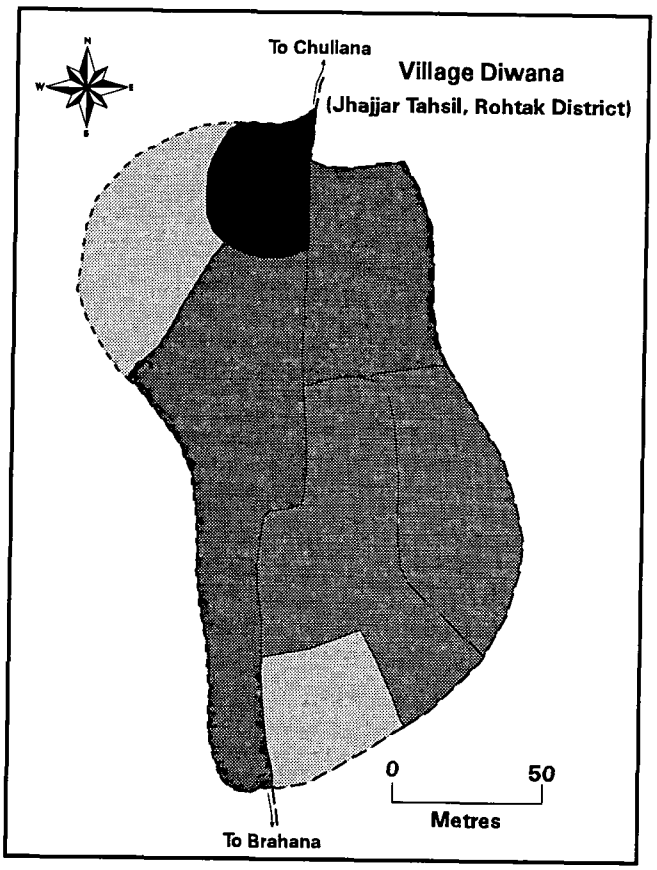


Figure-1.11

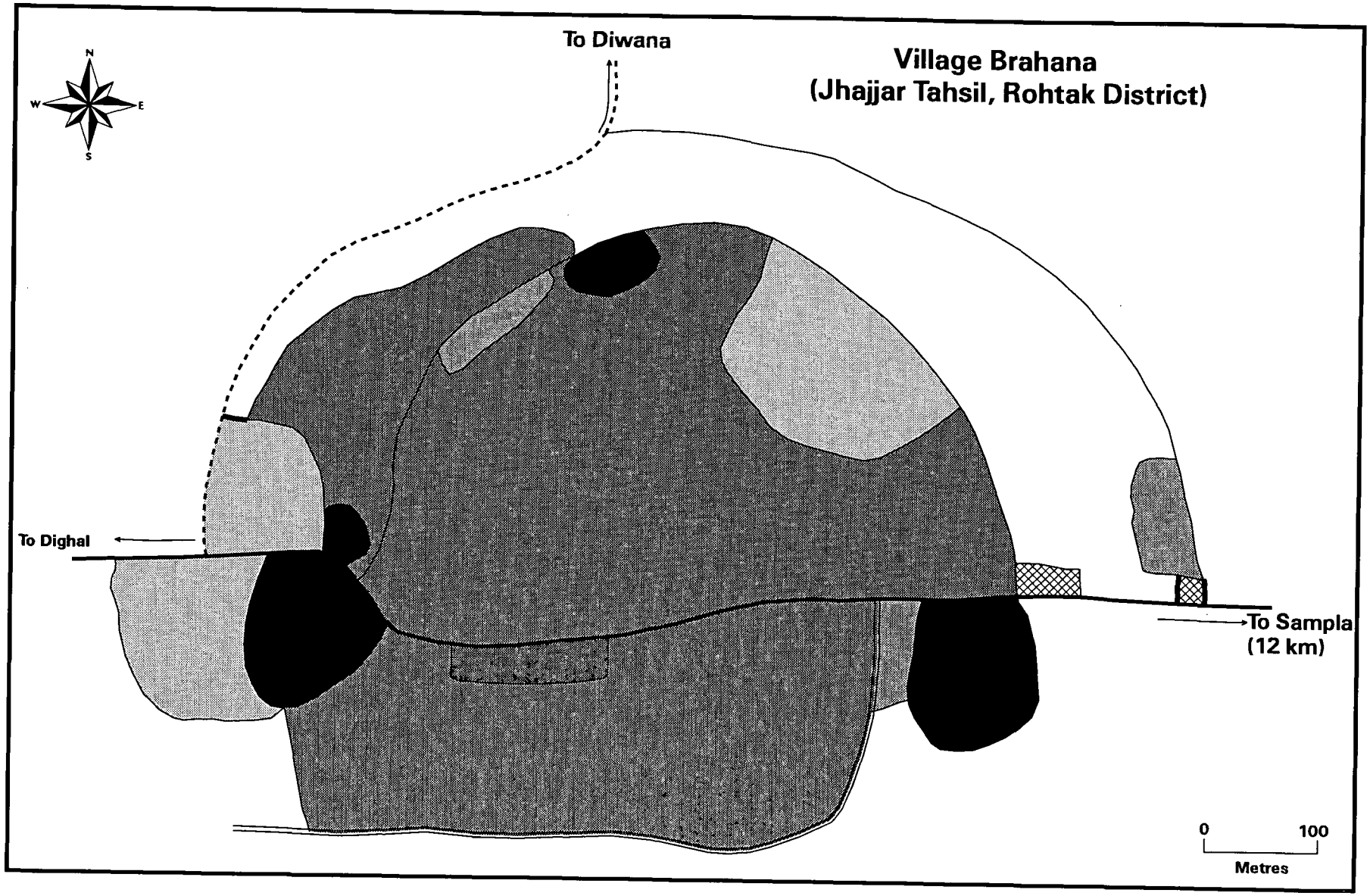

To Diwana
Village Brahana
(Jhajjar Tahsil, Rohtak District)
N
W
E
S
To Dighal
To Sampla
(12 km)
0
100
Metres

Figure-1.12

Figure-1.13

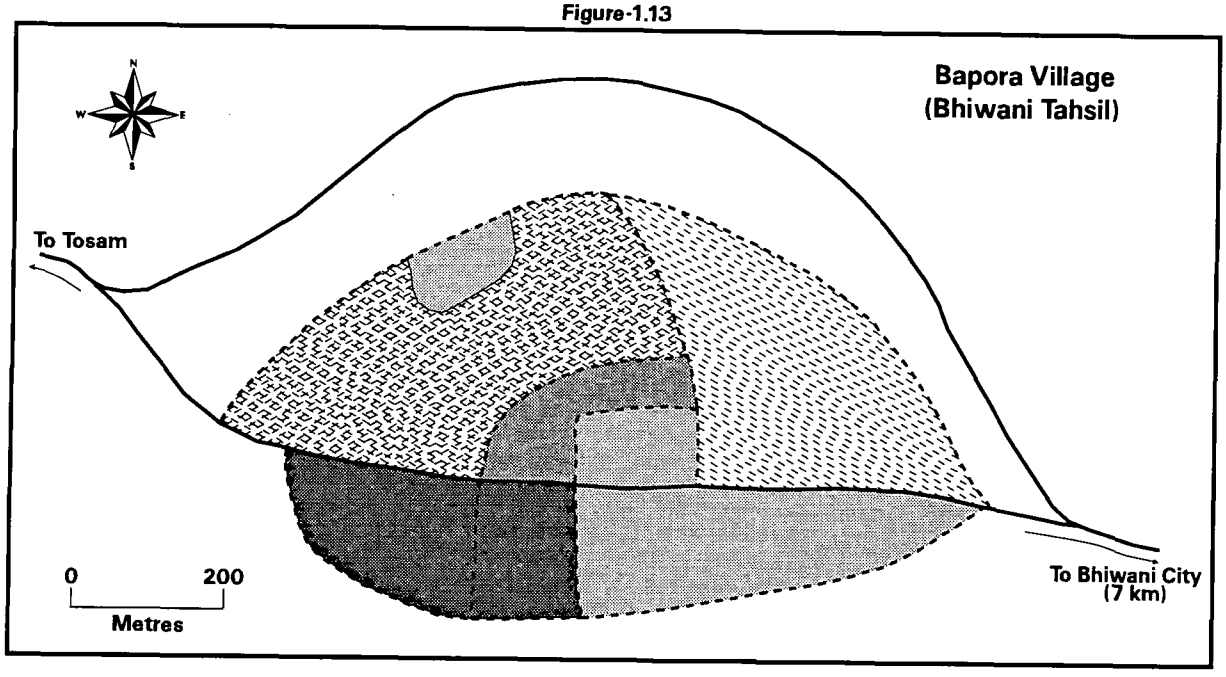


Figure-1.14

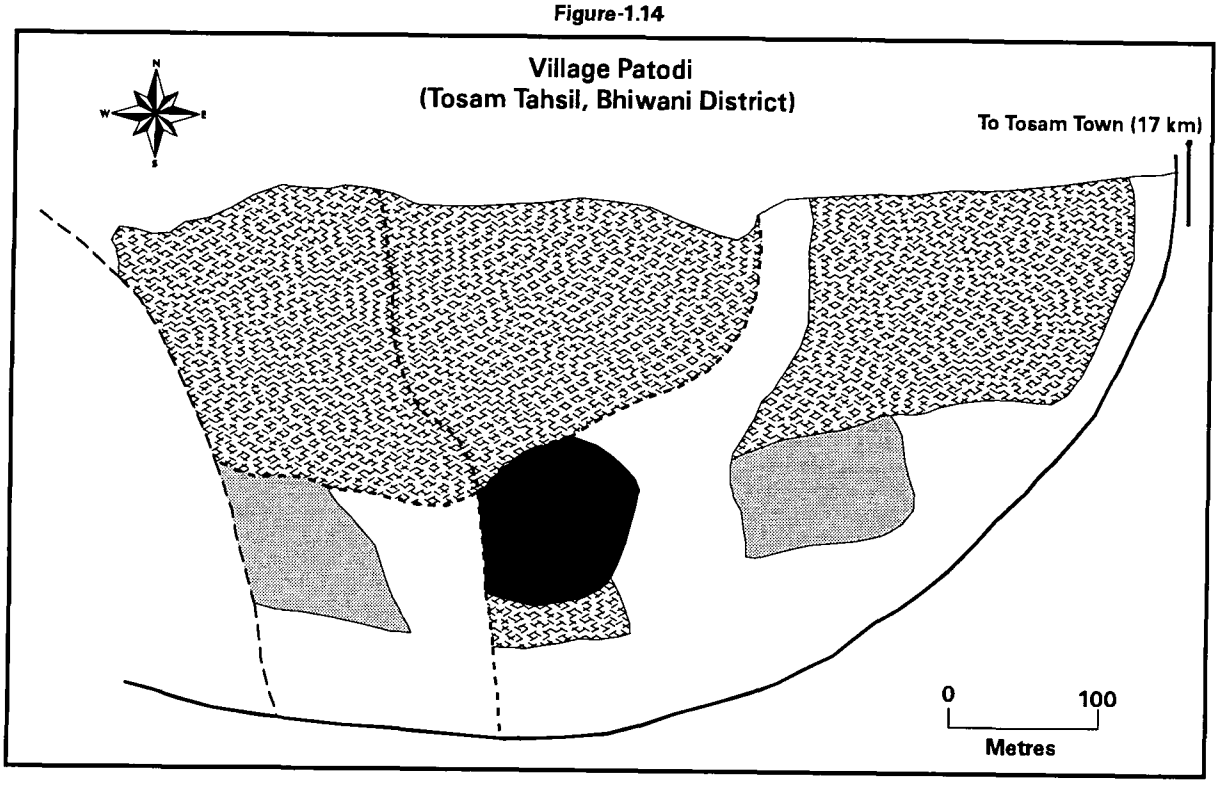


Figure-1.15

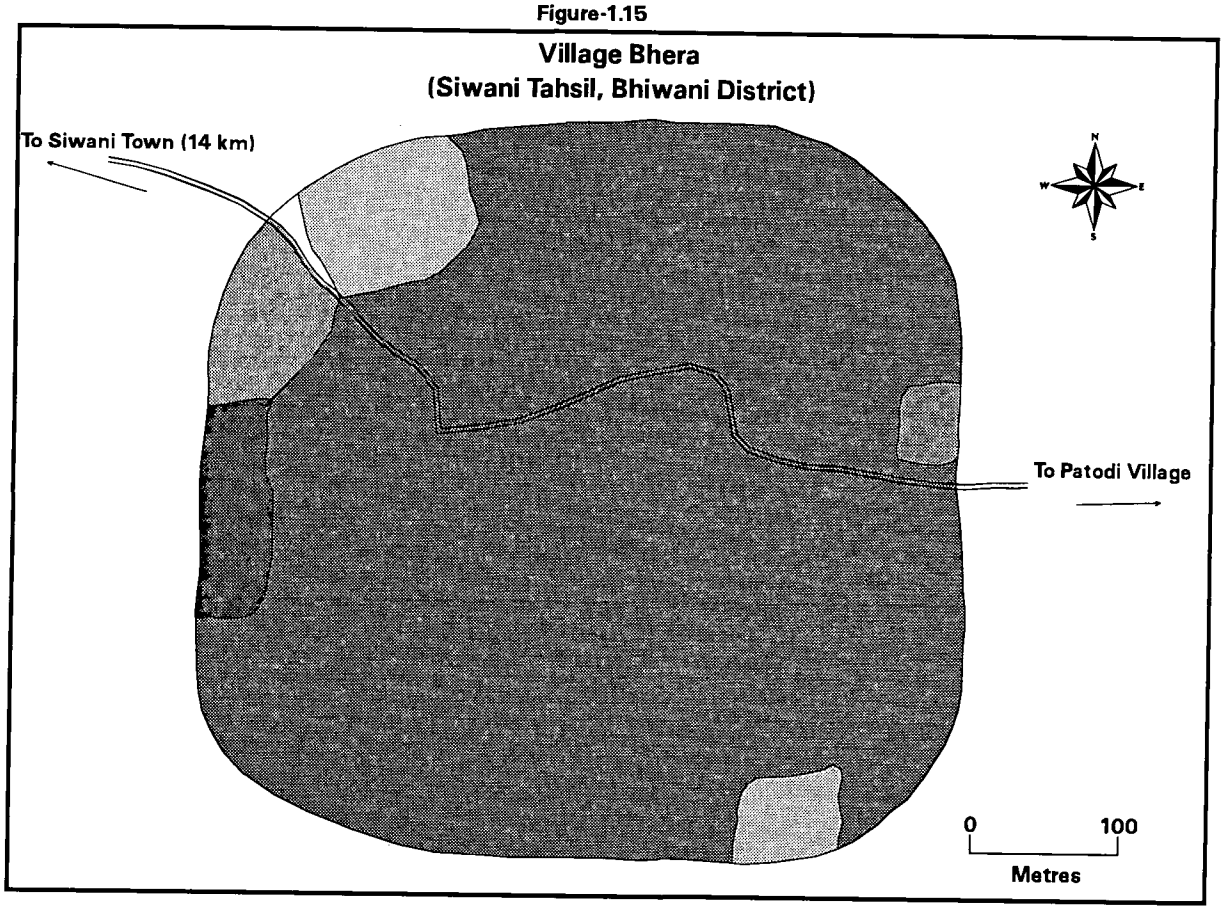
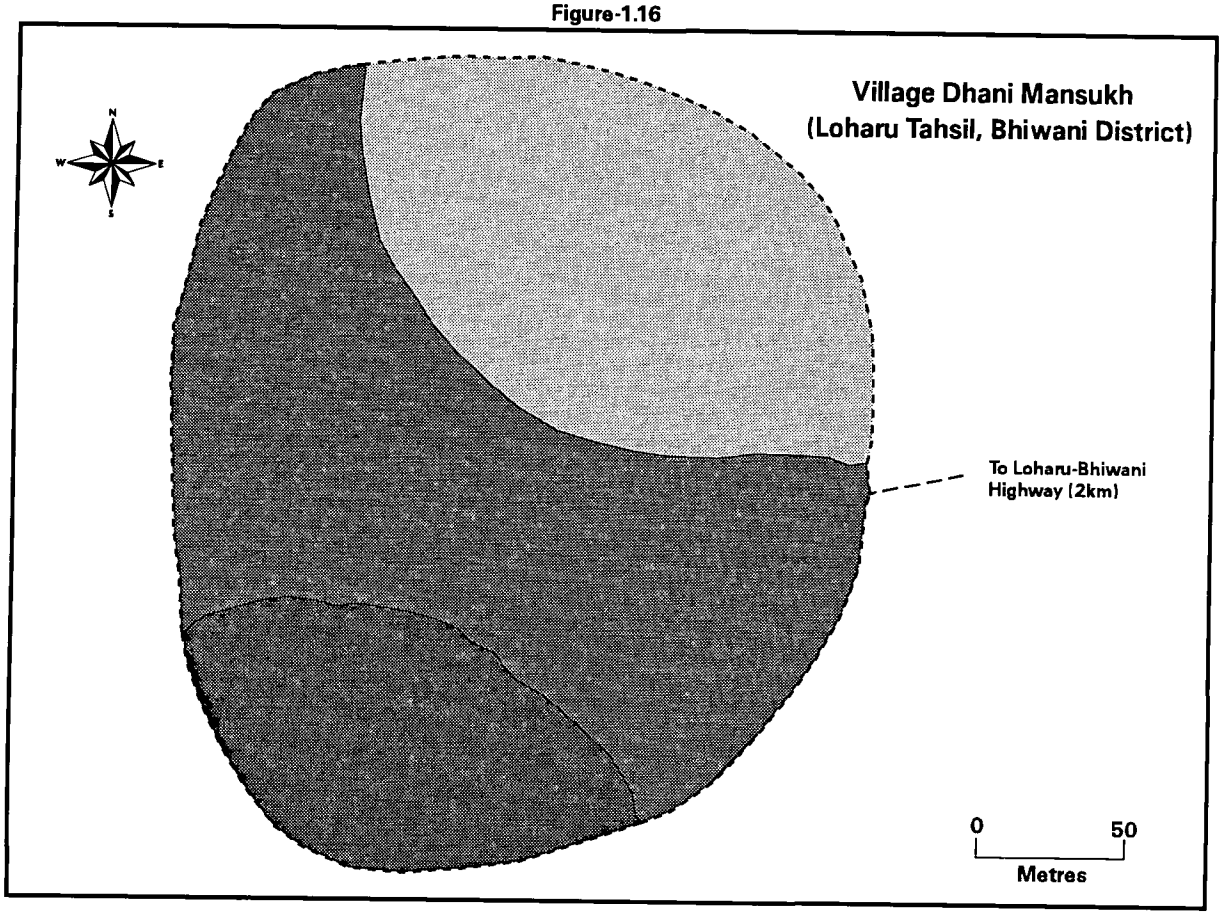


Figure-1.16



Chapter - 2

CONCEPTUAL FRAMEWORK

2.1 INTRODUCTION

This chapter is divided into four sections. Key infrastructure related terms are defined in the first section, followed by a detailed discussion of the linkages between infrastructure and the development process, especially in the Developing Countries, in the second section. In the third section, an attempt is made to review the relevant literature on infrastructure services in the context of transport, education and health, and a conceptual framework for the present research is developed in the final section.

2.2 DEFINITION OF KEY TERMS

The term 'infrastructure' was evolved during the Second World War by military strategists to indicate the wide-ranging elements of war logistics (Ahmed and Donovan, 1992). Later, economists used the term in the literature on development economics. Now, this term is used frequently (and very loosely) in different contexts, but it has specific connotations in the context of socio-economic development. Sometimes, the terms infrastructure and social overhead capital (SOC) are used interchangeably[1]. Generally, both terms refer to basic 'public services and facilities'[2] which provide an environment for the productive activities of individuals and groups in a society (Ahmed and Donovan, 1992; Johnston et al, 1996; Sills, 1968). Ahmed and Donovan (1992) set four conditions that provide a common understanding of infrastructure: (1) the services are provided to facilitate or are basic to economic activities; (2) the services are usually public goods because of economic externalities; (3) the services cannot be imported; and (4) investment tends to be indivisible or lumpy. According to Anderstig and Mattson (1989) infrastructure is "all capital that influences conditions of production beyond the spatial and dynamic limits of decision-making firm... and a set of attributes which provides external economies of scale" (p.288). A considerable number of

---

[1] Youngson (1967) defines infrastructure as "a set of attributes... to the degree that an asset/capital possesses the attributes, it could be regarded as infrastructure".

[2] Infrastructure development means the creation of public capital goods; such capital carries the distinction of producing external exogamies (technology and pecuniary) and social benefits are different from private benefits (Ahmed and Donovan, 1992). Public services differ from non-public services (provided by the independent or 'private' sector) because they are the part of collective consumption through which services are organised and managed by the state-operated system, financed at least partly through, and are consumed by users according to non-market criteria such as a need for services, rather than market criteria such as ability to pay (Johnston, et al, 1996, p.489).

studies recognise law and order, education, health facilities, sanitation, transport and communications, energy, drinking water facilities, water and irrigation, credit, marketing and other supporting institutions as infrastructure services (Hirschman, 1958; Sills, 1968; Clark, 1985; Johnston, et al, 1996; Rietveld, 1989a; World Bank, 1994).

There can be different types of infrastructure, such as 'social infrastructure', 'economic infrastructure', 'hard infrastructure', 'soft infrastructure', 'physical infrastructure', and 'institutional infrastructure' (Ahmed and Donovan, 1992). There is a considerable overlap between different types of infrastructures. Broadly, infrastructure can be grouped into two categories, namely directly productive economic[3] (transport and communications, market, irrigation, power supply, credit etc.) and social[4] (education, health, drinking water, sanitation etc.). This division started appearing with the changing significance of different types of infrastructure services since the Second World War. Another important distinction can be made between public and private infrastructure. Public infrastructure ensures that the consumption of a service by one individual does not prevent consumption by others (Samuelson, 1954). Production of public goods is not free or costless, but the marginal cost of having an additional individual consume the good, once produced, is zero. Johnston et al (1996) make a distinction between pure and impure public goods:

> *'Public services are often organised collectively because it would not be efficient, effective or equitable to leave their provision solely to the operation of commercial market forces or to the responsibility of charitable agencies. In a hypothetical sense public services could be considered as a 'pure' public goods if nobody in a society were excluded from using it and nobody could opt out of consuming it. Fluoridation of water supplies and defence might almost be considered to meet these criteria. However, few if any public services are actually consumed and benefited from jointly by all members of a society, so that they are more properly considered as impure public goods' (p.489).*

Private firms cannot produce public goods (services) as the marginal cost would result in no revenue, yet charging any other price would be difficult since individuals would want someone else to pay. But due to declining expenditure on public services, deteriorating quality

---

[3] Economic infrastructure directly or indirectly facilitates economically productive activities and is characterised by lumpiness. The main categories of economic infrastructure investment in rural areas are electrification, rural credit institutions, scientific agricultural research and extension, flood control and drainage, irrigation works, rural roads and transport, market for input and output, storage structures and warehousing, common property resources and watershed development (Bhalla and Singh, 1999).

[4] Social infrastructure may not directly contribute to productive activities, but helps enormously in expanding human capability and increasing well being of all the population (see Drèze and Sen, 1995; Dower, 1992).

of the existing services, and lack of accountability (as in rural areas of the study area) public services fail to cater for the needs of all the population. This has resulted in the emergence of private services in rural parts of the study area. Therefore, both public and private services are included in the present work. Three basic infrastructure services, namely education, health and transport, are chosen for the present study. Availability, accessibility, utilisation and their impact on social and economic conditions of the people are the central thrust of the research. The terms, availability, accessibility and utilisation are used differently in different contexts. Therefore, it is necessary to define these terms before proceeding further.

Availability: Generally, the 'availability' of a service refers to its physical existence at a particular location. It could be available within the village or out of the village. In the present context, the availability of a service means 'it is located within such a distance that it can be reached/accessed (physically) by each and every individual irrespective of any socio-economic discrimination'; and the use of this service by one individual does not restrict its use by other individuals. Although the availability of an infrastructure service (at a particular settlement/location) improves the chances of its accessibility and utilisation, this does not necessarily mean that this service is accessible to the needy (in particular children, the poor and women). Therefore, the availability of a service is somewhat different from its accessibility/utilisation.

Accessibility: In the present study, accessibility is used in two different contexts, namely 'geographical' and 'socio-economic'. The term 'geographical accessibility', in its simplest form, can be defined as 'the ease with which one place can be reached from another' (Johnston et al, 1996, 489). This term was derived from the interaction between two locations; and interaction is considered to be a negative function of dis-utility (distance, time and cost), while it is positively associated with the flows of goods, services and people (Isard, 1956). Nutley (1981) defines accessibility in 'terms of people's ability to gain access to certain facilities relative to the ability of the prevailing transport system to overcome the distance barrier' (p. 3). It is apparent that the distance[5] between the service centre and demand point is the key determinant of geographical accessibility; distance can be measured in terms of geodetic

[5] Distance is one of the fundamental spatial concepts identified by Nystuen (in Berry and Marble, 1968). Tobler's (1970) distance lapse rate model can be mentioned here: 'everything is related to everything else, but near things are more related than distant things'. This 'distance effect' can be expressed in a series of mathematical equations (see Johnston et al, 1996).

distance, topological distance, journey distance, journey time and monetary cost (Johnston, et al, 1996). It is reported that, other than physical distance, other factors, such as social, cultural, political and economic (income in particular), govern access to facilities and/or their utilisation (Hassouna, 1994; Johnston et al, 1996; Phillips, 1990; World Bank, 1994; Zakaria, 1974). In the present context we have used 'geographical accessibility' only in terms of physical distance. However, the quality of service also determines utilisation and hence accessibility. For example, there may be a Government school available in a village, but if people do not send their children to it due to the poor quality of education on offer or for some other reasons, the school in effect is not accessible to them. They are compelled to use private services, which fulfil their expectations. But the poor cannot afford to use private services and their non-paying capacity constrains their access to quality services. Therefore, the 'real accessibility' to services must be understood in terms of their utilisation (as and when people need them) and clients' satisfaction.

2.3 INFRASTRUCTURE AND DEVELOPMENT

The provision of social and economic infrastructure services has been considered as a backbone to development. They have played a vital but indirect role in the development process by promoting growth and increasing the productivity factors employed in the production process. Infrastructure investment constitutes the core of development planning in most of the Developing Countries through the resources devoted to transport, electrification, irrigation, communication, research and development and social overheads like education and health. In addition to this, the attainment of equity, appropriate income distribution and augmentation, provision of minimum needs, market extension and improvement of common property resources are other important objectives (Bhalla and Singh, 1999; World Bank, 1994), which lie at the heart of rural development, particularly in the Developing Countries. Therefore, infrastructure investment is indispensable to the development process; but the focus of infrastructure investment has been changing with changes in development approaches. It will be appropriate to investigate the development process in relation to infrastructure provision in the Developing Countries.

The origin of the term 'development' can be traced to Newman's 1845 'Essay on the Development of the Christian Doctrine'. Nisbet (1969) reported that development, in its classical phase, was based on the life cycle of all moving things; the growing and maturing

organism deposits a seed to recreate life amidst its own decay and destruction. This led to the emergence of a dual character of change: positive, constructive change emerging from negative moments of destruction and decay. Newman's development was a counterpoint to corruption and corruption became a synonym for 'underdevelopment' (Cowen and Shenton, 1995) and after the Second World War, most of the Third World Countries were characterised by corruption (Nisbet, 1969).

The need for planned development was realised in the Developing Countries only after the end of the Second World War (under the influence of the United States and international funding agencies). US President Truman's speech on January 20, 1949[6] proposed a planned development for the Third World Countries. For the first time, he used the term 'underdevelopment[7]' and on that day (20th January 1949) about two billion people were declared 'underdeveloped'.

In the 1940s, the concept of development revolved around 'modernisation'. Developed societies were distinguished by their economic, social, cultural and political modernity, which contrasted sharply with the traditional values of the underdeveloped, developing, backward, Third World or the latecomer societies (Corbridge, 1995, 2). In the 1950s, the major emphasis was on the western model of development, i.e. industrialisation, and the transfer of the rural labour force to more productive occupations in the urban-industrial sector. Lewis (1955) saw 'economic growth' as the first task of development planning not the distribution of fruits of economic growth. Baran (1957) defined growth or development as an increase in the per capita production of material goods. Rostow's (1960) model characterised development in stages of economic growth. Some researchers argued that development could not be reduced to industrialisation and economic growth only, but also the creation of a modern workforce for modern industries and hence massive investment in education and modern forms of time management (McClelland, 1961). In other words, the integration of the Third World societies

[6] "We must embark on a bold new programme for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas. The old imperialism- exploitation for foreign profit- has no place in our plans. What we envisage is a programme of development based on the concepts of democratic fair dealing" (Truman, 1949).

[7] Underdevelopment is present in a society in which a number of reinforcing evils are present, such as high rates of infant mortality and morbidity, low rates of productivity, poor provision of health care and of educational opportunities, illiteracy and (centrally) poverty and development is away from this cycle of evils (Attfield and Wilkins,1992). It was realised that the underdeveloped countries were suffering from these evils and they needed planned interventions from the Developed World to overcome these evils.

into the Western structure of thought, custom, production and consumption (regardless of whether or not they were suited for these societies) was sought by the process of modernisation initiated after the Second World War (Folch-Serra, 1989). This perspective of development was short-sighted and influenced by the spirit of the time, which did not take into account the indicators of social development such as education, health, life expectancy, quality of life etc.

An expression of social development was also introduced as a vague counterpart to economic development (Esteva, 1992). The Economic and Social Council of the United Nations in 1962 recommended the integration of social and economic development. In the same year, the Proposal Plans for Action of the First UN Development Decade (1960-70) declared that:

> *The problem of underdeveloped countries is not just growth, but development... Development is growth and change... Change in turn, is social and cultural as well as economic, and qualitative as well as quantitative... and the key concept must be the improved quality of life* (United Nations, 1962).

It was realised in the 1970s that the high rates of population growth in the Developing Countries were a major threat to the task of eliminating poverty, servicing the population, creating employment and achieving development (Elliott, 1994). This led to the emergence of a 'condom and clock school of thought' where the major emphasis was on 'attaching contraceptives in reducing population growth and enabling development to take place. Moreover, the economic approach to development was criticised, as economic growth did not bring satisfactory progress in development during the 1950s and 1960s. McNamara (President of the World Bank) recognised the fact that development should be more than just gross measures of economic growth[8]. Esteva (1992) argued that the First Development Decade considered the social and economic aspects of development separately, while the Second Decade emphasised the convergence of the two; the integration of physical resources, technical processes, economic aspects and social change were essential for comprehensive forms of development (UNRISD, 1980). The Cocoyoc Declaration of 1974 emphasised that

[8] Weaknesses of the developmentalist paradigm were realised and it became evident to many that this paradigm was impotent in the face of many of the terrible travails through which the Third World was passing. The growth of poverty and the attendant human misery; the spread of repressive, authoritarian regimes; the waste and suffering caused by wars both civil and regional- all combined to the disillusion of those working in the field, especially as the realisation began to grow that in fact there was no theoretical, commanding height from which to make sense of these awful realities (Tony, 1995).

'the purpose of development must not be to develop things, but to develop man'. The declaration also emphasised the need for diversity and for pursuing many different roads of development as well as the goal of self-reliance and the requirement of 'fundamental economic, social and political change' (Esteva, 1992). This led to the emergence of 'the basic needs approach for development'[9] which aimed at the achievement of a minimum standard of living before the end of the century. Along with this emerged some new phrases of development such as 'growth with equity' or 'redistribution with growth'.

The 1980s was called 'the lost decade of development'; the oil price hikes of the 1970s and the subsequent structural adjustment process meant, for many countries, abandoning or dismantling (in the name of development) most of their previous achievements (Esteva, 1992). For other countries (especially those in the Pacific Rim) development was a multi-dimensional concept encapsulating widespread improvement in the social as well as the material well-being of all in society (Elliott, 1994). By 1985, a post-development age started and the 1990s gave birth to a new development ethos. In the North[10], this calls for redevelopment, i.e. to develop again what was maldeveloped or is now obsolete. Conceptually and politically redevelopment is taking the shape of 'sustainable development[11]' for 'our common future'.

In the South, redevelopment also requires dismantling what was left by the adjustment process of the 80s, in order to make room for the leftovers of the North (atomic waste, obsolete or polluting manufacturing plants, unsellable or prohibited commodities etc.). The obsession with competitiveness for fear of being left out of the race, compels many of the Developing

---

[9] Basic needs oriented development focuses on the alleviation of poverty through a variety of measures other than merely the redistribution of incremental output. Attention to how much is being produced is supplemented by attention to what is being produced, how, for whom, and with what impact. Obviously, the rapid growth of output will still be important to the alleviation of poverty, and GNP per head remains the important figure (Hick and Streeten, 1995, 42), although now adjusted for the PPP (Purchasing Power Parities). Essential basic needs are: nutrition, primary education, health, sanitation, water supply and housing and related infrastructure (Streeten and Burki, 1978; ILO, 1976).

[10] North-South is a dichotomous term. North is used for wealthy advanced industrial countries, both socialist and capitalist. The South corresponds to those poor, largely non-industrial and ex-colonial states that are seen to constitute a Third World (Jonhston, et al, 1996)

[11] Sustainable development in the future will require a commitment to overcoming poverty through a focus on the welfare issues of the poorest sectors of society, particularly in the Developing Countries. Their environmental concerns and their needs are associated with securing the most basic level of economic and social well-being. Only through a global commitment to addressing these interdependent concerns of the poor will the environment be conserved or the development aspirations of the individuals and nations be secured. Elimination of poverty and the provision of the basic welfare needs for large numbers of people in the developing world must form an essential basis for future development patterns and processes if the human cost of unsustainable development is to be avoided (Elliott, 1994,26).

Countries to accept the destruction of what was developed over the last 30 years (Esteva, 1992). But the redevelopment approach was not accepted universally, which led to the emergence of two dichotomous views of development: 'alternative development' and 'anti-development'.

Banuri (1990), Escobar (1993,1995), Hettne (1990), Kaviraj (1991) and Cowen and Shenton (1996) belong to the anti-development school of thought. They point out that the development process has been deleterious to the welfare of the Third World because the project has forced indigenous people to divert their energies from the positive pursuit of indigenously defined social change to the negative goal of cultural, political and economic domination by the West. With the process of planning and development, peasants and the Third World people generally appear as the half human, half cultured bench mark against which the Euro-American world measures its own achievement. The discourse and strategy of development in reality produced massive underdevelopment and impoverishment, and untold exploitation and oppression. The practice of development is bound up with a European or Western system of thought whose purpose has been to impose modernity upon people who live according to traditions (Cowen and Shenton, 1996, 455). The debt crisis, the Sahelian famine, increasing poverty, malnutrition, and violence are the most pathetic signs of the failure of forty years of so-called development (Escobar, 1993). Unemployment was not an object for development but part of the process of development, and in both its classical and modern expression, development includes processes of decay, decomposition and destruction as well as of growth, expansion and improvement (Cowen and Shenton, 1996, 444-45). The major emphasis of antidevelopment is on the change in the discourse of development (in place of alternatives to development[12]) which requires moving away from development sciences in particular and a partial strategic move away from conventional western modes of knowledge in general in order to make room for other types of knowledge and experience (Escobar, 1995). Escobar further proposes 'new social movements[13]' (NSM) as the medium through which alternative

[12] The idea of another development, such as autonomous development, development from within or development from below, as alternatives to development is nonsensical. The argument that there are real alternatives between externally-managed and internally-generated 'development' is simply a reprise of an age-old image of 'Eurocentric universalism' (Cowen and Shenton, 1996).

[13] NSM strives for analysis based not on structures but on social actors; the promotion of democratic, egalitarian and participatory styles of politics; and the search not for grand structural transformations, but rather for the construction of identities and greater autonomy through modifications in everyday practices and beliefs. Thus social movements constitute a potential terrain in which 'the weakening of development and the displacement of certain categories of modernity can be defined and explored (Escobar, 1995).

discourses to development can be attained; he makes the case for NSM as the best hope for 'a more radical imagining of alternative futures'.

An implicit strand in the argument of the anti-development school is that investment in physical infrastructure, or indeed any capital intensive policy, is doomed to be an expensive and possibly counter-productive use of resources which could be more efficiently and effectively used in people-centred development. The philosophy of such planning is one of 'modernisation' and its scale dwarfs that of the local community level that is preferred by the new wave of scholars. Crush (1995) raises an important question: 'what has development meant for those spaces and peoples who are defined as its object'? He puts forward three answers to this question: (1) development has had a very negative impact; (2) people would have been a lot worse off without it; and (3) some benefit while the majority do not. All of these answers represent the recipients of development either as victims or beneficiaries. It is clear by now that the role of development cannot be completely negated in the name of much harm that has been, is being and will be done by development especially in the investment in the 'basic infrastructure services'. Infrastructure development epitomises the approach adopted for decades by the World Bank and the major donors and is therefore anathema to their critics.

Chambers (1983), Preston (1996) and Williams (1997) belong to the second school of thought i.e. alternatives to development. They have also highlighted the negative effects of development, but they see the deleterious effects of development as a result of outsiders' approaches to developmental planning. These outsiders belong to core areas and do not have enough knowledge of the way rural people learn, think, feel and act. Almost all plans for the development of the rural poor have so far been framed on the basis of survey-based research which has weaknesses: (1) The survey usually embodies the concepts and categories of outsiders rather than of the rural people themselves. (2) Their presentation of rural people is shallow as they focus on what is measurable, answerable and acceptable. (3) Being outsiders, researchers often get slanted or false knowledge from the rural poor because of fear, prudence, ignorance, exhaustion, hostility, or hope of benefits. The proponents of the participatory

school of thought recommend an agent-centred approach to the developmental processes[14]. Chambers (1983) recognises the importance of the knowledge of the rural poor. In all the Third World countries rural people's knowledge is an enormous and under-utilised national resource. Rural people's knowledge has marked local advantages but in the hands of outsiders it has been at its weakest. The 'indigenous technical knowledge' of rural people can be accessible to outsiders only through learning from rural people themselves or, rarely, through the ethnographic literature. Development plans are always translated into practice at the local level, and knowledge of local-level cultural patterns must be seen as a precondition of success in planning. Those involved in the development process can be seen as agents, as having their own understanding of their own situations, their own expectations of change, and their own strategy for securing such objectives (Preston, 1996).

Human well-being has been another important goal of the development process. The United Nations (1986) '*Declaration on the Right to Development*' defines development as a comprehensive economic, social, cultural and political process, which aims at the constant improvement of the well-being of the entire population and all of its individuals on the basis of their active, free and meaningful participation in development and in the fair distribution of benefits resulting therefrom. Dower (1992) defines development 'as a process in which there is a steady increase in well-being for all the population'; and further raises a question: is there a right to this? These rights are seen in terms of education and health for all in the pursuit of human well being (World Bank, 1990). Sen (1996) and Staudt (1991) [15] give due significance to the expansion of choice and opportunities for building human capabilities in the development process. Sen (1996) recognises the need for the expansion of social opportunities

---

[14] There is a clear acceptance that development should be people-centred; democratically organised; responsive to the whole environment, not only the ecological and the economic, but also the political, social, and cultural; and balanced, for example, between centre and periphery, between public and private, and between the roles of men and women. Development was described as an increase in one's capacity to pursue proposes, while taking into account that the effects of achieving human purpose becomes the goal of development, the touchstone against which development is assessed. This new paradigm puts human purpose at the centre as the driving force or source of power for development (Sato and Smith, 1996). The development must be coming from within, rather than imposed from outside. In addition, the centre of efforts in development needs to shift from resource-based strategies to interactive or participative strategies. In many ways, local practitioners are far ahead of the international donor agencies and the recipient Governments.

[15] Development can be interpreted as 'a process of enlarging people's choices'; of enhancing 'participatory democratic process' and 'the ability of people to have a say in the decisions that shape their lives'; of providing 'human beings with the opportunity to develop their fullest potential' and of enabling the poor, women, and 'free independent peasants' to organise for themselves and work together. Simultaneously, development is defined as the means to 'carry out a nation's development goals' and to promote economic growth, equity, and national self-reliance (Staudt, 1991).

through access to elementary education, health, social security and land reform, which will enable the more contained sections of society to lead less restrictive lives, have better freedom of choice and opportunities, and have free use of the facilities.

This second group of writers emphasises that the role of state planning for development cannot be denied. Reporting on the case study of the '*Panchayati Raj*' in West Bengal, Williams (1997) argues that there should not be an outright rejection of planned social intervention by the state in the name of which 'much harm has been, is being and will be done by development'. The power of development as a discourse is not all-pervasive, irresistible or indeed without the potential for positive effects for the rural poor. Preston (1996), however, argues that the role of Non-Government Organisations (NGOs) will be crucial for education and action at grass roots level; the work of NGO groups has generally been small, local and concerned to empower the ordinary people of the community. A formal theoretical justification for these activities has been found in the idea of the provision of basic needs, which are understood to be the minimum necessities of human social existence, housing, food, medicine, schooling and welfare, and which might best be provided by developmental agencies working in close connection with the local people through NGOs (Preston, 1996, 313). It may be doubted that NGOs could provide basic infrastructure services at the local level without the economic and political assistance of the state. Therefore, the role of the state for the provision of basic infrastructure services cannot be denied, and NGOs may have a further role to play in making these services accessible to the rural people in general, and to women and the poor in particular.

It is clear by now that 'human welfare' of the present and future generations (through expansion of opportunities, choice and freedom, and poverty alleviation) is the core of almost all theories of development. This objective cannot be attained without the adequate provision of essential basic services. Similar attempts have been made in India to provide basic minimum services through the planned development processes (initiated in 1951). In the following section, planning interventions for the development process in India are examined, started from the beginning of the First Five Year Plan.

Planned Development in India: At the time of independence, India inherited mass illiteracy, poor health, high fertility and mortality rates, a low life expectancy, large-scale poverty, a

sluggish agrarian feudal economy, externally dominated lop-sided industrial growth, lack of capital and a British bureaucratic administrative structure. Pandit Jawaharlal Nehru (the First Prime Minister of India) was aware of many of these problems. In his famous speech 'tryst with destiny', on the eve of independence on 14th August 1947, he reminded the country that the task ahead included 'the ending of poverty and ignorance and disease and inequality of opportunities' (quoted from Sen, 1996). Nehru pointed out that the elimination of ignorance, of illiteracy, of remediable poverty, of preventable disease, and of needless inequalities in opportunities must be seen as objectives that are valued for their own sake. India was seen as possessing natural resources and human skills capable of ensuring that within a space of twenty-five to thirty years it could develop and diversify its economic structure in the same way as the West had done since the mid-nineteenth century (Government of India, 1952). The main barrier to this was the lack of capital both in terms of quantity and quality. It was soon realised that the development process would require the generation of adequate savings for rapid growth of investment, which could not have been possible without the active role of the Government.

A National Planning Commission[16] was set up in 1950. The 'First Five Year Plan' was launched in April, 1951 aiming at not only raising the standard of living of the people but also opening out new opportunities for them for a richer and more varied life (Government of India, 1952), which was sought through economic growth, modernisation, self-reliance, and social justice (Mathur, 1996). In the beginning, the major focus was on rapid industrialisation and it was expected that a significant proportion of the population dependent on agriculture would shift to the non-agricultural sector. The public sector[17] was assigned a commanding role right at the beginning of the First Five Year Plan. It was observed that if development is to proceed at the pace envisaged and to contribute effectively to the attainment of the larger

[16] Unlike the Finance Commission, the Planning Commission is not a statutory body. It is organically connected to the Central Government, the Prime Minister being the Chairman of the Commission. Its formal authority is derived from the sanction given to the Five Year Plans by the National Development Council (NDC), of which Chief Ministers are the members and the Prime Minister is the Chairman (Bhaya, 1997). The term 'democratic planning' was used in the First Five Year Plan Document.

[17] The Government of India (Union, States and local bodies) is the biggest single unit in India in terms of organised sector employment, contribution to total national product and capital formation. It also provides a wide range of conventional public goods and services and many non-public commercial goods and services; the organised financial sector is entirely under the public domain (Kabra, 1997, 79). Jawaharlal Nehru envisaged the inevitable role of the public sector for growth and development of the nation by providing surplus reinvestable resources, but this has not happened as it should have (Mathur, 1996).

social ends, it is inevitable that the public sector must grow not only absolutely but also in relation to the private sector.

The major thrust of the Five Year Plans has been on building a sound infrastructure network, particularly with the beginning of the Second Five Year Plan[18], which was considered to be a pace-setter in taking risks and nurturing entrepreneurship, to take care of social needs, to help the poor and the weak, and to create an environment for equal opportunities and social justice (Mathur, 1996). Since then eight Five Year Plans have been completed and the Ninth Five-Year Plan (launched in the 50th year of India's Independence i.e. 1997 and which will take the country into the new millennium) is in progress. The main focus of the Ninth Plan is 'growth with social justice and equity'.

Increasing standards of living and economic growth have been the explicit goals of ambitious plans in India since 1951 under Nehruvian socialism. The development of basic economic infrastructure services such as irrigation, transportation, power supply, water facilities and marketing was widely recognised and massive investments were made in multi-purpose hydroelectric projects, railways and industries, and later in the 'Green Revolution' of the late 1960s and 1970s (Grove and Hussar, 1964; Johnson, 1970; Weitz, 1971). It was hoped that the provision of these services would boost the economy, help in transforming agriculture from a subsistence to a commercial basis and curtail poverty by increasing income from agriculture and generating rural employment (Nicholls, 1963; Ishikawa, 1967; De Vries, 1963). They have indeed contributed greatly to economic (including agriculture and industry) growth and per capita income (Mellor, 1988; Mathur, 1996; Vaidyanathan, 1988). Ahluwalia (1988 [based on economic performance and policies]) concludes that:

> *The Indian economy has gained strength and structural maturity in many dimensions since independence. It has certainly emerged from sluggish growth evident up to the mid-seventies, to a much better performance subsequently, especially in the most recent years. But population (growing at over 2 per cent per annum) has been absorbing much of the economic growth. The combined effect of the modest acceleration in economic growth and gradual decline in population growth would put the economy on a much faster pace of per capita income growth than experienced in the past (p. 360).*

[18] Enormous public investment was made in irrigation and power, infrastructure, R&D, finance and marketing for stimulating growth of agriculture (mainly food), rural employment and industrialisation especially in the Second Five Year Plan, 1956.

It is also reported that economic growth has had little impact on improving the social and economic conditions of the poor; rather their absolute number has increased over a period of time (Mathur, 1996; Vaidyanathan, 1988). The problem of poverty was not tackled through growth, which itself was slow for a long period of time; the previous decade (1980s) was characterised by a severe unemployment problem, which became worse in the 1990s (Mathur, 1996). Not all of the population has access to all the basic necessities, particularly drinking water, education and health. Infant mortality is still high and literacy levels, particularly among women, are low. The failure of growth with justice and the persistence of poverty compelled social scientists to search for alternative development strategies. The anti-development school of thought completely denies the role of planning. In India (as Mathur argues) planning still has a major role to play for creating social infrastructure and for human development[19], but this needs to be redefined with the major focus on poverty alleviation and human welfare through enlarging people's capabilities and the opportunities available to them. The Government of India adopted some bold steps[20] to directly attack rural poverty, such as self-employment and wage-employment programmes, asset generation etc. Bhalla and Singh (1999) argue that the direct poverty alleviation programmes yielded quick results, but they were not sustainable over a long period of time. Because enough resources could not be generated without either economic growth or substantial foreign aid available on a continuing basis (an impossible situation for large countries like India, where the population size is near to a billion).

The latest Five Year Plan (approved by the National Development Council) included some of the most important concepts of recent development practices. It has the following objectives:

- Priority to agriculture and rural development with a view to generating adequate productive employment and the eradication of poverty.
- Accelerating the growth rate of the economy with stable prices.
- Ensuring food and nutritional security for all, particularly the vulnerable sections of society.

---

[19] We need to build schools, hospitals, institutions of excellence and scientific research. We have to plan and structure the system of education to cultivate the necessary calibre, skills and value systems. Planning is necessary to take care of the poor and the downtrodden, who have little asset endowments to benefit from natural growth of economic activities and also lack access to basic services. Removal of regional disparities requires flow of resources across regions. Poverty alleviation programmes have definitely helped in reducing poverty and generating employment.

[20] 'Garibi Hatao' (poverty alleviation) was the central objective of the Fifth Five Year Plan (Government of India, 1976).

- Providing the basic minimum services of safe drinking water, primary health care facilities, universal primary education, shelter, and connectivity to all in a time bound manner.
- Containing the growth rate of population.
- Ensuring environmental sustainability of the development process through social mobilization and participation of people at all levels.
- Empowerment of women and socially disadvantaged groups such as Scheduled Castes, Scheduled Tribes and Other Backward Classes and Minorities as agents of socio-economic change and development.
- Promoting and developing people's participatory institutions like Panchayati Raj institutions, cooperatives and self-help groups.
- Strengthening efforts to build self-reliance.

At the end of 1990, the future looked threatened due to a severe economic crisis (debt repayment, foreign exchange deficit, loss-making public sector undertakings etc.). In 1991, moderate economic reforms were introduced, which were aimed at removing 'licence raj', and 'ever proliferating bureaucracy' (Drèze and Sen, 1995) and barriers to the free flow of international trade. Liberalisation led to considerable expansion of exports in some sectors and to a substantial improvement in the foreign exchange balance. Drèze and Sen conclude that:

> *The central question is not economic growth, but a participatory growth. The year to year growth of GNP and GDP can, quite possibly, move up rapidly (as it is already doing to some extent), but the country remains handicapped economically and socially by its overwhelming illiteracy, backwardness in health and other crucial deprivations... the cage that keeps the Indian economy well tamed is not only that bureaucracy, and Government overactivity, but also that of illiteracy, undernourishment, ill health and social inequalities, and their causal antecedents: Governmental neglect and public apathy... the real issue in uncaging the tiger is to go well beyond liberalisation. Neglect of social opportunities through the lack of adequate progress in the basic education, health care, social security, land reforms, and similar fields has been detrimental to economic and social development in India, so has been the neglect of the appropriate incentives for economic efficiency and expansion* (Drèze and Sen, 1995, 180-81).

Economic reform took good note of the diagnosis that India has 'too much Government' in some fields, but it ignored the fact that she has 'too little Government activity' in many other fields, including basic education and health care. This makes people's lives miserable and limits the possibility of economic expansion (Sen, 1996). There is an urgent need for widespread and better health care, greater access to social security, more effective land

reforms, and in general, enabling the more constrained sections of the population to lead a less restrictive life, including being more free to make use of the facilities than the spread of the market can provide.

The above discussion reveals that there is a need for effective provision of social infrastructure, which requires active Government intervention for efficient, effective and equitable delivery of the most basic infrastructure services, which cannot be left solely to the private sector (Johnston, et al, 1996). Therefore, public provision of basic infrastructure services is essential. In the next chapter an attempt will be made to review the role of the availability, accessibility and utilisation of selected infrastructure services, namely education, health and transport, in the development process.

2.4 INFRASTRUCTURE AND ITS IMPACT

It has been widely accepted that the existing level of economic development[21] is partly an outcome of infrastructure development; economically more developed regions enjoy a sustained level of infrastructure investment compared to those which are less developed (Binswanger and Rasenzweig, 1986; Binswanger, et al., 1989; Bromley, 1983; Epstein, 1962; Schatzberg, 1979; Wanmali and Islam, 1995). Most development theories are based on the premise that 'creation of infrastructure generates external economies, hence widespread benefits' (Ahmed and Donovan, 1992). Regional variations also emerge because of the lack of rational criteria used for the planning of infrastructure services (Rushton, 1988) and the mismatch between demand and supply.

The following section is divided into three parts. The first deals with infrastructure overall and the impact of transport, education and health on development. In the second part an attempt is made to examine the issues related to the availability of and accessibility to infrastructure services. In the final section, the role of controlling variables (namely income and sex) on accessibility to and/or utilisation of infrastructure services is examined.

The literature on the significance of infrastructure dates back to 1842, when Von Thünen explained geographical variations in the intensity of farming systems and productivity of

[21] Investment in infrastructure services is considered to be an integral process of development (Wanmali and Islam, 1995)

labour in terms of urban-industrial pull, and of transportation and communication. Later on, due importance was given to transport in the locational analysis of settlement and industry (Chorley and Haggett, 1967; Christaller, 1966; Losch, 1954; Smith 1981; Weber, 1929). Unlike the sectoral development of agriculture and industry, infrastructure does not directly increase output, but indirectly contributes significantly towards the factor productivity of land, labour and capital (Bhalla and Singh, 1999). It is evident from the literature that transport infrastructure contributes significantly towards overall development (Ahmed and Donovan, 1992).

Investment in the transport sector generates employment opportunities for the poor through the creation of jobs for unskilled labour in construction and maintenance (Bhalla and Singh, 1999). The availability of transport services, particularly of rail and road, has been one of the most important forms of infrastructure, as it improves accessibility to other services such as markets, education, health and other institutions. It has two significant impacts on the economy: 'productive or generative' and 'distributive' (Rietveld, 1989b and 1990). It is widely accepted that transport development is a necessary but not a sufficient condition for economic growth; and economic growth in turn increases demand for transport (Bhalla and Singh, 1999). Ruttan (1984) explains rapid agricultural growth in North and South America, and in Australia in terms of the advances in transport and communication, which are important bases of the 'frontier model'. There is adequate evidence which supports the argument that the development of rail and road transportation in parallel with irrigation tends to increase agricultural production by the use of modern inputs, due to declining transportation costs and ease of access of farmers to the market and other institutions (Antle, 1983; Ahmed and Hossain, 1990; Binswanger et al, 1987; Cobbs, 1980; Epstein, 1962; Evenson, 1986). The availability of transport services in rural areas strengthens the linkages between town and country and the farm and non-farm sectors (Johnson, 1970); this also expedites the trickle-down effect in the countryside (Bhalla and Singh, 1999; Ahmed and Donovan, 1992).

The availability of transport services helps in improving the chances of the rural population, in general, and that of the rural poor, in particular, for non-farm employment (in urban areas) through commuting, which not only ensures more working days but also more income as compared to employment in agriculture (Chadha, 1994; Epstein, 1962; Lanjouw and Stern 1993; World Bank, 1994). In a case study of Palanpur village of Uttar Pradesh, Lanjouw and

Stern (1993) show that the availability of rail transportation has helped the villagers to commute to the towns of Moradabad and Chandausi for employment. This has improved not only their per capita income and but also their living standard. The development of transport services also has regional dimensions, such as the location and relocation of investment and labour (Rietveld, 1989b). Bhalla and Singh (1999) further argue that the impact of transport in poverty alleviation works through cumulative causation. The lack of transport facilities results in low agricultural productivity, high transport costs, low profit margins, higher spoilage and losses of goods during transportation and hence lower levels of income and increased poverty.

The provision of economic infrastructure helped the mechanisation of agriculture and the industrialisation process in the 1960s and 1970s, which boosted economic growth (Drewe, 1977). There is evidence that the growth of agriculture has a significant impact on poverty reduction (Ahluwalia, 1988). The 'diffusion model', which formulates the process of technological spread in agriculture as a source of dramatic growth in that sector, critically depends on both physical and institutional infrastructure (Ruttan, 1984). Mellor (1976), citing an example from India, explains that infrastructure played a strategic role in producing a large multiplier effects in the economy for agricultural growth. As agricultural income grows, consumption expenditure increases in rural areas, creating increased demand for urban goods; hence the multiplier effects (Ahmed and Donovan, 1992).

It would be appropriate to mention some empirical studies that examine the impact of infrastructure on development in general and the rural economy in particular. Antle (1983), in a study of 47 less developed countries, concluded that transport and communication contributes significantly towards the expansion of aggregate productivity. Binswanger et al (1987) conducted another cross-country study based on 1969-78 data. They found a significant positive impact of roads and fertiliser use on crop production. Government expenditure on infrastructure services had a significant impact on poverty reduction as well. One interesting study (based on state level data in India) reveals that Government expenditure on roads had the highest impact on reduction of poverty, followed by that on welfare, health, rural development, education and soil and water (Fan et al, 1998). Further studies conducted in Asian countries demonstrate that infrastructure development has a significant impact on strengthening linkages between rural and urban areas and the farm and non-farm sectors of the economy (Mellor, 1992; Saith, 1986).

Ahmed (1987), in a study conducted in Bangladesh, concluded that development of rural infrastructure helped alleviate poverty by increasing the agricultural and wage income of landless and small landowning households. Barnes and Binwanger (1986) analysed data for 108 villages of India for the period 1966-80 and found that electrification leads to increase in agricultural productivity. Binswanger et al (1987), in a study of 85 districts of 13 states in India, confirmed that (a) improved road investment enhanced agricultural output significantly, (b) education and rural banks played an overwhelming role in determining investment in agriculture, and (c) electricity had a significant impact on the growth of grain mills in the countryside (another non-agricultural activity). Levy's (1996) examination of socio-economic conditions of the rural population before and after rural road building in Morocco confirmed that it had a considerable impact on rural areas by: (a) changing the agricultural economy (including higher output, transformation of the output mix from low-value cereals to high value fruit crops), (b) improving access to education and health, (c) increasing enrolment rates in rural schools and the frequency of visits to health services and (d) reducing poverty among the small and marginal farmers.

All of these studies reveal that improved infrastructure in the 1960s and 1970s (in other words during the implementation phase of the Green Revolution) had a significant impact on agricultural output and income. Yet, despite economic growth and improvement in social indicators (World Bank, 1990), inter-personal and inter-regional disparities have increased considerably, as the benefits of economic growth could not trickle down significantly (as expected) to the backward areas and targeted sections of society (especially the poor and women) in most of the Developing Countries (Lea and Chaudhari, 1983; Lipton, 1977; World Bank, 1990). Poor people and areas could not take advantage of the available services, because 'those who take up and make use of services are at first those who are better placed geographically, socially and economically' (Chambers, 1983). Sen (1996, 9) further argues that in major parts of India 'the privileges were often exploited for the sectional benefits of those with economic, political, or bureaucratic power, or those with the opportunity to influence people with such power'.

Growing and glaring inter-regional and inter-personal disparities and the impoverished conditions of the rural poor have forced us to realise the need for improvement in socio-

economic conditions of the deprived sections of society. Investment in human capital is considered essential for overall economic development. A large part of economic growth in the US during the first half of the 20th Century was attributable to increases in the stock of human capital (Denison, 1962). The availability of and accessibility to 'social infrastructure' such as education, health and sanitation and drinking water was considered to be the most important in order to ensure social justice (Drewe, 1977; Kuklinski, 1977; Sen, 1992 and 1996).

It has been documented that everyone, regardless of income level or social stratum, has a right to acquire a basic level of knowledge and skills; this principle is included in the Universal Declaration on Human Rights (United Nations, 1967). The availability of and accessibility to health and educational services (if utilised) improves socio-economic conditions of the population in general and mental skills and health in particular (Morris, 1979; World Bank, 1990 and 1993). Social infrastructure also has a great impact on the physical quality of life[22]. Government spending on education and health is usually associated with economic development; improvement in education, health and nutrition directly addresses the worst consequences of being poor; progress in social indicators requires a long-term commitment to making education, health care and other social services accessible (Noor, 1981; World Bank, 1990). These indicators cannot be separated from development; Sen (1996, 6) further claims that it is beyond doubt that 'more education and health must directly count as development, since they help us to lead longer, freer, and more fruitful lives'.

Accessibility to and utilisation of education and health services helps to reduce fertility, improves health and nutrition and promotes other behavioural and attitudinal changes, which are powerful catalysts to economic development (Ahmed and Hossain, 1990; Cochrane, 1979; Colclough, 1982; Murthi et al, 1995; World Bank, 1993). Improving education levels and health conditions help in raising the marriage age of women and in reducing birth, infant and child mortality rates. Access to education also enhances the ability of women to affect and improve their own lives and status, and the lives of their children (Kumar, 1993; USAID, 1994).

---

[22] Morris and Alpin (1982) measured quality of life by life expectancy, infant mortality rate and education. Many of the ingredients of a good quality of life- including education, health, and elementary freedoms- clearly do have instrumental roles in making us more productive and helping us to generate more outputs and incomes (Sen, 1996, 6).

There has been a major emphasis on the provision of basic education in the Developing Countries through its contribution to economic growth (Colclough, 1982). Noor (1981) argues that access to basic education allows an individual to develop his or her own potential to the fullest and at the same time to become effective in the wider processes of modernisation and growth. He has identified three major advantages of basic education:

- Education is a basic human need (World Bank, 1980b), which equips people with fundamental knowledge, skills, values and attitudes and enhances their capacity to change their willingness to accept new ideas.
- Education is seen as a means of meeting other 'core' basic needs, such as adequate nutrition, clean drinking water, and primary health care, mainly because it provides the necessary knowledge for change in the current practices and skills to better use of the services provided.
- Education plays a critical role for development by infusing in an individual an ability to identify with his changing culture and to seek a constructive role in his society.

Primary schooling increases labour productivity in both urban and rural areas, and the economic returns to such investment are typically high (Birdsall and Sabot, 1993a and 1993b; Colclough, 1982; Noor, 1981; Psacharopoulos and Woodhal, 1986; Sen, 1996). Primary schooling helps overall economic growth in rural areas by (1) increasing agricultural productivity through the mechanisation of agriculture as educated farmers are able to adopt new technology convincingly, (2) generating self-employment, and (3) educated people have better chances for non-farm employment that provide higher wage rates and a longer duration of employment (Noor, 1981; Standing, 1978). Elementary education also facilitates rapid and participatory growth (Sen, 1996). The availability of universal basic education makes people more aware socially and politically and in an area of mass literacy, where people are socially and politically more conscious, people demand more health facilities, use the health system more, and use it better (Ramachandran 1997). The example of Kerala's success in terms of widespread education is instructive:

> *Kerala's development is attributed to mass literacy, transformed agrarian relations, improved conditions of oppressed and a change in attitude towards girls and women and public policy intervention of the Kerala Government. Kerala's achievements were*

possible because of mass literacy and because traditional patterns of gender, caste, and class dominance were transformed radically. In the conditions of contemporary India, it is worth remembering that public action, and not policies of globalisation and liberalisation, was the locomotive of Kerala's progress (Ramachandran, 1997).

Despite ambitious Governmental plans, basic education and health services are still not accessible to a major section of society in the Developing Countries (Noor, 1981). Jallade (1982) concludes that education per se cannot significantly reduce inequality and that Government interventions are needed to bridge the gap between rates of return from education and reduced income inequalities. In India, there is little evidence so far that the seriousness of educational backwardness has been officially recognised (Sen, 1996). It is observed that there have been deep-seated class biases that have determined Indian educational priorities and that the inequalities in education are, in fact, a reflection of the inequalities in the economic and social powers of different groups (Sen, 1970). Sen (1996) further associates elementary education with India's role in the global economy. Firstly, elementary education is extremely important for successful integration of a nation with the world market. The nature and range of commodities sold by, say, South Korea since the 1970s or China from the 1980s brings out clearly how crucial basic education is for catering to the world market, with production to specification and reliable quality control. Second, the coverage of the population that takes part in the integration with the world market, the more 'participatory' the process of growth would tend to be, raising the income-earning power of large parts of the nation.

Sen (1996) further makes a relevant comparison between Brazil and South Korea. In the 1960s and 1970s the Brazilian economy grew very fast but achieved rather little reduction in poverty in economic as well as social terms, because of the poor provision of universal elementary education, while the wider base of elementary education in East Asia brought out big differences in participatory growth. Basic education is not only important for the well-being and freedom of people and for social change, but is also necessary for the success of India's economic reform. The prospects for participatory growth of India and her ability to make good use of the opportunities of integration with the world market are significantly compromised by the extraordinary backwardness of her basic education (Sen, 1996).

Besides elementary education, there are other expansions of social opportunities that call for urgent attention. These include the need for more widespread and better health care, greater access to social security, more effective and sweeping land reforms, and in general, enabling

the more constrained sections of the population to lead a less restrictive life, including being more free to make use of the facilities that the spread of the market can provide.

Health is an important agent of poverty reduction. Traditionally, a healthy population and workforce has been assumed to favour economic development, while an unhealthy population has been associated with poverty and underdevelopment (Phillips, 1990). It is realised that there is not a one way relationship between health and development. Brockington (1958) points out that development affects health both favourably and unfavourably, although the balance of advantage clearly lies with the developed countries and greater modernisation. It is noticed that better health can contribute to economic growth in four ways: (i) it reduces production losses caused by worker illness; (ii) it permits the use of natural resources that had been totally or nearly inaccessible because of diseases in certain areas; (iii) it increases the enrolment of children in school and enables them to learn; and (iv) it frees alternative resources that would otherwise have to be spent on treating illness (World Bank, 1993).

It is widely noted that few people (in the Developing Countries especially the poor) have access to, or contact with a modern Western health sector; about 70 per cent of the populations of the Third World Countries do not have basic access to modern medicines or health care, and in some countries this figure is above 80 per cent. This has resulted in excessively poor health, and high rates of morbidity and mortality (Akhtar, 1991). World Bank (1980a) findings on Third World health are summarised below:

- Health facilities are generally inaccessible to the majority of population especially women and children may experience difficulty in reaching a source of care.
- Urban and rural differences and inequalities frequently persist in health and health care.
- The availability of services and treatment (such as drug or X-rays) are often erratic, not only in rural areas but also in some parts of towns.
- Official health facilities sometimes fail to provide the necessary medicines, whereas the private black market can do it.
- Economic barriers as well as physical barriers exclude many people from formal health services; transport cost and time lost may prove too high for the poor to enable them to use these services.

- Imbalances therefore characterise health services: imbalances between individuals and communities (rich versus poor, favoured versus unfavoured), between regions, between urban and rural areas, and between countries.
- Less emphasis on curative medicines and training of health workers and physicians are not attuned to the needs of health services in rural areas.
- Lack of intersectoral co-ordination.

A study conducted by Crow and Thorpe (1988) concludes that the Green Revolution in India increased social stratification in many villages, enabling the better off peasant households to become wealthier and better housed and fed, but poorer peasant households have often been reduced to the status of landless labourers. The health opportunities of the poorer strata have often suffered as a result. In fact, health services in India respond to the demand of some groups rather than others: for instance men's complaints rather than those of women and children, town-dwellers' rather than villagers, ruling classes or parties rather than those of the ruled (Jeffery, 1991). The health problems of the ruling class (whose demands are responded well) are somewhat different and if the provision of health services is supposed to respond to demand it may not necessarily represent the real disease pattern and hence may constitute improper health services.

In most of the Developing Countries, all agencies and individuals involved in health care provision, administration, research and related social programmes, such as famine and disaster relief, are aware of these problems, but failure to overcome them lies in institutional weaknesses (Ostrom et al, 1993) and a lack of Government commitment. Moreover, narrow class interests have a clear impact on several aspects of health policies (Griffin, 1991; Sen, 1996). Jeffery (1991) notes that:

> *The urban professional, bureaucratic and commercial classes have a direct interest in expanding medical education in order to provide career paths for their sons (and to a lesser extent, daughters)...not much attention is paid to improve quality of public health services as for their own medical care they share the demands for private medical facilities in the towns and none of the propriety class will use Government hospitals except in an emergency or in case (as with some urban teaching hospitals) where facilities are unavailable elsewhere (p. 109).*

The major proportion of the population in rural areas is unable to take advantage of basic services because of geographical inaccessibility to these services (Bose and Desai, 1983;

Gollady and Liesen, 1980; Indian Council of Social Science Research, 1981; Stock, 1983; Wanmali, 1985; World Bank, 1980). The reasons for this are political intervention, Government policies, socio-economic constraints and improper planning. Some of these factors either facilitate or impede the location of infrastructure services. The growth of disparities in the availability of infrastructure services has been noticeable and the spatial distribution of infrastructure is especially biased in favour of developed regions (Sundberg and Carlen, 1989).

From a planning point of view, therefore, it becomes inevitable to pose the question of how infrastructure services can be planned so that accessibility (in terms of distance) can be improved. Generally, two approaches have been considered for the planning of infrastructure services: urban functions in rural development and location-allocation models. The former may be defined as a functional integration (with the major emphasis on the hierarchy of settlements) approach. Before 1970, there was a major emphasis on the establishment of rural-urban linkages. Johnson (1970) found that many developed countries had invested heavily in the establishment of linkages between town and country in the early stages of economic development. In this way, he argued, formerly isolated rural regions could become integral to the development process. Urban function methods, generally, organise and assess basic information on the investments needed to strengthen the role of settlements as marketing and service centres. Urban function approach does not seek to maximise geographical access of the rural population to individual urban functions, as is done by location-allocation algorithms (Fisher and Rushton, 1977; Hall and Bowerman, 1996; Oppong and Hodgson, 1994; Rushton, 1984 and 1988; Tiwari and Jena, 1987). Location-allocation analysis provides an explicit framework for diagnosing service accessibility problems, measuring the efficiency (measured by the comparison of actual and optimal distance between service centres and demand points) of recent locational decisions and the current levels of settlement efficiency, and for generating viable alternatives for action by decision-makers (Rushton 1988).

These methods evaluate alternative combinations of feasible locations and determine the best combination of sites with respect to defined objectives (Hansen et. al., 1983; Hodgart, 1978). Using location-allocation models, Fisher and Rushton (1977) identified a spatial hierarchy of potential service centres that would meet the separate spatial requirements, as defined by different sectoral agencies, for effectively meeting the basic needs of a rural population. In the

examination of an average distance to the closest existing service centre in a district of western India and average distance in optimal system computed by their algorithm, they found that bank, post and telegraph services require people to travel, on average, a 40 per cent greater distance than in the optimal system, followed by 21 per cent for hospitals, and 10 per cent for police stations. Further, they conclude that when consumers have to travel to services, the providers of services are insensitive to consumers' need for access, but when providers of services have to travel to the consumers, the providers succeed in locating the services in more accessible locations. Oppong and Hodgson (1990) argue that accessibility to services can be improved with better locational choices rather than the additional provision of services, especially when there is a resource squeeze for the provision of essential services. While dealing with the distribution of health facilities in the Suhum District of Ghana, they found that people have to travel a 26 per cent greater distance as compared to the optimum approach identified by using location-allocation models.

A demand-based location-allocation approach can be used to suggest rural populations with access to urban facilities and also to contain the cost of providing services (Belsky and Karaska, 1990). Rondinelli (1990) points out that, despite providing least distance locations, the location-allocation models are not adequate to improve rural-urban linkages and strengthen the functions of economic growth centres in rural areas. Rietveld (1990) stresses that location-allocation and urban function models should not be considered as mutually exclusive, but complementary to each other for the planning of infrastructure services. Location-allocation models can have a useful role within the broad urban function approach to regional development planning. But the basic drawback is that location-allocation models take into account only demand and distance, and the spatial aspects of service provision; other important social, political and economic determinants of access to services cannot be handled by these models. Spatial change per se (availability of infrastructure services and minimisation of geographical distance) is not sufficient to induce development in rural areas. The historical forces that led to the existing pattern of activities themselves must also change (Bromley, 1983). These historical forces influence the decision-making bodies and the administrative structures within which they work (Cheema, 1981). Change mechanisms, which have led to present patterns, must be considered in the planning process. If doctors are not trained to practise in typical rural conditions, or the cost of utilisation is beyond the control of targeted sections, and the quality is poor, then the opening up of rural health services that are optimally

located will be of little use (Zaidi, 1986). If the standard of care then offered by Government-provided health services is perceived to be low then an optimal location will not solve the problem of low use-level (Annis, 1981). Therefore, the delivery of infrastructure services should respond effectively to users' demands in terms of quality and quantity (World Bank, 1994).

Gender and Income Based Differential Access to Infrastructure Services

Several studies establish that infrastructure services are least accessible to the poorer sections of society (World Bank, 1990 and 1994). Children are forced to work at early ages in poor families, for poverty does not allow their parents to give up the immediate gain from their children's labour. Therefore, children of poor families are deprived of education to a greater extent. A correlation between educational level and health care awareness has also been established (World Bank, 1991).

A report by the World Bank (1991) has recognised that one of the most important factors which restricts women's access to infrastructure services (particularly in north India) is their culturally-defined traditional role 'inside the household'. During the last decade there has been a major emphasis on gender studies. Literature relating to these studies points out that higher morbidity, and lower utilisation of education, health, transport, and market services by women clearly indicates their poor access to infrastructure services (Phillips, 1990; Morris and Alpin, 1982; Freud, 1986; Levy, 1996; World Bank, 1991). Improvement in women's access to infrastructure services, particularly to education and health, has been recognised as one of the important measures to improve socio-economic conditions of women (Miller, 1982; Sadik, 1990; UNDP, 1993; UNESCO, 1991; World Bank, 1991). It has further been asserted that women's access to basic infrastructure services could bring them higher returns for their labour (World Bank, 1991). This will not only increase their income but also strengthen their economic independence and decision-making power.

2.5 CONCEPTUAL BASIS

From the literature discussed above it is very clear that the provision of basic services, particularly education and health (if serving the needy people), forms the basis for overall development. In the present research an attempt is made to model the relationship between availability, accessibility and utilisation of basic services, and social and economic

development of society (Figure-2.1). The question of utilisation arises only when services are available, and this requires investment. Therefore, investment in education and health services ensures their availability and quality. It must be noted that the investment must respond to 'real/appropriate demand' for services[23]. Availability, distance (measured in terms of topological distance, travelling time and cost) and income level (if services are not completely free or are located at distance places so that there is some transportation cost) greatly influence access to services.

Accessibility to education and health services is essential for a healthy and educated population. This in turn improves knowledge and skills, which are essential for a higher income and what Sen (1996) terms capability building, freedom of choice and the expansion of opportunities (indispensable for human welfare). The increase in income (through economic growth) may in turn increase Government expenditure on social services and this may again keep working in a loop of cumulative causation.

The present study examines the availability of, access to and/or utilisation of education, health and transport services. The availability of services is examined through secondary data from all the villages in the study area. The availability of services alone cannot guarantee access to services. Therefore, an extensive field survey was conducted in 8 villages of Rohtak and Bhiwani Districts to find out 'what determines access to (or the real utilisation of) services (education, health and transport)'. A model is formulated to examine this relationship (Figure-2.2), which can be divided into three parts, namely the controlling variables (which govern access to and utilisation of education and health), the response variables, and the variables indirectly affected by the accessibility and/or utilisation. It is assumed that the four variables, namely income, caste, gender and village accessibility are important determinants of access to and/or utilisation of education and health; and better education and health results in better skills and higher income, which are crucial for the capability building of the people and for the expansion of the freedom of choice and opportunities, considered to be essential to eliminate poverty, ignorance and disease. These tasks Nehru (the first Prime Minister of India) set before the nation five decades ago (Quoted from Sen, 1996).

---

[23] There is a well documented literature (discussed earlier in this chapter) that demand for services is biased in the favour of better off sections of the society and it may not truly represent the actual plus the latent demand. Therefore, we have used the term 'appropriate demand', which represents the real needs of the needy people.

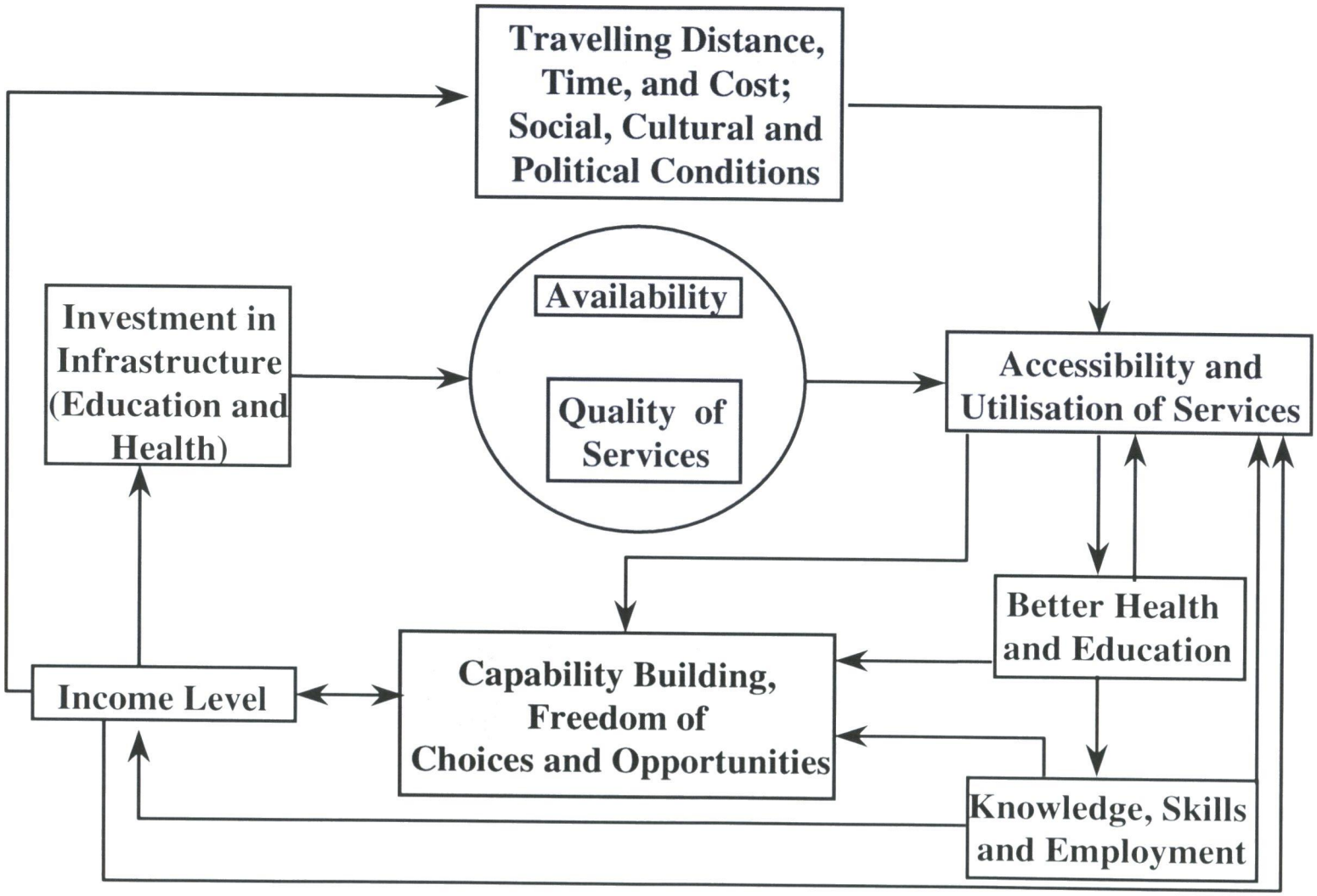


Figure-2.1: Conceptual bases of infrastructure availability and accessibility and their impacts

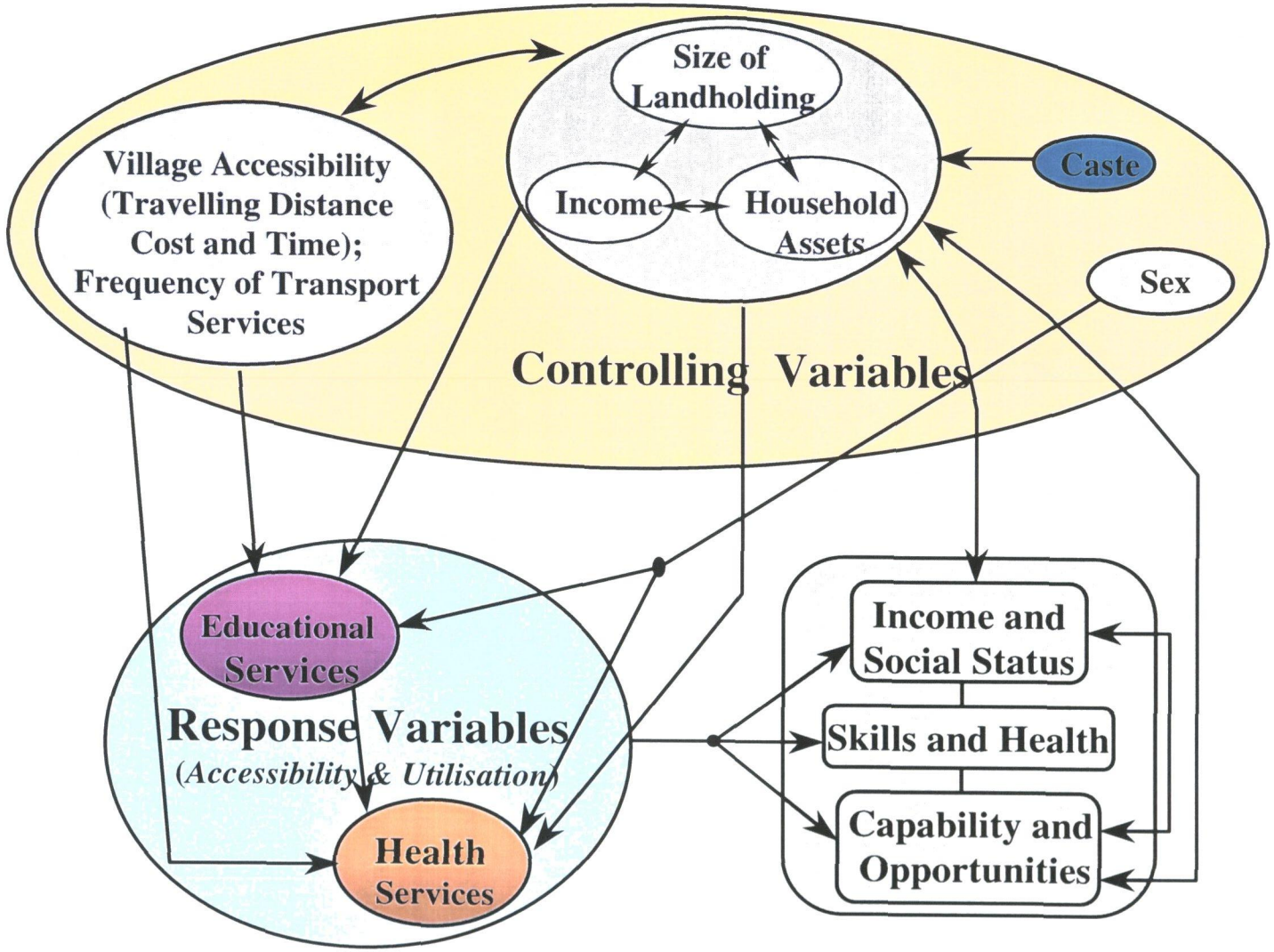


Figure-2.2: Accessibility to and/or utilisation of, education and health: their controlling variables and effects.

- What are the impacts of income, caste, village accessibility and gender on service utilisation?
- What is the impact of village accessibility on education and non-agricultural employment?
- What do people think about the quality of the available services? What are service users' and providers' views on operation, maintenance and monitoring of the selected services?

To investigate these issues a wide range of data was collected from different sources at different points in time. In the first section, sources of data and data collection are discussed. The second provides a detailed description of methods used for the data analysis.

3.2 DATA SOURCES, COLLECTION AND TYPE

3.2.1 Secondary Data:

Secondary data were collected at village and district level from the Census, the Economic and Statistical Organisation (ESO), the Finance Department and Director of Higher Education of Haryana Government, Chandigarh (Capital of both Haryana and Punjab States), the Chief Medical Office (CMO) and the District Education Office (DEO) at Rohtak and Bhiwani headquarters. The types of data collected from these sources are given below:

The Census of India: The village is the smallest administrative unit in India, and it is only the Census which publishes data at village level. The Census of India publishes District Census Handbooks (DCHB) for each district of the country for every Census year (conducted every 10 years). Data on infrastructure availability were collected from DCHB of Bhiwani and Rohtak Districts for the years 1981 and 1991. 1991 Census data were available in electronic format (from Registrar General of India's Office, New Delhi), while 1981 data were collected from the published DCHBs. Each DCHB contains a wide range of data for each village and town in the respective district. This is the only source of reliable data on infrastructure availability at village level. Each DCHB contains data on the availability of six infrastructure services: education, health, post and telegraph, markets, drinking water and electricity. Three pieces of information are reported for these services: (1) whether the service is available or not; (2) if available, then the type of service; and (3) if not available, at what distance it is available. There were some changes in the administrative boundaries of both districts under study. Therefore, 1991 data were adjusted according to the 1991 Census. In the 1981 Census, Gohana tahsil was a part of Sonipat District. Therefore, some data were

collected from 1981 DCHB of Sonipat. There have also been changes in the administrative boundary of Bhiwani District. Some villages, which were in Hisar District in the 1981 Census, were merged with Bhiwani in the 1991 Census. At times, Siwani tahsil has been in Bhiwani and Hisar Districts, but at the time of Census enumeration in 1981 and 1991 it was in Bhiwani District. DCHBs also contain data on the Primary Census Abstract (PCA), which is based on universal slips (which means 100 per cent counting). This includes data on population, the number of households, literacy, and workers and non-workers.

The Economic and Statistical Organisation (ESO), Haryana: The ESO is a part of the planning division in every state and publishes a statistical abstract every financial year. It contains comprehensive statistics on almost all socio-economic aspects of the state along with corresponding statistics for the last several years (Government of Haryana, 1997a). The ESO compiles data at the district and the state level. The Statistical Abstracts of Haryana (SAH) State, 1980-81, 1985-85, and 1990-91 and 1995-96 were consulted for collecting data on the number of schools, teachers and pupils both for Rohtak and Bhiwani Districts and for Haryana State. This also provided information on Government and private schools separately and girls' and boys' enrolment in the schools, and number of hospitals, CHCs, PHCs, doctors and a price index.

The Finance Department, Haryana State Government: The Finance Department of every state Government prepares a budget for each financial year for their respective states, which is presented in the State Assembly by the state finance minister and is approved by the Government with some modifications if necessary. This budget is published once the state Government approves it. The Haryana State Budgets, for 1982-83, 1987-88, 1992-93, 1997-98 were consulted for development and capital revenue expenditure for the financial years 1980-81, 1985-86, 1990-91 and 1995-96 respectively. Every budget has data for the last three years. The most recent are only estimates for the next financial year. There are two statements for the last financial year, namely: budget estimates and revised estimates, and the final estimates are given for the previous year. Therefore, the final figures for 1990-91 are available in the budget of financial year 1992-93.

The Directorate of Higher Education, Haryana State Government: Census data are collected every decade, but the latest data on the education and health services are not available from the Census. Therefore, some unpublished records were used for the most

recent information on education and health services. The Director of Secondary Education of Haryana Government published a directory of all Government and private schools for the year 1996 for all the villages and towns in the state (Government of Haryana, 1996). Prior to this they published another school directory in 1992, but that was close to the 1991 Census. Only 1996 data on school availability were used from this source. The availability of these data helps in a comparative analysis of school availability for three points in time - 1981, 1991 and 1996.

Other unpublished records: The latest data on the availability of health services were not available from any published sources. In every district, the Chief Medical Officer (CMO) controls and directs the hierarchy of Government health services in rural and urban areas. Therefore, Chief Medical Offices of Bhiwani and Rohtak Districts were consulted for 1996 data on the provision of health services in all the villages and towns. Unfortunately, they do not maintain records of the provision of private health services.

Indian planning is still centralised and budget allocation is generally at the sector level. Therefore, district-wise aggregate expenditure data on infrastructure services are not published. Expenditure data on education and health were collected (with great difficulty[1]) from unpublished records of District Education Office (DEO) and CMO at Rohtak and Bhiwani District headquarters. Expenditure was grouped into three categories: salaries, maintenance (machinery and equipment: also medicines in the case of the health services) and others. Aggregate expenditure data may not reveal the true picture of rural areas as these include expenditure incurred on services located in urban areas. Therefore, expenditure data on two Government schools in Kehrawar and Chuliana villages were also collected.

3.2.2 Primary Data:

One of the important objectives of this research work was to examine the accessibility (social and economic) and utilisation of basic infrastructure services. But none of the published sources provide data on infrastructure accessibility. Therefore, an intensive field survey was conducted in order to collect these data. There were 921 villages in both Rohtak and Bhiwani

[1] Data on public expenditure are not easily available. District officials are generally hesitant to release these data to the public. When I visited the CMO's office for the first time, I was denied any data. Then I had to get formal approval from the Director of Health Services, Haryana. Expenditure records are not well maintained in these offices and one has to really work hard to get hold of these data especially at District headquarters.

Districts and it was not plausible to conduct field surveys in all of these villages. Therefore, 8 villages, four from each of Rohtak and Bhiwani districts were selected for an intensive field survey. The population of the selected villages varied from 373 in Dhani Mansukh to 8,553 in Bapora (Table-2.2). Selected villages can be grouped into three categories in terms of population size: small (less than 1000), medium (1000 to 5000) and large villages (more than 5000). A village accessibility index[2] was also derived. Based on this index, only two villages, namely Kehrawar and Bapora were declared as 'more accessible' and the rest as 'less accessible'.

A great deal of social disparity in terms of castes[3] (deeply rooted in Indian society) and economic disparities in terms of size of land holding were observed in each of the surveyed villages. Therefore, due consideration was given to caste and the size of land holding for the selection of a representative household sample. There are thought to be about 3000 castes in India (Hutton, 1946). The current caste system in India is somewhat different from the Vedic Varna system. Socially disadvantaged groups 'Scheduled Castes' (SC) and 'Scheduled Tribes' (ST) were identified under clauses 24 and 25 respectively of Article 366 of the Indian Constitution. The Government of India notified another socially disadvantaged group known as 'Other Backward Classes' (BC) on 8th September 1993, which comprises Castes and Communities listed in the Mandal Commission report (Mandal, 1980). None of the STs is listed in Haryana State. Broadly, castes were grouped into three categories in order of their social ranking in Indian society: General or Upper, Backward and Scheduled castes. General castes include Brahmin, Jat, Rajput and Vaishya. These castes belong to the first three Varnas and are placed highest in the social order. Backward castes are those identified in the Mandal Commission report and are considered to be second in the social order. These generally comprise craftsmen such as carpenters, gold and black smiths etc. The Scheduled castes are

[2] The village accessibility index is discussed in detail in the next section on methodology.

[3] During the *Vedic* period (1500 B.C.) the caste system was fully established in India, which owes its origin in the *Varna* system (Hutton, 1946; Sagar, 1975). The caste hierarchy was arranged in four *Varnas* namely Brahmin, Kshatriya, Vaishya, and Sudra. Brahmins were assigned divinity and six other duties of studying, teaching, sacrificing, assisting others to sacrifice, giving alms, and receiving gifts, to the end that *Vedas* might be protected; Kshatriya were assigned strength and the duties of studying, giving alms, using weapons, protecting treasure and life, to the end that good Government should be assured; Vaishyas were allotted the power of work and the duties of studying, sacrificing, giving alms, cultivating, trading and tending cattle, to the end that labour should be productive; and to the Sudras were given duties to serve the three higher varna (Bühler,1879-82; Hutton, 1946). During this period the basis of *Varna* system was occupational and people of different *Varna* could chose different occupations. After the Vedic period the caste system became more rigid gradually, especially during the medieval age.

those known as Sudras in the Varna system and have the lowest social ranking in Indian society. These castes are generally engaged in manual activities and the lowest occupations (considered in Indian society) such as cleaning, cobbling, agricultural labour etc. At present, occupation is not very rigid for different castes: upper caste people can practice lower caste jobs and vice-versa.

Before carrying out the household survey, key informants (such as the village headman, members of Panchayats etc. [Plate-3.1]) in the villages were consulted for the identification of numbers of households belonging to different castes and the distribution of agricultural land and the location of different castes' households. These key persons were very informative. They also drew sketch maps of their respective villages, which proved to be very helpful for the final household selection. The villagers were also very informative and had a very good knowledge of different households. Keeping in mind the number of households belonging to different castes and the amount of agricultural land, 507 households were surveyed in 8 selected villages (Table-3.1), out of which 287 in Rohtak and 220 in Bhiwani District. Of the total, 339, 65 and 103 households belong to General, BC and SC respectively.

There is a positive relationship between caste hierarchy and size of land holding (Table-3.2). Among the 507 surveyed households, there were 2455 acres of agricultural land, and 67, 13 and 20 per cent of General, BC and SC households account for 94, 4.5 and 1.5 per cent of the agriculture land respectively (Figure-3.1). Within the general castes, attempts were made to select a fairly representative sample[4] in terms of the distribution of agricultural land.

Structured household surveys and informal discussions with the villagers (service users or clients) and district officers (Government service providers or district-level-bureaucrats) were conducted during the period October, 1997 to March, 1998. Data on a number of issues, ranging from general conditions of the household to service accessibility were collected. In each of the surveyed households, the most informative person available at the time of the

[4] Key informants gave some idea about the number of households with different sizes of land holding. A list of households with different size of landholdings was prepared and an attempt was made to give a fair representation (proportionate to the number of households in different categories of land holdings) to households with different size of land holdings.

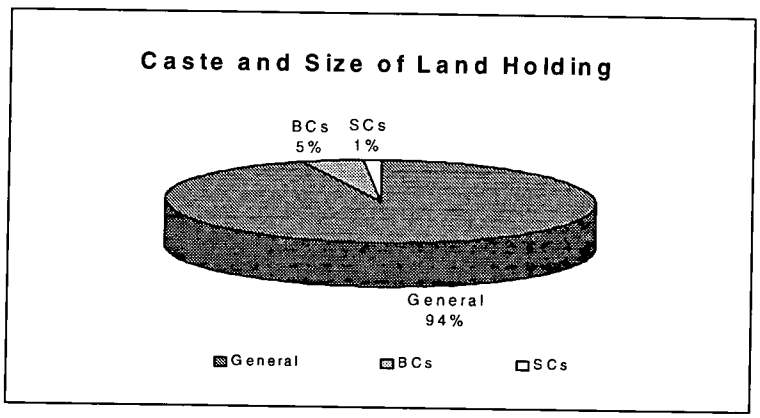
survey was interviewed. In most cases, respondents were male[5], especially among the general caste households. Therefore, the surveyed data may be biased in favour of males. The structured questionnaire for the household survey, which has 10 parts, is discussed in the following section; a full copy of the questionnaire is presented in Appendix 2.

Table-3.1: Households Surveyed (number of households)

Village	Number of Households			
	General	Backward Castes	Scheduled Castes	Total
Rohtak District				**287**
Kehrawar	62	18	19	99
Chuliana	40	10	22	72
Diwana	13	3	1	17
Brahana	74	3	22	99
Bhiwani District				**220**
Bhera	29	11	10	50
Patodi	25	7	8	40
Bapora	78	13	14	105
Dhani Mansukh	18	0	7	25
Total	339	65	103	507

Source: Author's calculation

Figure-3.1



Source: Author's calculation

[5] The surveyed region is a male-dominant patriarchal society and females' contact with outsiders/strangers is not acceptable, particularly among the General/Upper Castes (Plate-3.1 and 3.2). Moreover, women (especially married in the age group 15 to 50 years) are not seen at the place of social gathering for males such as a 'Chopal'; and a stranger is not accepted at the places of social gathering for women such as a well. Therefore, it was difficult to contact women in the surveyed villages for any sort of group discussion; and a relatively small number of women was interviewed (less than 40).

Plate-3.1: Village headman and villagers, Bhera

Plate-3.2: Villagers playing cards, Bapora

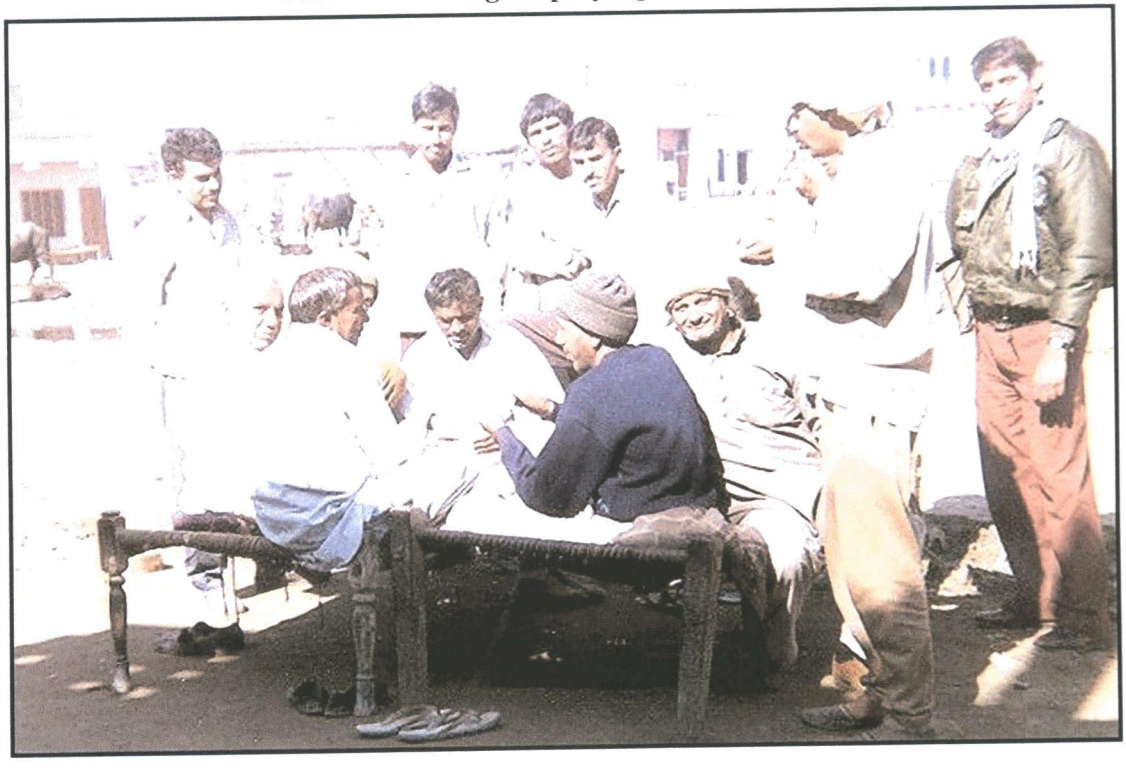


Table-3.2: Castes and Agriculture Land

	General	BC	SC	Total
Average(Acres)	6.8	1.7	0.4	4.8
Total (Acres)	2308	111	36	2455
Per Cent Land(%)	94.0	4.5	1.5	100.0
Household With Land (%)	86.6	9.4	4.0	100

Source: Author's calculation

In the introductory part of the questionnaire, two variables are important: caste and size of operational land holding. In the first part, the individual particulars of each member of the household were collected. These include the relationship with the head of the household, the year of birth, the education level, the last educational institution attended, distance from the last educational institution attended, any reason for dropping out of education, marital status, and main work etc. Some questions were pre-coded. After the data collection some of them were re-coded (see Appendix 3) as some of the responses were beyond the pre-coded responses.

The second part of the questionnaire relates to expectations from education. Respondents were asked about their expectations in educating boys and girls, and the type of educational institutions preferred (Government or private) etc. These questions were asked only if at least one boy or girl, or both was studying. Questions listed in parts one and two were used to investigate access to education in general and to school education in particular.

The third part is related to health. Respondents were asked about health sources for treating minor illnesses, and the reasons for choosing those sources. The second section was for those members of the household who suffered from any illness during the previous six months (from the date of interview). Important information collected in this was: the source of treatment, distance from that source, reasons for using that source, the number of consultations, whether the patient was accompanied by any other person when he/she went for consultation, and the outcome.

The fourth part of the questionnaire deals with fertility and mortality in the household during the last year; although these data are not used directly in the thesis, since they are not directly associated with the main objectives of the present work. The fifth part relates to drinking water, which was identified by the villagers in the pilot study as one of their important

problems. These data were also not used, because these are also not directly related to the infrastructure services selected for the present study.

The sixth part of the questionnaire deals with transport. Data on the availability and type of personal conveyance owned by the household are collected in the first section. The second section is on visits by household members, which helped in investigating access to transport. The important questions in this section are: the number of visits during the last month, the places visited, distance travelled, time of departure and arrival, mode of transportation used, and whether the visit was alone or accompanied by some other person. These data pertain only to those members of the household who had travelled out of their village (for any purpose) at least once during the previous month.

Respondents were then asked about the village's problems and about additional services needed in the village. The eighth part of the questionnaire relates to the economic base of the household. Important questions that respondents were asked relate to their main source of income, and the number of family members contributing towards the household income. Information on every member of the household who was working was collected separately. This includes main and subsidiary work, the place of work, distance between village and working place, the number of working days in the main and subsidiary work, and monthly income. If some members of the household were engaged in cultivation, data on the crop production (during the previous year in *Rabi* and *Kharif* seasons) were collected. Respondents were asked about land leased in, leased out, rented in and rented out, which helped for income estimation of the household. If a household owned agricultural land and did not cultivate, income data were also collected from rented out or leased out land. The ninth part of the questionnaire relates to household assets and livestock. In the tenth part, an attempt was made to gather information on respondents' satisfaction level for the selected infrastructure services, but this did not prove useful, as it was difficult to get precise information on satisfaction levels.

Accessibility and utilisation: One of the important aims of this study was to identify the variables which govern accessibility to and utilisation of basic infrastructure services. In the present study, the terms 'accessibility' and 'utilisation' are used interchangeably. It is rather difficult to capture data on the need for services and their utilisation. Therefore, some direct and some indirect indicators of access to education, health and transport services were used.

Access to school can be judged by knowing whether a person has attended a school or not. It is assumed that if a person could not attend a school in his/her lifetime it means school was not accessible to him/her (although he/she might have not felt the need to go to school). Secondly, the duration of access can be measured in terms of education level. The higher the education level, generally the more the time one has spent in attending an educational institution, and hence the greater the duration of access. Another important issue under consideration is accessibility to different types of educational institutions (especially Government and private) located at different places and distances.

In the case of health services, the situation is somewhat different. The need for health services is an erratic phenomenon that can arise at any time for anyone; one has to use a health service under compulsion of ill health or its prevention. Therefore, the major concern here is to examine the utilisation of different types of health services located at different places and distances and the reasons behind their selection.

The availability of a personal conveyance, the number of vehicles, and the frequency of visits are considered as important measures of mobility, which can indirectly indicate the level of access to transport services. Besides these three, some other associated variables, such as time of arrival and departure and freedom to visit alone, can also be considered as measures of access to transport services.

A large number of variables control accessibility to and/or utilisation of infrastructure services. Only four important controlling variables, namely income level, caste, sex and village location, are used in this research. An attempt will be made to examine their impact on the accessibility and or utilisation of the three selected services. It was not possible to capture income data for every individual. Therefore, income data were compiled at the household level, and were divided by the number of members in the household.

Participatory[6] informal discussions were organised (recorded on tape) with the service users in all eight villages, and with district officers (service providers) at district headquarters of

[6] Participation entails empowerment i.e. everybody's right to have a say in decisions concerning their own lives; it is an instrument in the promotion of ideological or normative development goals such as social justice, equity and democracy (Mikkelsen, 1995, p.63). In the present context, participation means the identification of relevant infrastructure problems from the service users' and providers' point of view.

Bhiwani and Rohtak Districts. There are some common places in villages, where people (only males) of almost all age groups are available especially during the weekend. Villagers were asked to form groups and were then asked the following questions:

- What important services are available in the villages?
- Are they satisfied with the available services, if not then why?
- Are there problems in the operation and maintenance of these services?
- What could be your (villagers') role in the operation and maintenance of these services?
- What are the additional infrastructure services needed in the village?

Similar types of discussion with women were not possible at all due to the prevailing social conditions. But some issues related to infrastructure services were discussed individually with Scheduled Caste women. Therefore, from the service users' point of view these discussions may not fully represent women's opinions.

Informal meetings were organised with the district officers namely- the Additional Deputy Commissioner (ADC) (in-charge of rural development planning), the District Education Officer (DEO), the Block Education Officer (BEO), the Chief Medical Officer (CMO), the General Manager (GM) Haryana Roadways, and the Block Development Officer (BDO). These meetings were carried out twice at both district headquarters before and after the final survey of the selected villages. Officers were posed the following issues for discussion and this discussion was recorded on tapes and translated later on.

- What do you think are the achievements and failures of the rural-development process in the villages of Rohtak/Bhiwani Districts during the last 50 years (especially in terms of infrastructure services)?
- Whose role has been most active in these failures and successes?
- What do you think are the most important services/facilities in rural areas for the developmental process?
- What are the prime objectives of providing services/facilities such as education, health, transportation, drinking and irrigation water?
- Who is responsible for establishing, running, maintaining and monitoring services/facilities? Has the concerned body been able to run, maintain, and monitor the available services effectively and efficiently?

- Due to some problems of running, maintaining and monitoring of the available Government services, people have started utilising some private services, such as a private school and a health centre. What is the difference between Government and Private services? What are the main reasons that people have started doubting the reliability of Government services?
- Although experienced and trained manpower is employed in Government services as compared to private services, but their quality is deteriorating mainly because of over-security of jobs and poor accountability for the operation and maintenance of services. How can the quality of these services be improved?
- Government provided services (especially in rural areas) appear like an 'orphan child' as neither the service providers nor the service users are willing to take full responsibility to the operation, maintenance and monitoring of services. What are your opinions about this? What could be the villagers' role in the operation, maintenance and monitoring of these services?
- These days, people (service users) may be said to over-expect and over-depend on Government provided services. What are your opinions about this?

3.3 METHODOLOGY

A number of methods were used in this research extending from simple percentage calculations to sophisticated location-allocation and multinomial logistic regression models. To some extent the utility of a method depends on the nature of data to be analysed. In this research, two types of data are used, based on which the following section is divided into two parts: primary and secondary data analysis. Firstly, the methods used for the analysis of secondary data are dealt with, and the methods for analysing primary data are discussed in the second part.

3.3.1 **Secondary data analysis**: According to the 1991 Census, there were 493 and 439 villages in Rohtak and Bhiwani Districts, respectively which were adjusted[7] to 490 and 431 according to the 1981 Census for a comparison between 1981 and 1991. There were 8 and 6 towns and cities in Rohtak and Bhiwani Districts, respectively.

[7] In the 1991 Census, some new villages were created out of large villages and data for these new villages were not available separately for the 1981 Census. Therefore, these new villages were merged in to the villages they were carved from.

A number of methods were employed for analysing secondary data extending from the calculation of simple growth to location-allocation models, which are discussed below one by one:

A large number of variables related to infrastructure services were tabulated and cross-tabulated for both districts: Rohtak and Bhiwani. As discussed above, time scale data were collected on a large number of variables: such as expenditure on education, health and transport, availability and type of these services etc. Simple and exponential growth rates were calculated to assess change in these variables. The method for the calculation of exponential growth in population and other associated variables is:

$$r_t = 100 * (1 - (\text{antilog}((\log(\frac{x_t}{x_0})) / t)))$$

Where r_t = growth rate for the time period t

x_0 = variable x at the beginning of t

x_t = variable x after time t

Data on expenditure on education, health and transport were adjusted to the base year 1980. The index numbers[8] for 1980, 1985, 1990 and 1995 were 100 (base), 138.5, 192.6 and 317.9 respectively, simple growths were worked out for every five years at current and constant prices (1980-81).

Another important issue of this research is to assess demand and pressure on the available services. For this the pupil/teacher ratio was also worked out for Rohtak and Bhiwani Districts separately, for 1980-81, 1985-86, 1990-91 and 1995-96. The pupil/teacher ratio could not be worked out at the village level, as data on number of teachers and pupils were not available at this level. But population pressure on each infrastructure service was worked out by dividing the population by the respective number of infrastructure services, for example the population for every high school, or senior secondary school, or every PHC, etc.

[8] This index is based on all India wholesale prices. Some adjustments were made to calculate 1985, 1990 and 1995 prices to the base of 1980 prices (source: Economic Adviser, Minister of Industry, Government of India, New Delhi; quoted from '*Statistical Abstract of Haryana: 1995-96*, Chandigarh: ESO, 576-78).

Straight-line distances between villages and the nearest town or market, main road, rail station and Delhi UT boundary were calculated using the 'near' function[9] of ARC/INFO, a Geographical Information System (GIS). All villages were considered as point locations in order to perform these calculations. The straight-line distance d_{12} between two points in a plane is given by the following formula where (x_1,y_1) and (x_2,y_2) are the locations of the two points in a Cartesian plane (Robinson et al,1995, 99):

$$d_{12} = \sqrt{((x_1 - x_2)^2 + (y_1 - y_2)^2}$$

Where d_{12} = straight line distance between point 1 (x_1, y_1) and point 2(x_2, y_2)

One of the important objectives of the present study is to examine geographical accessibility and efficiency levels of selected services. Geographical accessibility is generally measured in terms of the physical distance people have to travel to access a service. An important issue here is: how to find out the geographical efficiency of infrastructure services? It can be calculated by estimating the difference between the actual and the optimal locations. This leads to another important question, i.e. what is 'optimal' and how can it be identified? An answer to previous question may lie in the analysis of 'location-allocation models[10], if optimality is defined in terms of geographical distance and demand (Ghosh and Rushton, 1987; Rushton, 1984 and 1988; Killen, 1983). These models have been used for a wide variety of problems, such as locating warehouses in order to minimise transport cost or locating a public (Government) facility to minimise weighted distance. ESRI (1998) defines location-allocation as:

> "*a process of determining the best or 'optimal' locations for one or more facilities so that the services or goods are accessible to the population in the most efficient manner. The models optimise efficiency by simultaneously determining the configuration of the*

[9] The near function computes the distance from each point in a coverage to the nearest arc, point, or node in another coverage. Distances and the internal number of the closest feature are saved as new items in the input point coverage's feature attribute table (See ARC/INFO: Starter Kit, ESRI, 1998 and 1999).

[10] These models are used to determine the optimal location of central facilities in order to minimise movement and other costs and can be used for the location of public and private sector facilities/services. A public sector example could be the location of two new hospitals. Its objective would be to minimise the aggregate travel cost to patients and to arrive at an optimal assignment of patients to the hospitals. A private sector example is the location of warehouse facilities between factories and markets in order to minimise total distribution costs (Johnston et al, 1996, p. 345).

facilities (location) and assigning the facilities (allocation)" (ARC/INFO version 7.2.1, online help).

The main objective of location-allocation is to find out the 'best locations', but answers to the questions, 'what is a good or the best location?' and 'What kind of measures should be used to determine how good a location is', depend on what type of facility are being located and who will use it. The provision of public sector services and RMP doctors is dealt in the present research. Before location-allocation problems are analysed, it is essential to know the data requirements for the operation of these models.

A location-allocation problem involves two basic elements: (a) a set of consumers (demand) distributed spatially over an area and (b) a set of facilities (service centres) to serve them (Taylor, 1977). Data on the location of schools and health centres are available for 1981, 1991 and 1996 for all the villages of both districts. But data on consumers of these services are not published. Therefore, we have to use population as a proxy for demand for these services. In the case of school education, the population in the age group 5 to 25 is needed, but age-specific data at village level are not available. Use of total population as a proxy for demand is appropriate if we assume that the proportion of population in the age group 5 to 25 is uniform across all the villages. In the case of health services as compared to education population can be a better proxy for demand. General health services are needed for all, irrespective of age unless some specific health programmes are dealt with such as family planning, immunisation etc. Since only general health services are considered here, total population suffices as a proxy for demand.

There are two broad classes of location-allocation models: location on a continuous surface, and location on a network. In the continuous surface straight-line form distance is used as a proxy for real distance, which is determined by time and travel cost. As data on real distance are rarely available (unless generated in the field, which is difficult, if the size of problem is big) straight-line distances (which can be lesser than the distance along the actual route) are extensively used. Recently network form[11] is considered to be more important than straight-line distance. In the network form potential locations are defined as nodes and are linked to sources by a route network (Johnston et al, 1996) which helps in calculating the geographical

[11] In network form demand points and service centres are defined along the transport routes, this provides actual geographical distance (if not time and travel cost) instead of straight-line distance.

distance to services along the actual routes. Unfortunately, although data on minor roads are available from large-scale topographical sheets, but most of them were either outdated or not available for the study area. Moreover, all villages (which are considered as demand points) were not networked through the main roads (district or state highways) and many of them are just connected to approach roads, which are very poorly maintained and in many of the villages no public mode of transport was available. Therefore, the only choice left was location on a continuous surface.

Mathematical formulation is another important aspect of location-allocation models, which depends on the objectives of the problem to be examined. Therefore, it is necessary to define objectives and constraints before model formulation. Our main objective is to determine geographical accessibility through distance minimisation (a p-median problem[12]). A P-median problem locates p centres to minimise the total weighted distance from the centres to the demand locations. This problem can be solved with the following mathematical formulation (ReVelle and Swain, 1970):

$$MinZ = \sum_{i=1}^{n} \sum_{j=1}^{m} w_i * d_{ij} * x_{ij}$$

Subject to :

1. $\sum_{j=1}^{m} y_j = p$ restricts the number of facilities to p

2. $\sum_{j=1}^{m} x_{ij} = 1, \forall_i$ ensures that every demand location is served

Where:

i	=	demand location
j	=	candidate facility location
n	=	number of demand locations
m	=	number of candidate facility locations
p	=	number of facilities to locate
w_i	=	weight at demand node i

[12] ESRI (1998) recommends this approach for private service location, where the objective is to minimise distance and optimise efficiency. This model is also recommended for public service locations with distance constraints.

d_{ij}	=	shortest distance between demand location i and candidate j
y_j	=	1, if facility is located at site j; 0 otherwise
x_{ij}	=	1, if demand location i is served by facility at site j, 0, otherwise
$\forall_i$	=	demand site decision variable

Location allocation models were run separately for each of the services under study. For each service a model was run in four steps. In the first two steps the environment was set[13] for the operation of the location-allocation. In the third step locational analyses were performed and in the fourth step the results from the location-allocation models were analysed.

Step 1: In the first step candidates and demand items are defined. Each candidate (village in this study) items can have either of three values: 0,1,2 which indicates that they are not a candidate, or a mobile candidate (which means a service may be or may not be located) or a fixed location respectively. Therefore, each village was assigned to one of these three options. Each village also has a demand value. If the demand value is 0 then that village is not a candidate.

Step 2: In the second step, a location-allocation model is specified along with a distance constraint (if needed). Four models are available in ARC/INFO: minimum distance, maximum attendance, maximum coverage and minimum total powered distance. Model selection depends on the identified objectives of the study. The 'minimum distance' criterion is employed in the present analysis, as our major thrust is on the identification of geographical efficiency of existing services in terms of weighted distance.

Step 3: In the third step, the system performs the location-allocation analysis based on input parameters set in the first two steps. For executing a locate-allocate function, the names of three output files (where the results will be stored) and the number of locations selected are to be defined. Solving a location-allocation problem would require analysing every possible alternative configuration and it could be a large number as shown in the equation given below:

[13] Data input and constraints and conditions are defined prior to final execution of the location-allocation programme.

$$\text{Number of alternatives} = \frac{n!}{m!(n-m)!}$$

Where n = number of candidates

m = number of sites to choose.

The number of alternatives for choosing 2 sites out of 6 (6 choose 2) is 15. Similarly, 100 choose 10 will give 17,310,309,456,440 alternatives (ESRI, 1998) and it is not feasible to find an optimal solution out of a large number of alternatives. Therefore, heuristic algorithms were used to solve such problems. Two types of heuristics are available in ARC/INFO, namely- the Global Regional Interchange Algorithm (GRIA) (Murray and Church, 1994) and the Teitz and Bart Heuristic (TAB). The TAB is generally used when candidate locations are different to the demand locations (Teitz and Bart, 1968), but in the present study both candidate and demand locations are the same. Therefore, the GRIA algorithm[14] was used, to be specified at the end of the command syntax.

Step 4: The final results stored in three files are analysed in the fourth step. Once the model stops running the final results are passed into three files (out allocation, out centre, and out global files) specified in step 3. The first file is the 'out allocate file'. This file contains information on seven items. Each demand feature is assigned to the closest and the second closest centres. Information on distance between every demand feature and the closest and the second closest centre are stored in this file. The second file, the 'out centre file', stores calculations for the number of service centres chosen by the model. The average distance between the selected centre and the assigned demand features is stored in this file. This file also contains information on the average and the average weighted demands assigned to each centre (Appendix-4). The third file, the 'global out file', contains a brief summary of the procedure followed and constraints defined in the model. It also gives a brief statistical summary for the whole region, which includes average, and average-weighted distances. Once the results are understood these can be plotted on a map.

[14] The GRIA heuristic begins with a 'starting solution', or 'seed', of m candidates. The algorithm then goes through a global and a regional phase of candidate substitution to arrive at a location optimum. In the global phase, a site is selected that makes the least increase in the total weighted distances once it is removed from the solution. It is replaced with the candidate that decreases the total weighted distance the most. This process continues until there is no further reduction in the total weighted distance. The regional phase involves the candidates allocated to each site. If a site can be replaced by one of these candidates to reduce the total weighted distance, the substitution is made. These substitutions are made until there is no further reduction in the total weighted distance (see ESRI, 1998, online manuals).

In the present study, location-allocation models were run twice for each service: firstly, for the identification of actual distances and demand-weighted distances from the service centres to the demand points and secondly for the identification of optimal centres and their average distances from the demand features allocated to them. While running these models for actual services, villages having a facility/service were coded with 2, which identified these villages as pre-defined fixed locations. Location allocation analysis of existing facilities will generate the same three files as discussed earlier, but these files will have the statistics for the existing (actual) location of service centres, as we have already declared them fixed locations. Once the locations of service centres are declared fixed, the model has to select these locations and will produce all statistics in relation to these locations.

For the identification of modelled (near to optimal) locations[15] the same model was run[16], but all candidates were coded as 1 (except uninhabited villages, coded with 0). This means that all inhabited villages were candidates for the service location. The model will again generate three separate files and it will identify the least distance centres (their number will be equal to the actual number of services). The identified modelled locations may not necessarily be the actual locations. The best indicator of comparison is the average and the average-weighted distance (included in the out global file). A comparison of actual with the optimal distances can help in judging the efficiency level (or geographical accessibility level) of the existing services; and it is assumed that the larger the deviations of the optimal from the actual locations the lower the efficiency level of existing services. These models were run for both the districts jointly and separately. Out files were used to map[17] the identified centres and demand locations. The ARCPLOT module of ARC/INFO was used for mapping other variables as well.

[15] If n-number of modelled (near to optimal) locations are to be identified in terms of demand and distance all the candidates (demand points) have to considered as mobile. Efficiency level of services is assessed by a comparison of actual with the modelled locations. For example, if a high school is available in 100 villages. The model will be run twice, once keeping the actual locations (this means all 100 villages are considered as fixed locations) and secondly all villages as mobile locations. If all locations are mobile only then system will provide the modelled locations, which may not be the actual locations.

[16] The operation of each model took more than 20 minutes of CPU time when both the districts are analysed together and all centres are mobile locations.

[17] A 'spider function' was used to map service centres and demand points. This connects the service centres to the assigned demand points (see ARCPLOT MANUAL, ESRI: 1998).

non-agricultural employment. If the straight line is further extended it will cross the x-axis, but in reality the value of non-agricultural employment cannot be below zero. Keeping this limitation in mind, a locally weighted scatterplot smoothing was used[19].

3.3.2 Primary Data Analysis: This section is divided into two parts: the first part is a description of the techniques used for data preparation, such as sample selection, variable coding, income estimates and the village accessibility index, and the second part is on the analysis of primary data such as tabulation, and fitting different models.

One for the most important tasks in primary data collection was the selection of a representative sample. The levels of development and population size were taken into consideration for the provisional selection of 10 villages, five of each from Rohtak and Bhiwani Districts. A composite index of development was prepared for all villages. This index comprises (a) availability of six infrastructure services (education, health, transport, post and telegraph, market, and electricity [50]); (b) distance from market [20]; (c) percentage of non-farm employment [15]; and (d) percentage of female literacy [15] [20]. Firstly, these variables were standardised using the following expression:

$$(Xi-Min(X))/Max(X)$$

Where Xi = value of X variable for ith village,
Min(X) = minimum value of variable X, and
Max(X) = maximum value of variable X.

[19] The KSM technique (available with the STATA program) was used for curve smoothing. KSM carries out locally weighted smoothing ('lowess') of y on x variable. In lowess, the regression is weighted so that the central point is given the highest weight and points farther away receive less. The estimated regression is then used to predict the smoothed values of 'estimated y_1' on y_1. A separate weighted regression is estimated for every point in the data (see ksm in Stata, 1997, pp. 296-97; Cleveland, 1979; Royston, 1991).
[20] Figures in brackets are the arbitrary weights used for the calculation of a composite index.

An inverse function was used to calculate standardised scores for the distance from the nearest town or city, because the smaller the distance from the market or town the greater is the convenience and the better the geographical accessibility and vice-versa. The formula used for this was:

$$(Max(D)-Di)/Max(D)$$

Where Di = distance of ith village from the nearest market, and
Max(D) = maximum distance of any village from the nearest market.

Secondly, standardised scores were multiplied by the *ad hoc* weights (given on the previous page) assigned to infrastructure services, distance from the nearest town or city, female literacy and non-farm employment[21]. These weighted variables were summed for each village. The composite index of development ranges from 0.705 to 64.39 in Rohtak and from 16.115 to 69.170 in Bhiwani District, and experiences a statistically significant positive correlation with the size of population. The composite index of development was cross classified by population size. Villages of Rohtak and Bhiwani Districts were stratified on the basis of development index and population size. Five villages from each district were selected using proportionate stratified random sampling techniques. These selected villages are shown in Table-1.5 in Chapter-1. After the preliminary survey, four villages[22] from each district were selected.

A composite index of village accessibility was prepared for the eight villages finally selected based on the following seven variables:

X1 = Number of Government and private schools in the village.
X2 = Number of Government and private health centres in the village.
X3 = Number of personal vehicles for every 100 people in the village.
X4 = Distance from the district headquarters (km).
X5 = Distance from the nearest town (km).
X6 = Approximate waiting time for public or private transport.
X7 = Type of road available in the village.

[21] The highest weights were assigned to infrastructure services as provision of the other three variables is directly and/or indirectly governed by these services.
[22] Only three villages were selected from the 10 provisionally selected villages, keeping in mind the village suitability for the final field survey.

All these variables were standardised using the following formula:

$$z_{xi} = \frac{(x_i - \bar{x})}{\sigma_x}$$

Where is z_{xi} = standard score of ith observation (village) for X variable

x_i = value of variable X for ith observation

$\bar{x}$ = average for variable X

σ_x = standard deviation for variable X.

Distances from the nearest market/town, district headquarters and waiting time for transport were negatively associated with people's mobility or village accessibility. Therefore, the standard scores of these variables were multiplied by –1 (minus one) in order to make them comparable with the rest of the variables. Numerical codes were used for the availability of road types namely 4,3,2 and 1 for national, state and districts highways and approach roads respectively. Variables X1 to X7 were assigned weights in the following sequence: 1, 1, 1, 1.25, 1.5, 1.5, and 1.25[23] for the calculation of a composite index. The highest weights were assigned to the distance from the nearest town or city and waiting time for conveyance. Proximity to market/town improves villagers' access to other services located in the town or city. Waiting time for transport was assigned a higher weight for the obvious reason that more waiting time results in poorer accessibility to services located out of the village. These weights were multiplied by the standard scores of all the seven variables and then summed for each of the selected villages. These composite indices were further standardised using the previous formula. This index ranges from –1.046 in Dhani Mansukh to 1.5 in Kehrawar village. Only three villages have a positive value and Kehrawar and Bapora have a value of more than 1. The third one i.e. Brahana experienced relatively a very small positive value. Therefore, only Kehrawar and Bapora villages were considered as more accessible and the rest as less accessible villages.

Income Estimates: It is difficult to generate accurate income data. Therefore, income surrogates have frequently been used in previous studies. In the present work, one of the important controlling variables is household income. Therefore, it was essential to collect data

[23] Distance from town and the availability of transport services have significant impact on people's access to higher order services located in town/cities. Therefore, these two variables, which determine frequency of villager's visit to towns/cities, were assigned a higher weight. Moreover, these variables also play an important role in the location of certain other services.

on income-related variables for the surveyed households. Income-related data were collected for three variables: size of land holding, monthly household income estimates, and household assets. The size of land holding is often used as an indicator of household income, which is useful if all surveyed households had some agricultural land. In a sample size of 507, 134 (more than 25 per cent) households do not own any agricultural land. Therefore, the size of land holding cannot be used as a proxy of income (in the present study) if all households are kept in the analysis.

Data on household assets were collected and a composite index of household assets was prepared, which may be considered as a proxy for household income. The availability of productive assets, particularly agricultural assets, helps in generating more income. Different weights were assigned to different assets. These weights were assigned in accordance to the prevailing market prices and usefulness of these assets in income generation. These assets are: radio (0.5), television (1.5), refrigerator (7), cooler (1.5), sewing machine (0.5), bicycle (1), scooter or motorcycle (15), four wheeler vehicle such as truck, jeep and car (125), tractor (125), bullock/camel cart (20), wheat and fodder cutter (5), cow (3), buffalo (8.5) and other cattle (1). The figures in brackets represent the weights assigned to each asset for working out a composite household assets index. This index also does not represent the true income estimates of landless households, for two reasons: (a) higher weights to agriculture assets were assigned and (b) only agricultural households have a large number of assets; many of the landless households do not own any assets except some cattle.

An attempt was made to estimate the average gross household income using both agricultural and non-agricultural income. Gross annual agricultural income was estimated by multiplying crop outputs[24] by their respective prevailing prices.

[24] Some households leased out their land on a share basis. For them, the amount of their crop share is considered as their crop output; for the households which leased land on share basis, the total output was considered proportionate to their share of the crop.

$$\text{Agricultural Income} = \frac{\left\{\left(\sum_{i}^{n}(crop_i * Price_i) * (0.67)\right) \pm (Agricultural\ Rent)\right\}}{12}$$

Where $crop_i$ = output (in quintals) of ith crop during the last year

$price_i$ = annual average price (in rupees) of the ith crop.

The summation of agricultural output (calculated in Rupees) was multiplied by a constant value of 0.67[25]. Data on the value of rented-in and rented-out land were also collected. Value of rented-out/rented-in land was added/subtracted to/from the annual income from agriculture, which was divided by 12 in order to give monthly agricultural income estimates for each household. Monthly gross output (in Rupees) from livestock was also estimated and multiplied by a constant of 0.701[26]. Income from agriculture and livestock was added and considered as 'agricultural income'.

Non-agricultural income comprises the salary from paid employment in Government and private sectors, agricultural and non-agricultural labour, small scale business and any other income not covered by any of the other sources mentioned above. For casual labourers the number of working days was multiplied by the prevailing wage rates in the village or at the place of work. Agricultural and non-agricultural incomes were summed and a correlation was run between different household income estimates (Table-3.3).

[25] Bhalla et al (1990) calculated 67 per cent net value added as a percentage of gross value of output for the agricultural sector in Punjab State, 1979-80. This means that 67 per cent of the total agricultural output can be considered as income. In 1969-70, the share of net value added was 77.2 per cent, which declined in 1979-80 due to mechanisation of agriculture and the increased cost of agricultural inputs. After economic liberalisation in 1991, there was an impact on agricultural income, as the Government removed subsidies from agricultural inputs. Due to the non-availability of similar data we have to use the 1979-80 estimates.

[26] Income from animal husbandry was estimated at 70.1 per cent of the gross output (see Bhalla et al, 1990).

Table-3.3: Correlation matrix (income related variables)

Income type	a_land	asset_inx	Income_ag	income_nag	income_total
a_land	1.00000				
asset_inx	0.5569*	1.00000			
income_ag	0.8866*	0.6292*	1.00000		
income_nag	0.05200	0.1852*	0.06100	1.00000	
income_total	0.7295*	0.6173*	0.8343*	0.5821*	1.00000
* Significant at 1 per cent level of significance					

Source: Author's calculation

a_land = Size of agricultural land holding (acres)
asset_inx = Asset index of the household
income_ag = Gross monthly agricultural income of the household
income_nag = Gross monthly income from non-agriculture
income_total = Gross monthly total income.

Three estimates of income, namely the size of land holding, income from agriculture and an asset index of the household, show a high positive correlation with each other. Only one variable among them, i.e. the asset index, shows a significant but weak relationship (i.e. only 0.18) with non-agricultural income. Only gross monthly total income shows more than 0.5 (statistically significant at the 1 per cent level of significance) positive correlation with the other four income estimates. Therefore, this seems to be an appropriate income indicator, which has a statistically significant association with income from the agricultural and non-agricultural sectors. When individual data were analysed in relation to income, the average per capita gross income was derived by dividing household income by the number of members in the household. Each household member was assigned the same income level (which may not be a real situation) as it was not possible to generate individual income data for each family member (especially from agriculture), for example most of the adult members of the household work in the field, but the money goes to head of the household once the crop is sold, and money is not divided among the household members in proportion to their labour in the field. Although all members of household benefit from the agricultural income; the non-availability of cash makes women dependent on head of the household.

Surveyed data were arranged at the individual and household level. Some household variables were integrated with those from individuals. Most of the household and individual variables were categorical (see Appendix-3). The techniques used for the analysis of categorical data are somewhat different from the techniques used for the analysis of variable on a continuous

scale. Frequency counts, χ^2 tests, logit, mlogit and log-linear (most frequently used techniques for categorical data analysis) methods are employed for analysing categorical data[27].

Tabulation and cross tabulation of frequency counts are the most widely used techniques in social science research, being the simplest tools of categorical variable examination. It is easy to tabulate two or three categorical variables and model an association between them (Gilbert, 1993). On the examination of a frequency counts table (with the row and column percentages) a trend of the relationship can be identified, but it is rather difficult to make statistical inferences based on descriptive tabular analysis. Some higher order statistical techniques are needed to make statistical inferences. These are discussed in the following section.

Karl Pearson proposed the χ^2 test in 1900, which is used to examine whether there is a significant association between two variables or not. In the χ^2 test the deviation between actual and modelled (expected) cell counts is calculated (Agresti, 1996, 28):

$$\chi^2 = \sum_{i=1,j=1}^{n} \frac{(x_{ij} - m_{ij})^2}{m_{ij}}$$

Where x_{ij} = actual frequency in cell ij

m_{ij} = modelled (fitted) count in cell ij

When there are more than two variables, the χ^2 test cannot be used for making statistical inferences, so logit (also known as logistic model) and mlogit models were used to analyse binary and multinomial categorical variables respectively. Both of these models are based on odds ratios.

[27] (see Agresti, 1996; Gilbert, 1993; Hamilton, 1992; Wrigley, 1985 for categorical data analysis).

$$\pi(x) = \log\left(\frac{\pi(x)}{1-\pi(x)}\right) = \alpha + \beta x$$

An alternative formula is :

$$\pi(x) = \frac{\exp(\alpha + \beta x)}{1 + \exp(\alpha + \beta x)}$$

Where $\pi(x)$ = probability of success of event (x)

$1 - \pi(x)$ = proability of failure of event (x)

α = intercept

β = regression coefficient (slope)

A logit model is used when the dependent variable has a binary response (two responses, such as yes or no, success or failure). Many binary response variables were dealt with; and their responses were coded as 0 or 1 (see Appendix-3 for the coding of these variables). In simple terms, a logit model helps to show whether the response in the dependent variable changes significantly with every unit change in an independent or many independent variables. A logit model ensures an S-shaped curve[28], which means that the regressed values will lie between 0 (no probability at all) and 1 (100 per cent probability of success). Parameter β determines the rate of increase or decrease of the S-shaped curve. The steepest slope on the curve occurs when π(x) is 0.5, and the slope approaches 0 when the probability of π(x) approaches 0 or 1. Given below is another interpretation of the odds used in the logistic model:

$$\frac{\pi(x)}{1-\pi(x)} = \exp(\alpha + \beta x) = e^{\alpha}(e^{\beta})^{x}$$

The odds increase multiplicatively by e^{β} for every unit increase in x. That is, the odds at level $x+1$ are equal to the odds at x multiplied by e^{β}. When $\beta = 0$, $e^{\beta} = 1$, and the odds do not change as x changes. In the case of more than one controlling variable, this equation can be written as follows:

$$logit[\pi(x)] = \alpha + \beta_1 x_1 + \beta_2 x_2 \ldots\ldots \beta_n x_n$$

[28] See Agresti (1996) for a detailed discussion on logit S-shaped curve and logit models (pp. 104-105).

Where, x_n and β_n are the number of independent variables and regression coefficients respectively. The Stata program was used to run logit models. This program uses iteration to work out logit estimates. The iteration continues until the log likelihood ratio is minimised. Logit estimates include the number of observations, the log ratio, χ^2 and its probability of significance, R^2 and adjusted R^2, constant and regression coefficients for each of the controlling variables and their z-values, and the probability of significance[29].

Some of the response variables such as the type of educational and health services used, education levels etc., had more than two responses. These variables were regressed using a maximum-likelihood multinomial logit model (mlogit[30]). This model is used with discrete dependent variables. Let us assume there are 1,2,3 ...m responses of variable y and explanatory variable x. In mlogit, a set of coefficients are estimated for each outcome:

$$\pi(y=1) = \frac{e^{xb(1)}}{e^{xb(1)} + e^{xb(2)} + e^{xb(3)}}$$

$$\pi(y=2) = \frac{e^{xb(2)}}{e^{xb(1)} + e^{xb(2)} + e^{xb(3)}}$$

$$\pi(y=3) = \frac{e^{xb(1)}}{e^{xb(1)} + e^{xb(3)} + e^{xb(3)}}$$

Where $\pi(y=1)$, $\pi(y=2)$ and $\pi(y=3)$ are the probability of outcome 1, 2 and 3 of dependent variable y respectively. This model is unidentified as there is more than one solution to $\beta^{(1)}$, $\beta^{(2)}$ and $\beta^{(3)}$ that leads to the same probability for y=1, y=2 and y=3 (Stata, 1997). To identify the model, one of the $\beta^{(1)}$, $\beta^{(2)}$ and $\beta^{(3)}$ is set to 0 and it does not matter which one, but that will be the base of comparison. If we set $\beta^{(1)} = 0$, the equation becomes:

[29] See Stata (1999), *Stata: Release-6, Reference Manual Extract*, College Station: Stata Corporation, p. 230-35 for a detailed discussion of logit estimates.
[30] See Stata (1999), pp.254-61 for a detailed discussion of mlogits.

$$\pi(y=1) = \frac{1}{1 + e^{x\beta^{(2)}} + e^{x\beta^{(3)}}}$$

$$\pi(y=2) = \frac{e^{x\beta^{(2)}}}{1 + e^{x\beta^{(2)}} + e^{x\beta^{(3)}}}$$

$$\pi(y=3) = \frac{e^{x\beta^{(3)}}}{1 + e^{x\beta^{(2)}} + e^{x\beta^{(3)}}}$$

The relative probabilit y of y = 2 to the base category is :

$$\frac{\pi(y=2)}{\pi(y=1)} = e^{x\beta^{(2)}}$$

Mlogit was also run in the Stata program. This function also performs iterations. Except when dealing with more than two categories, the statistics produced by mlogit is the same as in the logit model, but the regression coefficients, their z-values and probability of significance are worked out separately for n-1 number of responses (if one is declared as the base of comparison). In other terms, these results help in understanding whether the responses of the dependent variable vary significantly from the base category to other categories with per unit changes in the explanatory variables[31].

[31] See Hamilton (1993) on multinomial logistic regression.

Chapter - 4

AVAILABILITY AND SPATIAL EFFICIENCY OF MIDDLE, HIGH AND SENIOR SECONDARY SCHOOLS IN ROHTAK AND BHIWANI 1981, 1991 AND 1996

4.1 INTRODUCTION

The Indian Government recognised the importance of social and economic development right from the beginning of its first 'Five Year Plan' (FYP) in 1951. Recently the eighth FYP (1992-1997) documented 'human development' as its main focus and the ninth FYP plan (1997-2002), which was launched in the 50th year of India's independence, has adopted 'growth with social justice and equity' as its major theme (Government of India, 1997). One of the important actions identified was to provide minimum basic services (which include primary health care and universal primary education) to all.

The most fundamental question is 'why do we need to educate people'? But, before we define this, it will be appropriate to ask 'what is education'? Noor (1981, 1) defines education 'as the planned activities formal, non-formal and informal. Its different elements are acquired over a lifetime and can lead to material welfare, increased productivity, and the ability to earn a living from self-employment. It has three important objectives: (a) skills to communicate, (b) skills to improve the quality of life, and (c) skills for production'.

Education (particularly formal education) is one of the most important basic needs[1]. The answer to the first question raised above lies in its strategic role in the development process in both the Developing and the Developed Worlds. Basic education allows an individual to develop his or her own potential to the fullest and at the same time, to become effective in the process of modernisation and growth. It has the following advantages:

- Education is a basic human need, which equips people with fundamental knowledge, skill, values and attitudes and enhances their capacity to change and their willingness to accept new ideas.

[1] Everyone, regardless of income level or social stratum, has the right to acquire a basic level of knowledge and skills. This principle, has been accepted by all societies and is included in the Universal Declaration on Human Rights (United Nations, 1967).

- Education is seen as a means of meeting other 'core' basic needs, such as adequate nutrition, clean drinking water, and primary health care, mainly because it provides the necessary knowledge for change in the current practices and skills to better use of the services provided.
- Education plays a critical role for development by infusing an individual with an ability to identify with his or her changing culture and to seek a constructive role in his or her society (World Bank, 1980).

Education plays a crucial role in enlarging people's income earning opportunities and enabling them to achieve a better quality of life (Drèze and Saran, 1995, 184) and is considered to be one of the important components of social and economic development of a society (Psacharopoulos and Woodhall, 1986; Sen, 1996; Murthi,et al, 1996). The economic rationale for investing in basic school education is clear, because the returns from basic education are many times greater than say higher education even if the waiting period for reaping benefits is longer (Noor, 1981; Psacharopoulos and Woodhall, 1986; Sen, 1996). Primary education also has an economic payoff for small and marginal farmers. Basic education can be viewed as a prerequisite for achieving vital socio-economic goals, for example in family planning and rural development.

Poverty alleviation and the eradication of ignorance are two key objectives of development, but ignorance is the wellspring of poverty and its continued presence compounds the problem created by poverty (Noor, 1981, 56). Access to education not only enhances individuals' capabilities, but also helps in accessing information, knowledge and other services and income growth. Therefore, investment in education (particularly basic school education) plays a strategic role in the development process.

The *Ninth Five-Year* Plan states that there is a need to create conditions by which the disadvantaged people (especially poor, women, Backward and Scheduled Castes, and Scheduled Tribes) and are not only empowered to take advantage of the available opportunities but also to contribute actively in the process of the creation of wealth and well-being (Government of India, 1997). The individual capabilities of the people have to be enhanced (through education, information and access to appropriate technology) in order to ensure the benefits of development to the masses.

The Indian Government started investing in education (in both rural and urban areas) from the beginning of the first FYP. Consequently, there has been a several-fold increase in the number of schools from 1951 to 1995 (Table-4.1) and enrolments in schools have substantially increased. Primary school enrolments have increased from 19.2 million in 1951 to 109.7 million in 1995 and that for upper stage primary schools from 3.1 to 41.01 millions (Government of India, 1997).

Table-4.1: Number of schools in India, 1951-95 (thousands)

School	1951	1995	% Increase 1951-95
Primary	210	590	180.9
Upper Primary[2]	10	171	1610.0
High	NA	72	NA
Higher Secondary	17 (1961)	24	41.2

Source: Government of India (1997), *Ninth Five Year Plan (1997-2002)*, New Delhi: Planning Commission.

The population of India has increased from 361 million in 1951 to 846 million in 1991 (Census of India, 1991), more than a 137 per cent increase. Population growth and educational awareness have resulted in a big demand for school education. Even with a substantial increase in the number of schools and staff employed in them, there is not an adequate provision of public educational services in general (and in rural areas in particular) even after 50 years of India's independence.

Haryana is one of the most developed states of the country (second highest in terms of per capita income). Even in this state, a considerable extent of regional disparities can be noticed in the availability of schools, particularly between rural and urban, developed and less developed areas. Even after 5 decades of the planned development process and substantial investment in education, many villages are without even a high school. The non-availability of schools in villages greatly hinders access to school education, especially of the poor children (who cannot afford to go out of their village) and girls (whose mobility is restricted by the prevailing social customs); and a significant proportion of the population is deprived of

[2] Upper primary generally includes the first five to eight years of schooling, which is also known as middle school.

basic school education. Therefore, it becomes important to examine the patterns of school availability.

In this chapter, an attempt will be made to examine the availability of and geographical accessibility[3] to middle, high and senior secondary schools in two districts of the Haryana State. This chapter is divided into five sections. In the first section, an attempt will be made to examine expenditure on general educational[4] and other social services, and to look at the school statistics in Haryana State, such as the number of primary, middle, high and senior secondary schools, and the teacher-pupil ratio from 1981 to 1995. In the second, third and fourth sections, availability and efficiency level of middle, high and senior secondary schools will be discussed respectively, which will be followed by a discussion of Government versus non-Government provision of school education. The findings of the first four sections will be discussed in the final section.

4.2 DEVELOPMENT REVENUE AND CAPITAL EXPENDITURE, AND SCHOOL STATISTICS

The development revenue and capital expenditures are generally incurred for basic social and economic infrastructure services[5], which in turn play a vital role in the social and economic development of a society. Unfortunately, expenditure data are not available at the district level separately for rural and urban areas, as the budget is allocated sector-wise at the state level. Therefore, the following discussion will present only a state level picture of development revenue and capital expenditure.

The total development revenue and capital expenditure was Rupees 4.1 billion in 1980-81. This figure reached 31.4 billions by the year 1995-96, more than a seven-fold increase, or a 2.4 times increase during the same period at 1980-81 prices (Table-4.2[a]) (which clearly shows high degree of inflation over a period of fifteen years).

---

[3] Geographical accessibility is measured by physical distance, time travelled and transport cost. In the present analysis, physical distance is considered as a measure of geographical access as data on travelling time and cost were not available.

[4] This includes elementary (primary), secondary, university higher, adult education, language development and general. Government of Haryana (1997b), *Budget 1997-98, Volume-II*, Chandigarh.

[5] There are 10 social and 9 economic services listed under the head of development revenue expenditure. See *Statistical Abstract of Haryana, 1995-96* for the list of these services.

A significant proportion of total development expenditure has been incurred on general education[6] since 1980-81, rising from Rs. 715 millions to Rs. 6166 millions in 1995-96 at current prices, more than an 8 times increase during the fifteen years. In terms of 1980-81(constant prices), there was a 2.7 fold increase. Keeping in mind the population growth, increasing demand for school and education, this is not a substantial increase, however. Two decades ago, the enrolment rate of students in general and of girls in particular was significantly lower. Recently, the demand for school has increased and the numbers of students are considerably higher in the Government schools. This is further evident from my informal discussion with Mr. Khushi Ram who is educating his niece in a private school:

> "In Government school study is not bad, but the number of students is less in private schools and that is why they may be able to pay more attention to students. In private school there are only 20-30 students in a class, while in Government there are about 50-60 children" (Khushi Ram, 1997, Bapora).

In all the four financial years shown in Table-4.2(a), more than 17 per cent of the total development expenditure was allocated to general education. In the financial year 1990-91, it was more than 20 per cent (Table-4.2[b]). But this does not necessarily represent a true picture of expenditure on schools in rural areas, as its major proportion is spent on college, university education and the direction and administration of the education. The development revenue and capital expenditure[7] has grown at the rate of 9.2 per cent per annum from 1980-81 to 1995-96 (Table-4.3). The annual growth of expenditure on general education has been higher than the total development expenditure.

The rate of growth of the development expenditure on education and other sectors has been declining gradually since 1980-81. The declining percentages of growth of expenditure on education might have degraded the quality of education. Some Government schoolteachers further support this argument:

> "People prefer to send their children to private schools, because they feel that there is no care, studious environment and facilities in the Government schools" (Teachers, Government High School, Brahana, 1998).

---

[6] Data on expenditure on school and college education is not available separately from the Statistical Abstracts. But this type of data is available separately from the state budgets, and will be discussed later in this chapter.
[7] Growth in development revenue and capital expenditure is calculated at 1980-81 prices.

Table-4.2(a): Development revenue and capital expenditure (Rs. 10,000,000)

	80-81	85-86	90-91	95-96
Current Prices				
General Education	71.5	154.6	313.3	616.6
Medical, Family Welfare, Public Health, Sanitation and Water Supply	38.5	94.9	156.0	336.7
Transport	83.6	131.8	241.1	411.7
Total	414.8	806.0	1522.1	3138.4
At 1980-81 Prices				
General Education	71.5	111.6	162.6	194.0
Medical, Family Welfare, Public Health, Sanitation and Water Supply	38.5	68.5	81.0	105.9
Transport	83.6	95.1	125.2	129.5
Total	414.8	582.0	790.3	987.2

Source: Statistical Abstract of Haryana, 1980-81, 1985-86, 1990-91 and 1995-96.

Table-4.2.(b): Development revenue and capital expenditure (%)

	80-81	85-86	90-91	95-96
General Education	17.23	19.17	20.58	19.65
Medical, Family Welfare, Public Health, Sanitation and Water Supply	9.28	11.77	10.25	10.73
Transport	20.15	16.35	15.84	13.12
Total	100.00	100.00	100.00	100.00

Source: Statistical Abstract of Haryana, 1980-81, 1985-86, 1990-91 and 1995-96.

On the one hand, there are not adequate funds for improving standards of education but on the other hand there has been a significant increase in the salaries of the staff employed in schools, colleges and universities (at current prices). A major proportion of total expenditure is incurred on the salaries of teachers and other supporting staff, which may not leave an adequate budget for the maintenance of existing schools.

Primary, middle, high and senior secondary schools have been grouped together in the next section although data on the different types of school were available separately. Some of these categories are not mutually exclusive, for example, high schools also have middle school classes and senior secondary schools have high and middle school classes. But data on the number of schools are available on the basis of separate locations.

Table-4.3: Annual growth in development revenue and capital expenditure at 1980-81 constant prices(%)

	1980-81 to 1985-86	1985-86 to 1990-91	1990-91 to 1995-96	1980-81 to 1995-96
General Education	11.23	9.15	3.85	11.43
Medical, Family Welfare, Public Health, Sanitation and Water Supply	15.59	3.64	6.16	11.67
Transport	2.77	6.31	0.69	3.67
Total	8.06	7.16	4.98	9.20

Source: Statistical Abstract of Haryana, 1980-81, 1985-86, 1990-91 and 1995-96.

Haryana State experienced a phenomenal increase in the number of schools from 1980-81 to 1995-96. The number of Government and non-Government schools increased from 7010 and 310 in 1980-81, to 8860 and 1138 in 1995-96 respectively. The increase in the number of Government schools is lower than the state average in both Rohtak and Bhiwani Districts. This means that in some other districts of the state the increase in the number of schools is higher than in the two districts under study. Growth in the absolute number of Government and non-Government schools from 1980-81 to 1995-96 is 1850 and 828 respectively. There were few non-Government schools in 1980-81, but there were more than 1100 non-Government schools in 1995-96. In terms of percentages, growth in non-Government schools is higher than for Government schools. Rohtak (which is one of the most developed districts of the state) experienced an annual growth of 5.3 per cent in non-Government schools, which is higher than the state average, while the figure is only 1.54 per cent in Bhiwani District, which is lower than the state average (Table-4.4[b]). This suggests that private investment in school education is more in developed areas.

There has been a substantial increase in the number of boys' and girls' enrolment in schools (Table-4.5[a] and [b]). The increase in girls' enrolment in school in terms of absolute numbers and percentages has been significantly higher than that for boys, although the strength of boys was 400,000 more than that for girls in 1995-96. The difference in boys' and girls' enrolment was larger in 1980-81, declining by the year 1995-96 due to the significant increase in the enrolment of girls.

Table-4.4(a): Government and non-Government primary, middle, high and senior secondary schools

District/ State	1980-81		1985-86		1990-91		1995-96	
	Govern-ment	Non-Govern-ment	Govern-ment	Non-Govern-ment	Govern-ment	Non-Govern-ment	Govern-ment	Non-Govern-ment
Bhiwani	557	20	556	21	605	27	585	26
Rohtak	535	42	545	52	684	95	639	206
Haryana	7010	310	7464	397	8162	729	8860	1138

Source: Statistical Abstract of Haryana, 1980-81, 1985-86, 1990-91 and 1995-96.

Table-4.4(b): Annual growth in Government and non-Government primary, middle, high and senior secondary schools (%)

District/ State	1980-81 to 85-86		1985-86 to 90-91		1990-91 to 95-96		1980-81 to 95-96	
	Govern-ment	Non-Govern-ment	Govern-ment	Non-Govern-ment	Govern-ment	Non-Govern-ment	Govern-ment	Non-Govern-ment
Bhiwani	-0.04	1.00	1.76	5.71	-0.66	-0.74	0.32	1.54
Rohtak	0.37	4.76	5.10	16.54	-1.32	23.37	1.09	5.31
Haryana	1.30	5.61	1.87	16.73	1.71	11.22	1.39	4.85

Source: Statistical Abstract of Haryana, 1980-81, 1985-86, 1990-91 and 1995-96.

The annual exponential growth in the number of school children was 3.9 per cent from 1980-81 to 1995-96. It was 2.4 for boys and 6.4 per cent for girls. In both districts, the increase in girls' enrolment is significantly higher than that for boys, but girls have not yet caught up with boys (in terms of absolute numbers). With the increase in students' enrolment in schools, the number of teachers has also increased from 52,435 in 1980-81 to 87,587 in 1995-96 i.e. a 3.5 per cent annual growth. The increase in the number of female teachers is more than that for male teachers (Table-4.6 [a] and [b]). The highest growth rate in male and female teachers was registered between 1980-81 and 1985-86.

Table-4.5 (a): Students in primary, middle, high and senior secondary Government and non-Government schools (Number)

District/ State	1980-81		1985-86		1990-91		1995-96	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Bhiwani	98508	33520	116989	53174	137060	90633	144254	97705
Rohtak	135668	68263	167265	103704	200427	154243	171782	151303
Haryana	1227352	540177	1513688	816104	1721050	1163335	1763996	1364260

Source: Statistical Abstract of Haryana, 1980-81, 1985-86, 1990-91 and 1995-96.

There was a decline in the number of teachers from 1990-91 to 1995-96 in both districts, while there was an increase for the State as a whole during the same period. There could be

two reasons for that. Either there may be some discrepancy in the data or the retirement rate was higher than the appointment rate of new teachers.

Table-4.5(b): Annual exponential growth rate of school children (%)

District/ State	1980-81 to 85-86			1985-86 to 90-91			1990-91 to 95-96			1980-81 to 95-96		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Bhiwani	3.5	9.7	5.2	3.2	11.3	6.0	1.0	1.5	1.2	2.6	7.4	4.1
Rohtak	4.3	8.7	5.8	3.7	8.3	5.5	-3.0	-0.4	-1.8	1.6	5.4	3.1
Haryana	4.3	8.6	5.7	2.6	7.3	4.4	0.5	3.2	1.6	2.4	6.4	3.9

Source: Statistical abstract of Haryana, 1980-81, 1985-86, 1990-91 and 1995-96

Table-4.6(a): Number of teachers in primary, middle, high and senior secondary Government and non-Government schools

District/ State	1980-81		1985-86		1990-91		1995-96	
	Male	Female	Male	Female	Male	Female	Male	Female
Bhiwani	3209	809	3463	1203	3926	2266	3911	2024
Rohtak	4429	2318	4874	2955	6930	4729	5368	5026
Haryana	36296	16139	41559	23416	46963	30532	50270	37317

Source: Statistical abstract of Haryana, 1980-81, 1985-86, 1990-91 and 1995-96

Table-4.6(b): Annual exponential growth rate of school teachers

District/ State	1980-85			1985-90			1990-95			1980-95		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Bhiwani	1.5	8.3	3.0	2.5	13.5	5.8	-0.1	-2.2	-0.8	1.3	6.3	2.6
Rohtak	1.9	5.0	3.0	7.3	9.9	8.3	-5.0	1.2	-2.3	1.3	5.3	2.9
Haryana	2.7	7.7	4.4	2.5	5.5	3.6	1.4	4.1	2.5	2.2	5.7	3.5

Source: Statistical abstract of Haryana, 1980-81, 1985-86, 1990-91 and 1995-96

There has not been any improvement in the pupil-teacher ratio since 1980-81. Rather it has increased from 34 students per teacher in 1980-81 to 36 students per teacher in 1995-96 (Table-4.7). A contrasting picture may be noticed here between Rohtak and Bhiwani Districts. In Bhiwani, there was greater number of pupils for every teacher as compared to Rohtak District. Bhiwani District is less developed socially and economically. In this district, not many qualified teachers are available locally, and amongst the teachers who are imported from other districts, the majority of them are not willing to serve for long and they soon try to get themselves transferred to more developed districts. Therefore, in Bhiwani, there is a continuing shortage of teachers.

Table-4.7 Student/pupil ratio in Government and non-Government schools

District/ State	1980-81			1985-86			1990-91			1995-96		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Bhiwani	31	41	33	34	44	36	35	40	37	37	48	41
Rohtak	31	29	30	34	35	35	29	33	30	32	30	31
Haryana	34	33	34	36	35	36	37	38	37	35	37	36

Source: Statistical Abstract of Haryana, 1980-81, 1985-86, 1990-91 and 1995-96

Generally, the increase in the number of schools would be proportional to demand. But in the study area, growth in the number of schools is lower than the growth in population (Table-4.8); the growth rate of the students has been more than that for the teachers. Side by side the pupil/teacher ratio has increased from 1980-81 to 1990-91. Table 4.8 clearly shows that demand for school education exceeds supply and that will be discussed later in this chapter.

Table-4.8: Annual exponential growth rates 1980-81 to 1990-91 (%)

	Population	Schools	Teachers	Students	Pupil / Teacher ratio
Bhiwani	2.08	0.91	4.42	5.60	1.13
Rohtak	1.78	3.05	5.62	5.69	0.06
Haryana	2.45	1.96	3.98	5.02	1.00

Source: Statistical Abstract of Haryana, 1980-81 and 1990-91

4.3 SCHOOL EDUCATION

Indian schools can be classified into four categories: primary, middle, high and senior secondary, which provide for years 1-5, 6-8, 9-10 and 11-12 of education respectively. The number of years of education provided in these schools is not always mutually exclusive, because higher levels of schools always have lower level school classes. For example, a senior secondary school will also have high, middle and primary school classes. Keeping this in mind, school data have been adjusted. For example, a village which has two high schools is considered to have two middle schools as well. A village with a middle school and a high school (located separately) is taken to have two middle schools and one high school. In this chapter, we have included only middle, high and senior secondary schools.

In this chapter, colleges have been included in the senior secondary school category, because the majority of colleges have senior secondary classes and some senior secondary schools are located in villages. Census data on Government and private schools were not available separately, but the Director of Secondary Education, Haryana (DSEH) has published two

school directories for the years 1992 and 1996. These directories list Government and non-Government schools separately. This data will be used later on for a discussion on the Governmental and non-Governmental provision of schools.

4.3.1 Middle Schools: The number of middle schools has increased from 905 in 1981 to 1637 in 1996 (Table-4.9[a]), more than an 80 per cent increase. The highest increase is reported in the urban areas of Rohtak Districts and the lowest in the urban areas of Bhiwani District. Rural areas experienced more than an 80 per cent increase in both Rohtak and Bhiwani Districts. There has not been much change in the rural-urban distribution of the number of schools from 1981 to 1991 (Table-4.9[b]). The patterns of middle school location has become denser from 1981 to 1996 (Figure-4.1, 4.2 and 4.3). Eastern parts of the study area namely villages of Rohtak District show a relatively higher concentration of middle schools. Besides the location of new schools in villages, there has been a considerable increase in their number in Rohtak, Bahadurgarh and Jhajjar towns (Figure-4.4).

Table-4.9(a): Number of middle schools

Year	Rohtak			Bhiwani			Total		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
1981	107	461	568	56	281	337	163	742	905
1991	185	666	851	76	405	481	261	1071	1332
1996	206	835	1041	80	516	596	286	1351	1637

Source: Census of India, 1981, 1991 and Directorate of Secondary Education Haryana (DSEH), 1996

Table-4.9(b): Number of middle schools (%)

Year	Rohtak		Bhiwani		Total	
	Urban	Rural	Urban	Rural	Urban	Rural
1981	18.84	81.16	16.62	83.38	18.01	81.99
1991	21.74	78.26	15.80	84.20	19.59	80.41
1996	19.79	80.21	13.42	86.58	17.47	82.53

Source: Census of India, 1981, 1991 and DSEH, 1996

The pupil-teacher ratio is one of the measures of the quality of education. Village-wise data on the number of students and teachers were not available. Therefore, the population[8] for every school is taken into consideration as an indirect estimate of the strength of pupils in

[8] Population size in age group 5 to 25 years can best represent the demand for school education, but total population was considered as a proxy of demand for school education because age-specific data were not available at village level; it was assumed that demand for school education is homogeneous across all villages.

schools. The main assumption behind this is that the students' enrolment in all the villages is homogeneous for all age groups, although in reality this may differ from one village to another.

There were 2700 people per middle school in 1981, declining to 2216 by the 1991 Census, this has increased slightly to 2236 in 1996[9]. Overall, there has been a decline in the pressure on middle schools, but during the period 1991 to 1996 the growth of population exceeded that of the number of schools. Population pressure on middle schools increased during this period. In urban areas, there were more people for every middle school as compared to rural areas. In Bhiwani, there were more people for every middle school as compared to Rohtak District, and these inter-district disparities have accentuated from 1981 to 1996 (Table-4.10).

Table-4.10: Population per middle school

Year	Rohtak			Bhiwani			Total		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
1981	2790	2642	2669	2956	2710	2751	2847	2668	2700
1991	2084	2137	2125	2694	2316	2376	2261	2205	2216
1996	2491	2053	2140	3173	2284	2404	2681	2142	2236

Source: Census of India, 1981, 1991 and DSHE, 1996

Distribution of Middle Schools: In 1981, middle schools were available in as many as 512 villages, although there were 905 middle schools in both Rohtak and Bhiwani Districts (Table-4.11[a] and [b]). In 1996, the number of middle schools (i.e. 1637) was more than the total number of inhabited villages (i.e. 910). Despite this, there was no middle school in as many as 292 villages, which clearly indicates inter-village variations in the distribution of middle schools (Figures-4.5, 4.6 and 4.7).

The number of villages with more than four middle schools increased from 16 in 1981 to 43 in 1996. In Rohtak and Bhiwani headquarters alone, there were as many as 91 and 35 middle schools respectively. A large number of middle schools were concentrated in urban areas for all the three years. The number of villages was more in Rohtak as compared to Bhiwani District, but there were more villages without a middle school in Bhiwani as compared to Rohtak District during all the three years under study. In Rohtak District, there were 30

[9] Village/town population for 1996 is projected based on 1981-91 growth rates, as the actual data on 1996 population were not available from any of the sources.

villages with more than four middle schools during the year 1996, while the figure for Bhiwani was only 13, making inter-district disparities (in the distribution of middle schools) very obvious.

In 1981, except in the southern parts, a middle school was available in the majority of villages of Rohtak District. In the southern and western parts of Bhiwani District, however, the majority of villages did not have any middle school. There has been considerable improvement in the availability of middle schools from 1981 to 1996, but the spatial patterns have remained almost the same. In 1981, about 50 and 62 per cent of the villages did not have any middle schools in Rohtak and Bhiwani Districts respectively. These figures declined to only 25 and 42 per cent in 1996. A significant increase in the number of villages and towns with 2 middle schools can be noticed from 1981 to 1991 (Table-4.11[b]). It is interesting to note that about 36 per cent of the villages in Rohtak District have two or more middle schools, while the figure for the Bhiwani District is 25 per cent. Settlements with more than four schools are primarily in urban areas, and the percentages of towns and villages with more than 4 middle schools increased from 2.7 in 1981 to 6.3 in 1996 Rohtak and 0.7 to 3.0 in Bhiwani District.

Table-4.11(a): Distribution of middle schools, 1981, 1991 and 1996

Number of Schools	Rohtak			Bhiwani			Total		
	1981	1991	1996	1981	1991	1996	1981	1991	1996
None	242	171	122	270	213	170	512	384	292
1	71	73	72	61	82	95	132	155	167
2	116	157	172	75	94	109	191	251	281
3	15	19	34	14	26	26	29	45	60
4	20	35	47	10	7	20	30	42	67
More than 4	13	22	30	3	11	13	16	33	43
Total	477	477	477	433	433	433	910	910	910

Source: Census of India, 1981, 1991 and DSEH, 1996

In the following section, an attempt will be made to examine the efficiency level of middle school locations. The actual school locations will be compared with the modelled locations derived from location-allocation models. A brief description of the methodology adopted is given here (see Chapter-3 on methodology for details of the location-allocation models). The

model used in the present analysis is based on the P-median problem[10]. Two parameters are required to run this model: distance and demand in order to work out least weighted distance centres.

Table-4.11(b): Distribution of middle schools, 1981, 1991 and 1996 (%)

Number of Schools	Rohtak			Bhiwani			Total		
	1981	1991	1996	1981	1991	1996	1981	1991	1996
None	50.73	35.85	25.58	62.36	49.19	39.26	56.26	42.20	32.09
1	14.88	15.30	15.09	14.09	18.94	21.94	14.51	17.03	18.35
2	24.32	32.91	36.06	17.32	21.71	25.17	20.99	27.58	30.88
3	3.14	3.98	7.13	3.23	6.00	6.00	3.19	4.95	6.59
4	4.19	7.34	9.85	2.31	1.62	4.62	3.30	4.62	7.36
More than 4	2.73	4.61	6.29	0.69	2.54	3.00	1.76	3.63	4.73
Total	100	100	100	100	100	100	100	100	100

Source: Census of India, 1981, 1991 and DSEH, 1996

In the present context, the size of population is considered as a proxy of demand after the adjustment for the number of schools (because the heuristic used to solve the location-allocation problem does not take into account the number of facilities at a particular location, it recognises only a binary condition [i.e. available or not available]). Therefore, the demand variable (i.e. population) was adjusted. For example, let us assume that in a village there are two schools. In this situation, these two schools serve the current demand and it is assumed that both these schools serve the existing demand equally (but in reality the demand for both the schools may differ). Keeping this limitation in mind, the total population was divided by the number of schools available in the respective villages, towns and cities. The middle, high and senior secondary schools are dealt with separately, but within them there may be variations in terms of ownership (such as Government or private) and quality. It is assumed that schools are equal in terms of demand and quality, as data on real demand for different types of school are not available and it was not plausible to generate these data for all villages within my limited time and resources. In place of actual, Euclidean (straight) distances were used between demand points and service centres due to non-availability of data on actual distance (topological distance along a road, travelling time and travelling cost).

[10] The median problem locates p centres to minimise the total weighted distance from the centres of the demand locations (see ReVelle and Swain, 1970; Tewari and Jena, 1987; Oppong and Hodgson, 1994).

Location-allocation problems are generally worked out with the help of an algorithm. In ARC/INFO (version 7.2.1), the GIS software used to solve the location problem, two heuristics are available, namely the Global Regional Interchange Algorithm[11] (GRIA) and The Teitz and Bart[12] (TAB). The GRIA is used to solve the location-allocation problem in this work, as the candidate and demand locations may be the same in our analysis.

The location-allocation models can be used with constraints. The type of sites (fixed or mobile[13]) can be defined in advance. For each service, this model was executed separately for the actual and modelled locations. Firstly, for the actual locations (all centres are fixed) where the model will provide p-median values for the existing locations. Secondly, for the modelled (near to optimum) locations, where all the specified number of centres is mobile. A comparison between the actual and modelled locations have been used to measure the efficiency level of existing services; the greater the difference between actual and modelled p-median values (average weighted distance), the lower the efficiency level.

In 1981, students had to travel an average distance of 1.55 kilometres[14] to access the nearest available middle school, which is 0.25 kilometres more than the modelled distance (Table-4.12). In 1996, however, the actual average distance had declined to 0.74 kilometre, which is

---

[11] GRIA is a relatively new heuristic used for solving location-allocation problems. This heuristic begins with a 'starting solution', or 'seed', of m number of candidates. The algorithm then goes through a global and regional phase of candidate substitutions to arrive at a local optimum. In the global phase, a site is selected which makes the least in the total weighted distance once it is removed from the solution. It is replaced with the candidate that decreases the weighted distance most. These substitutions are done until there is no further reduction in the total weighted distance. The regional phase involves looking at the candidates allocated to each site. If a site can be replaced by one of these candidates to reduce the total weighted distance, the substitution is made. These substitutions are done until there is no further reduction in the total weighted distance. Like other heuristics, this model also can not guarantee to find the optimal solution, but it finds a solution referred to as 'local optimum'. GRIA can provide a better solution when the candidate and demand locations are the same (ARC/INFO, *Online Help*, (version: 7.2.1).

[12] TAB begins with a 'starting solution' referred as a 'seed' of m candidates (temporary set of centres). A set of successive single candidate substitutions are used to arrive at a local optimum. TAB is considered to be a robust heuristic for solving location-allocation problems. The degree of optimality with TAB is dependent on data set and size. The use of TAB is recommended when candidate locations are different from the demand locations.

[13] Before the actual model is executed a candidate variable has to be defined. The candidate variable ranges from 0 to 2. A value of 0 means it is not a candidate; 1 indicates it is a candidate (mobile location), which means a service may or may not be located at this site; and 2 indicates that it is a candidate that is a fixed site (i.e. a site already exists there or a site must be located there) see ESRI (1998) *Arcplot Manual*, version 7.21.

[14] This is an average distance, which is calculated by dividing the total weighted distance by the total number of demand points weighted by demand. In case a school is located in a village, it is assumed that distance for the students of this village is 'zero'. In reality, students may have to walk on an average less than quarter of a kilometre (to reach a school located within a village) in an average size village. The availability of two or more schools will further change the real distance students have to travel, but again this model will assign a 'zero' distance for the school(s) located within a village.

0.16 kilometre more than the modelled distance. It can be said that the average distance has declined significantly due to an increase in the number of middle schools from 1981 to 1996, but the efficiency level also declined from 1981 to 1996. In 1981, students had to travel 19 per cent further when the actual locations are compared with the modelled locations and this figure increased to 27 per cent in 1996, which shows a lack of a criterion (particularly in terms of distance and demand) for the location of new schools or the upgrading of existing primary schools.

Figures-4.8, 4.9 and 4.10 show modelled locations of service centres (middle schools) and demand points served by them. Inter-district differences can be noticed in the geographical efficiency level of middle schools. At all three points of time under analysis, pupils had to travel lesser distances to access a middle school in Rohtak as compared to Bhiwani District. Moreover, efficiency as measured from the comparison of the actual and modelled distributions was greater in Rohtak and increased more rapidly in this district.

Table-4.12: Average distances (km) for middle schools

	Rohtak		Bhiwani		Total	
	Actual	Model	Actual	Model	Actual	Model
1981	1.29	1.10	1.86	1.56	1.55	1.30
1991	0.81	0.67	1.29	1.03	1.03	0.83
1996	0.52	0.42	0.97	0.74	0.74	0.58

Source: Author's calculation

A comparison between actual and modelled locations is shown in Figures-4.11, 4.12 and 4.13. A star shows an actual location, an empty circle shows a location suggested by the model, and a circle with a star shows that the actual and modelled locations are the same. Out of the total, about three-quarters of the actual and modelled locations of middle schools were the same (Table-4.13) in 1981. There was a considerable mismatch between modelled and actual locations in Bhiwani District especially in the south-western parts. The situation improved by 1991, because of the increase in the number of middle schools, but the spatial patterns remained almost the same. By the years 1991 and 1996, more than 80 per cent of middle schools were situated at the locations which were suggested by the least weighted distance location-allocation model.

Table-4.13: Actual and modelled locations of middle schools

Year	Total	Actual=Model Location	Per cent
1981	398	296	74.37
1991	527	432	81.97
1996	617	516	83.63

Source: Author's calculation

4.3.2 High schools: The number of high schools almost doubled from 1981 to 1991(Table-4.14[a]). Rohtak and Bhiwani Districts experienced an increase of 172 and 125 high schools respectively from 1981 to 1991. About one quarter of the total schools was concentrated in urban areas for the Census years 1981 and 1991, but only 22 per cent of the high schools were urban in 1996 (Table-4.14[b]). New locations of private schools in the rural areas may explain the increase in the percentages of high schools in rural areas. In 1996, there were 525 high schools in Rohtak District alone, which was almost double the number of high schools in Bhiwani District. This reveals inter-district variations in the distribution of high schools. In 1981, high school locations appear scattered, but there were more schools in the Eastern part (especially in Rohtak District) and less in Western parts (expect the Bhiwani City and Dadri town) (Figrue-4.14). The density of high school locations has increased considerably from 1981 to 1996 with a considerable increase in the number of new locations, and a sharp increase in the number of high schools in Rohtak City and Bahadurgarh town (Figure-4.15 and 4.16).

Table-4.14(a): Number of high schools

Year	Rohtak			Bhiwani			Total		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
1981	62	191	253	34	105	139	96	296	392
1991	103	301	404	46	151	197	149	452	601
1996	124	401	525	50	214	264	174	615	789

Source: Census of India, 1981, 1991 and (DSEH), 1996

Table-4.14(b): Number of high schools (%)

Year	Rohtak		Bhiwani		Total	
	Urban	Rural	Urban	Rural	Urban	Rural
1981	24.51	75.49	24.46	75.54	24.49	75.51
1991	25.50	74.50	23.35	76.65	24.79	75.21
1996	23.62	76.38	18.94	81.06	22.05	77.95

Source: Census of India, 1981, 1991 and DSEH, 1996

In 1981, there were 6233 people for every high school in both districts. This number decreased to 4639 people by the year 1996, showing declining pressure on high schools. Pressure on high schools is more in rural as compared to urban areas, whereas in the case of middle schools pressure was lower in rural than urban areas. In 1996, more than 22 per cent of high schools were located in urban areas, while the percentage of middle schools in urban areas was less than 20.

Table-4.15: Population per high school

Year	Rohtak			Bhiwani			Total		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
1981	4815	6376	5993	4868	7253	6670	4834	6687	6233
1991	3742	4728	4477	4451	6212	5801	3961	5224	4911
1996	4138	4276	4243	5076	5508	5426	4407	4705	4639

Source: Census of India, 1981, 1991 and DSEH, 1996

Table-4.16 (a): Distribution of high schools, 1981, 1991 and 1996

Number of Schools	Rohtak			Bhiwani			Total		
	1981	1991	1996	1981	1991	1996	1981	1991	1996
None	314	245	197	330	295	263	644	540	460
1	128	169	174	89	118	123	217	287	297
2	22	39	74	11	10	35	33	49	109
3	8	12	19	1	7	7	9	19	26
4	1	4	5	0	0	0	1	4	5
More than 4	4	8	8	2	3	5	6	11	13
Total	477	477	477	433	433	433	910	910	910

Source: Census of India, 1981, 1991 and DSEH, 1996

Out of the total, in 644 (more than 70 per cent) villages a high school was not available during the Census year 1981 (Table-4.16[a] and [b]). Some new schools have been added and some middle schools have been upgraded to high schools. Therefore, by the year 1996 the number of villages without a high school declined to only 460, just more than 50 per cent. In Bhiwani District, however, even by the year 1996 more than 60 per cent of the villages did not have any high school, while the percentage for Rohtak District was 41, showing a contrasting picture of high school availability in Rohtak and Bhiwani Districts.

Table-4.16(b): Distribution of high schools, 1981, 1991 and 1996 (%)

Number of Schools	Rohtak			Bhiwani			Total		
	1981	1991	1996	1981	1991	1996	1981	1991	1996
None	65.83	51.36	41.30	76.21	68.13	60.74	70.77	59.34	50.55
1	26.83	35.43	36.48	20.55	27.25	28.41	23.85	31.54	32.64
2	4.61	8.18	15.51	2.54	2.31	8.08	3.63	5.38	11.98
3	1.68	2.52	3.98	0.23	1.62	1.62	0.99	2.09	2.86
4	0.21	0.84	1.05	0.00	0.00	0.00	0.11	0.44	0.55
More than 4	0.84	1.68	1.68	0.46	0.69	1.15	0.66	1.21	1.43
Total	100	100	100	100	100	100	100	100	100

Source: Census of India, 1981, 1991 and DSEH, 1996

In 1996, about one third of the total villages had only one high school and about 12 per cent two high schools. Locations with more than two schools were either towns or district headquarters or relatively bigger villages (in terms of size of population). In 1996, there were as many as 57 high schools in Rohtak city alone. Bhadurgarh (located on the border of Delhi UT) had 25 schools, while Bhiwani City had only 21 high schools. Growth in the number of high schools has been very fast in the towns of Rohtak District, especially those located along the major highways. In 1981, there were only 30 and 9 high schools in Rohtak City and Bahadurgarh town respectively; their number rose to 57 and 27 by the year 1996. It is further interesting to note that in 1981 only 4.61 and 2.54 per cent villages and towns had two high schools in Rohtak and Bhiwani Districts, increasing to 15.5 per cent for Rohtak and 8 per cent for Bhiwani in 1996.

Figures-4.18, 4.19 and 4.20 show the actual distribution of high school locations and demand points. The longer the lines between demand point and service centre (high school location), the further people have to travel. The availability of high schools is relatively poor in the south-western part of the study area. This part of the study area is semi-arid, covering southern parts of Rohtak District and southern and western parts of Bhiwani District. It is relatively less developed as compared to the northern and north east regions and private investment in schools is relatively low, showing a positive relationship between development and investment in private schools.

The average actual distance to access a high school declined from 2.27 kilometres in 1981 to 1.34 kilometres in 1996 (Table-4.17). This shows an overall improvement in the availability of high schools in the study area, mainly because of an increase in the number of villages with

a high school. In 1981, the average actual distance was 15.8 per cent more than the average modelled distance, and this figure increased to 19.6 per cent in 1996. This shows a decline in the overall geographical efficiency of high school locations, and again it seems that new locations of high schools were not decided giving due consideration of distance from service centre to demand points. Had new high school locations been planned using location-allocation models, students could have travelled 19 per cent less distance to access a high school. Surprisingly, in Rohtak District the actual average distance was 16 per cent more than the modelled distance, while the figure for Bhiwani is only 14 per cent. This shows a better geographical efficiency of high schools in Bhiwani as compared to Rohtak District (although the average actual distance is less in Rohtak than in Bhiwani District). The distance travelled is not the same for all the villages. Out of the total, in 57 villages pupils had to travel a distance of more than 5 kilometres to the nearest high school in 1981. When this condition is examined for the optimised locations, only 14 villages had a distance of more than 5 kilometres from the nearest high school.

In 1991, the nearest high school was 5 kilometres away from as many as 26 villages. In the modelled locations, however, a high school was beyond a distance of 5 kilometres from only 5 villages. In 1996, people had to cover a distance of more than 5 kilometres to access a high school in 10 villages against only three villages in modelled locations. This shows a significant improvement in the geographical access to high schools (Figure-4.21, 4.22, and 4.23) largely because of the increase in the number of new schools built. The opening of a new school does not necessarily follow modelled locations, but in 1996, more than 75 per cent of high schools were available at the identified modelled locations against 65 per cent in 1981.

Table-4.17: Average distances (km) for high schools

	Rohtak		Bhiwani		Total	
	Actual	Model	Actual	Model	Actual	Model
1981	1.96	1.67	2.64	2.33	2.27	1.96
1991	1.30	1.11	2.13	1.84	1.69	1.41
1996	0.97	0.83	1.77	1.55	1.34	1.12

Source: Author's calculation

Table-4.18: Actual and modelled locations of high schools

Year	Total	Actual=Model Location	Per cent
1981	266	175	65.79
1991	371	277	74.66
1996	443	333	75.17

Source: Author's calculation

Figures-4.24, 4.25 and 4.26 show the distribution of actual and modelled locations of high schools in 1981, 1991 and 1996 respectively. In 1981, about two thirds of the actual and modelled locations of high schools were the same and the situation improved in 1991 and 1996, when only one quarter of the actual locations was different from the modelled locations. Inter-district disparities can further be observed in the actual and modelled locations of high schools. In Bhiwani District, a large number of high school locations were different from the modelled locations.

4.3.3 Senior Secondary Schools (SSS): The provision of SSS is more important than the lower schools. In the following analysis, senior secondary schools also include arts, commerce and science colleges. The Haryana Education Board in Bhiwani adopted the central Government's educational pattern only after 1985. In the newly adopted education system, students have to spend two years in senior secondary schools before going for college education. Prior to that one had to go to college for pre-university just after high schooling, and pre-university was of only one-year's duration. The main reason for us to include colleges in senior secondary school category is that many of the colleges have senior secondary classes. In 1981, SSS were primarily located in urban areas only (with some exception). In 1991, the location of SSS in rural areas increased significantly, and by 1996 their number had not only increased in the villages of Rohtak District, but there was a significant improvement in the number of SSS in the villages of Bhiwani District also (Figure-4.27, 4.28, 4.29 and 4.30).

In 1981, there were only 40 senior secondary schools: 31 in urban and 9 in rural areas. There had been a significant increase in the number of senior secondary schools from 1981 to 1996, more than a four-fold increase over a period of 15 years. It is interesting to note that the increase in urban areas is just more than double, but in rural areas there is a several-fold increase from 1981 to 1996 (Table-4.19[a] and [b]). In 1981, more than three-quarters of the

total senior secondary schools were located in urban areas, declining to only one third by the year 1996.

Table-4.19(a): Number of senior secondary schools

Year	Rohtak			Bhiwani			Total		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
1981	19	8	27	12	1	13	31	9	40
1991	35	28	63	19	6	25	54	34	88
1996	40	76	116	24	31	55	64	107	171

Source: Census of India, 1981, 1991 and (DSEH), 1996

Table-4.19(b): Number of senior secondary schools (%)

Year	Rohtak		Bhiwani		Total	
	Urban	Rural	Urban	Rural	Urban	Rural
1981	70.37	29.63	92.31	7.69	77.50	22.50
1991	55.56	44.44	76.00	24.00	61.36	38.64
1996	34.48	65.52	43.64	56.36	37.43	62.57

Source: Census of India, 1981, 1991 and DSEH, 1996

Out of the total (for all the three years under study), more than two thirds of the senior secondary schools were located in Rohtak District alone. Out of the total schools in rural areas, more than 80 per cent were located in Rohtak District alone during the census years 1981 and 1991, and more than 70 per cent in 1996. In both the districts, there has been a significant increase in the number of senior secondary schools in rural areas from 1981 to 1991 (Table-4.19[a]). In 1996, more than 65 per cent of the senior secondary schools in Rohtak were in rural areas, as against 56 per cent in Bhiwani District.

The number of people for every senior secondary school has declined from 61,083 in 1981 to 21,405 in 1996, a decrease of more than three times over a period of 15 years. It is interesting to note that in rural areas in 1981 there were more than 200,000 people for every senior secondary school, declining to 27,040 by the year 1996. This shows a considerable expansion of senior secondary schools in rural areas. In urban areas, however, there has been a decline of just over 3000 from 1981 to 1996. Again, inter-district disparities can be observed from Table-4.20. In Bhiwani (in 1996), there were 26,046 people for every senior secondary school against 19,204 people in Rohtak District. The population pressure on senior secondary schools in Rohtak District is significantly lower in rural areas as compared to Bhiwani District, but for urban areas the situation is reversed.

Table-4.20: Population/senior secondary school

Year	Rohtak			Bhiwani			Total		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
1981	15712	152217	56158	13793	761554	71313	14969	219921	61083
1991	11014	50826	28708	10775	156334	45709	10930	69445	33538
1996	12827	22561	19204	10575	38023	26046	11983	27040	21405

Source: Census of India, 1981, 1991 and DSEH, 1996

There were 98, 95 and 87 per cent of villages without a senior secondary school in 1981, 1991 and 1996 respectively. In 1996, only one senior secondary school was available in 10 per cent of the villages (Table-4.21[a] and [b]). In Rohtak, more than 13 per cent of villages have at least one senior secondary school against 7.39 per cent in Bhiwani District. In 1981, there were only two towns where more than 4 SSS were available. This number increased to 6 (primarily bigger towns and Rohtak and Bhiwani City) in 1996.

Figures-4.31, 4.32 and 4.33 show the distribution of actual locations of senior secondary schools in 1981, 1991 and 1996 respectively. Senior secondary schools were available at only four places in Bhiwani District in 1981. The average distance between school locations and the demand points declined from 16 kilometres in 1981 to 5.15 kilometres in 1996.

Table-4.21(a): Distribution of senior secondary schools, 1981, 1991 and 1996

Number of Schools	Rohtak			Bhiwani			Total		
	1981	1991	1996	1981	1991	1996	1981	1991	1996
None	463	445	400	429	422	396	892	867	796
1	10	22	64	2	8	32	12	30	96
2	2	4	6	0	1	2	2	5	8
3	0	3	3	0	0	0	0	3	3
4	1	0	0	1	0	1	2	0	1
More than 4	1	3	4	1	2	2	2	5	6
Total	477	477	477	433	433	433	910	910	910

Source: Census of India, 1981, 1991 and DSEH, 1996

In as many as 249 villages, students had to travel a distance of more than 20 kilometres to reach a senior secondary school during the Census year, 1981; the number of villages without a senior secondary school within a distance of 10 kilometres decreased rapidly from 512 in 1981, to 210 in 1991 and only 100 in 1996.

The location-allocation model suggests that in only four villages did students have to travel a distance of more than 20 kilometres to access a senior secondary school during the Census year 1981 (Figure-4.34, 4.35 and 4.36). In fact, in 51 villages (in 1996) a senior secondary school was not available within a radius of 10 kilometres. In the modelled distribution, only one village did not have a senior secondary school within a distance of 10 kilometres. If these schools were planned using the p-median approach the average distance travelled to access a senior secondary school would have been reduced to only 3.63 kilometres against 5.15 kilometres of actual average distance (Table-4.22).

Table-4.21(b): Distribution of senior secondary schools, 1981, 1991 and 1996 (%)

Number of Schools	Rohtak			Bhiwani			Total		
	1981	1991	1996	1981	1991	1996	1981	1991	1996
None	97.06	93.29	83.86	99.08	97.46	91.45	98.02	95.27	87.47
1	2.10	4.61	13.42	0.46	1.85	7.39	1.32	3.30	10.55
2	0.42	0.84	1.26	0.00	0.23	0.46	0.22	0.55	0.88
3	0.00	0.63	0.63	0.00	0.00	0.00	0.00	0.33	0.33
4	0.21	0.00	0.00	0.23	0.00	0.23	0.22	0.00	0.11
More than 4	0.21	0.63	0.84	0.23	0.46	0.46	0.22	0.55	0.66
Total	100	100	100	100	100	100	100	100	100

Source: Census of India, 1981, 1991 and DSEH, 1996

In 1981, the actual average distance was 82 per cent more than the modelled average distance, this figure declined to 41 per cent, indicating improvement in the 'geographical efficiency' of senior secondary locations. But there is no evidence that any rational criterion was used for the location of new schools, as indicated by my informal discussion with the DEO, Bhiwani:

> "To be very honest there is only one criterion for school up-gradation or for the location of a new school i.e. political...Politicians will visit the village and on the demand of villagers and if politicians are pleased, schools will be up-graded...politicians will be willing to provide new facilities or up-grading an existing one only at such places/villages where they have a vote bank" (DEO, Bhiwani District, 1998).

The most probable reason is that in 1981, only a few SSS were available in rural areas. By 1996 the number of SSS increased tremendously, showing improved availability and geographical access to SSS. Another interesting feature to note is that in Rohtak the actual average distance was 22 per cent more than the modelled average distance, while the figure for Bhiwani was 33 per cent (in 1996).

Table-4.22: Average distances (km) for senior secondary schools

	Rohtak		Bhiwani		Total	
	Actual	Model	Actual	Model	Actual	Model
1981	9.50	7.12	24.31	13.02	16.33	8.96
1991	5.95	4.65	12.51	8.29	8.93	5.89
1996	3.50	2.86	5.88	4.41	5.15	3.63

Source: Author's calculation.

In 1981, the actual average distance to senior secondary school was 9.5 kilometres in Rohtak District, declining to only 3.5 kilometres in 1996 (less than the average model distances for both districts in 1981). In Bhiwani, however, the actual average distance from a senior secondary school was 24.3 kilometres in 1981, declining to 5.88 kilometres by the year 1996. Two things are obvious from the analysis: (1) availability patterns of senior secondary schools improved from 1981 to 1996, and (2) that geographical access (measured in terms of physical distance) to senior secondary schools is better in Rohtak as compared to Bhiwani District, but that the increase in the number of SSS schools in Bhiwani is faster than in Rohtak District.

In Figures 4.37, 4.38 and 4.39 the actual and modelled locations of senior secondary schools have been compared for the years 1981, 1991 and 1996 respectively. Senior secondary schools were available at 18 sites in 1981, out of which only four locations coincided with the modelled locations (Table-4.23). The situation improved in 1996; and about 42 per cent of the actual locations of senior secondary schools were those suggested by the location-allocation model.

Table-4.23: Actual and modelled locations of senior secondary schools

Year	Total	Actual=Model Location	Per cent
1981	18	4	22.22
1991	43	9	20.93
1996	114	48	42.11

Source: Author's calculation

The mismatch between actual and modelled locations is more in Bhiwani as compared to Rohtak District, but geographical accessibility improved faster in Bhiwani than in Rohtak District (due to the new locations of SSS in the villages of Bhiwani District).

It is evident from the present analysis that the number of schools (availability) and their geographical accessibility has improved from 1981 to 1996. If the distance least-square criterion had been used for the location and/or upgrading of schools, the geographical efficiency could have been improved. Political, economic and social interference play a vital part in the location of a new school and this results in poor geographical efficiency. My informal discussion with the District Education Officer (DEO), Rohtak, further substantiates this argument:

> "Recently, in some senior secondary schools 'science courses' were introduced. On examination it was found that there were not enough students to fill these courses. Lecturers in physics, maths, chemistry and biology in these schools were available, but not the students. These lecturers are paid and there is no mechanism by which we can terminate them. This is a gross under-utilisation of available services. These facilities were provided under political pressure... there are some norms and criteria to be observed while locating or up-grading facilities, but these norms and criteria are generally overlooked by the higher authorities" (DEO, Rohtak, 1998).

Recently, private schools have started cropping up in rural areas. These schools are available either at the most accessible locations, especially in towns and cities, or in geographically accessible villages such as along a national or a state highway or in the vicinity of a town or city. In the following section, we will examine the distribution of Government and non-Government schools. This will help in understanding the bias of non-Government schools in the favour of developed and accessible areas.

4.3.4 Government versus non-Government schools: Data on Government and non-Government schools were published by the DSEH, Chandigarh for the years 1992 and 1996. The role of private sector investment in infrastructure services, especially in rural areas, has always been doubted and questioned. During the year 1992, there were only 6 non-Government senior secondary schools, three each in Rohtak and Bhiwani Districts, and all these six schools were located in a few urban areas (Table-4.24[a] and [b]). In 1992, no private high school was available in the villages of Bhiwani District, while in Rohtak, 15 per cent of the private schools were located in rural areas in 1992 (Government of Haryana, 1992c and 1996).

Table-4.25(a): Government and private schools, 1992

District	Government		Non-Government		Total	
	Rural	Urban	Rural	Urban	Rural	Urban
Senior Secondary[15]						
Bhiwani	17	8	0	3	17	11
Rohtak	35	7	0	3	35	10
High[16]						
Bhiwani	138	2	0	11	138	13
Rohtak	233	7	13	69	246	76
Middle[17]						
Bhiwani	124	1	9	2	133	3
Rohtak	90	1	4	18	94	19

Source: DSEH, 1992

In both districts, the great majority of private middle and senior secondary schools were located in urban areas, while more than 95 per cent of Government schools were located in rural areas, revealing that the location of private schools has been in favour of urban areas. This further strengthens doubts about private school investment in rural areas, although the numbers and proportions of private schools have increased in rural areas from 1992 to 1996 (primarily in geographically more accessible villages). There were 3, 37 and 48 non-Government senior secondary, high and middle schools respectively in rural areas in 1996 (Table-4.24[a] and [b]); in other words a majority of pupils have to travel to urban areas to access a SSS.

Table-4.25(b): Government and non-Government schools, 1992 (%)

District	Government		Non-Government		Total	
	Rural	Urban	Rural	Urban	Rural	Urban
Senior Secondary						
Bhiwani	68.0	32.0	0.0	100.0	60.7	39.3
Rohtak	83.3	16.7	0.0	100.0	77.8	22.2
High						
Bhiwani	98.6	1.4	0.0	100.0	91.4	8.6
Rohtak	97.1	2.9	15.9	84.1	76.4	23.6
Middle						
Bhiwani	99.2	0.8	81.8	18.2	97.8	2.2
Rohtak	98.9	1.1	18.2	81.8	83.2	16.8

Source: DSEH, 1992

[15] Does not include colleges.
[16] Does not include senior secondary schools where high school classes are also available.
[17] Does not include high and senior secondary schools where middle school classes are also available.

Table-4.26(a): Government and non-Government schools, 1996

District	Government		Non-Government		Total	
	Rural	Urban	Rural	Urban	Rural	Urban
Senior Secondary						
Bhiwani	33	9	1	9	34	18
Rohtak	51	11	2	21	53	32
High						
Bhiwani	144	0	1	11	145	11
Rohtak	226	6	36	60	262	66
Middle						
Bhiwani	119	0	9	7	128	7
Rohtak	98	3	39	37	137	40

Source: DSEH, 1996

More than 90 per cent of the private senior secondary schools were in urban areas against 21 and 18 per cent of the Government senior secondary schools in Bhiwani and Rohtak Districts respectively. In Bhiwani, none of the Government high and middle schools was available separately (but as a part of the senior secondary schools) in urban areas. Even in Rohtak, more than 95 per cent of the Government middle schools were concentrated in rural areas. It is interesting to note that more than 50 per cent of the non-Government middle schools were in rural areas.

Table-4.26(b): Government and non-Government schools, 1996

District	Government		Non-Government		Total	
	Rural	Urban	Rural	Urban	Rural	Urban
Senior Secondary						
Bhiwani	78.6	21.4	10.0	90.0	65.4	34.6
Rohtak	82.3	17.7	8.7	91.3	62.4	37.6
High						
Bhiwani	100.0	0.0	8.3	91.7	92.9	7.1
Rohtak	97.4	2.6	37.5	62.5	79.9	20.1
Middle						
Bhiwani	100.0	0.0	56.3	43.8	94.8	5.2
Rohtak	97.0	3.0	51.3	48.7	77.4	22.6

Source: DSEH, 1996

Another interesting question to be investigated is 'where are these schools located in rural areas'? Generally, a majority of private schools are available in geographically accessible villages. In 1996, there were only 11 non-Government schools in rural areas of Bhiwani

Districts against 77 in the rural areas of Rohtak District. This, further, shows that developed districts have a tendency to attract a large number of private schools even in rural areas, as was extensively observed in the field. The number of private schools in the villages of Bhiwani Districts (except Bapora) was significantly lower than that of Rohtak District. Moreover, some of the less accessible (geographically) villages did not have even a single private school.

4.4 EXPENDITURE ON EDUCATION IN ROHTAK AND BHIWANI DISTRICT, AND QUALITY OF EDUCATION

There has been a phenomenal increase in the number of schools in the study area. Private schools are growing at a rate faster than Government schools. This leads us to investigate: (1) 'have Government schools not been able to cater for the total demand', (2) 'has the quality of education in Government schools deteriorated', and (3) 'why do people prefer to send their children to non-Government schools'? These questions will be discussed in detail later in this and next chapter. In the following section the quality of education and expenditure on education will be discussed.

Recently, there has been a growing concern about the quality of education as the returns of qualitative improvements in education may be larger than the returns from quantitative expansion (Behrman and Birdal, 1983; Psacharopoulos and Woodhal, 1986). Heyneman and Loxley (1983) concluded that in the Developed Countries the quality of schooling is less important than family background in determining standards of achievement; in the Developing Countries, however, quality of schooling has a greater impact on social and economic rates of return. Their findings in the Developing Countries seem to be based on only one type of educational service, i.e. Government provided.

Many of the Developing Countries including India have sought to establish Government schools in rural areas. In the study area, there were not many private schools in rural areas until recently, only the Government schools were available in rural areas, and students of all backgrounds (irrespective of caste and income) used to go to the same school. Because of the increasing availability of non-Government schools in rural and neighbouring urban areas, the trend is changing. People generally prefer a better quality of education for their children, this

may result in higher personal rates of return, but some other questions related to this are still to be answered. These are: 'does the quality of education vary from school to school, Government to private, and for rural to urban areas'; 'has quality of education improved or deteriorated'; and 'who has access to higher quality education'? It was observed in the field that the standards of education had declined in the Government schools. Lack of accountability and teacher absenteeism were the two important reasons for the deteriorating quality of education. My informal discussion with the villagers further clearly reveals this:

> "In the Government high school, Bhera there are only five teachers on the roll against the full strength of 15 teachers over the last year. This village is quite isolated geographically and teachers do not like to work in this village and they want to get transferred from here as soon as possible. Therefore many posts in the school stay vacant, which affects the study of students to a great extent" (Balwan Singh, Village Bhera, 1997).

> "There is one middle school in this village which was upgraded to a high school, but this school is not fully staffed. The Hindi teacher's post has been vacant since the upgrading of this school in 1996" (Sarpanch, Village Patodi, 1997).

People in the field reported that private schools provide a better quality of education (see Chapter-5). In private schools, English is introduced right at the beginning of the primary class and teachers devote time to their pupils. Therefore, they prefer to send their children to private schools (provided they can afford it). My informal discussion with the service providers and villagers illustrates this point:

> "People have developed a taste to send their children to school at an early age and want English medium education for them. We do not admit children in Government schools before the age of six years. In private schools, they admit children at an early age and they also introduce English language in the first class. That is why private schools are becoming more popular. These private schools are very expensive, there is much show in these schools" (Teachers, Government High School, Chuliana, 1998).

> "If there is proper study in the Government school then we need not send our children to a private school. Moreover, we would be able to save money incurred on the study of our children in the private school" (Shobraj Singh, 1998, Bapora).

But the cost of utilising these services is higher than for Government schools. Therefore, in that situation family background plays an important role in determining access to quality education. But the issue in the study area is somewhat different, i.e. the deteriorating quality

of educational services in general and that of Government schools in particular. There has been a growing concern for the quality of education in the study area, and many people have already started sending their children to private schools, where (people think) the quality of education is better than in Government schools. But access to quality education is closely associated with family background, particularly the paying capacity.

From the interviews with the service providers and informal discussion with the service users, it is clear that the quality of education has declined in Government schools. There are many reasons for this, and teachers' negligence is one of the important reasons for declining standards of education. One villager reported that:

> "There are three Government schools in this village. Because of teachers' negligence the study environment has deteriorated completely. Some teachers (employed in these schools) are from this village. They work simultaneously in the school as well as in their fields. They devote more attention to their cultivation instead of teaching school children. Moreover, the mistresses spend most of their time in knitting sweaters and stitching clothes (instead of teaching). We are really fed-up with the Government schools and have started sending our children to private school" (Suresh Verma, Bapora, 1997).

The distribution of expenditure on education can also throw some light on the deteriorating quality of education in Government schools. In the first half of the 1980s, there was buoyancy in expenditure in general and on expenditure on salaries and wages and subsidies in particular. In the latter half of the 1980s and the beginning of the 1990s (when the resources constraint hardened) expenditure on wages and salaries kept on rising at a fairly high rate. But socially productive capital expenditure, especially on infrastructure, (in per capita terms at 1981-82 prices) declined even in absolute terms (Bhambhri, 1998). In the following section an attempt will be made to examine expenditure on school education in Rohtak and Bhiwani Districts.

Expenditure data on education and health were collected for Rohtak and Bhiwani District with great difficulty. These data have been grouped into three categories- salaries[18], maintenance[19] and others[20]. Out of the total expenditure on education 92 and 97 per cent was

[18] It includes the salaries of teaching and supporting non-teaching staff.
[19] It includes expenditure on building and repair, equipment and furniture and laboratory.
[20] It includes expenditure on sports, stipend, and others not covered anywhere else.

spent on salaries in Rohtak and Bhiwani Districts respectively (Table-4.27). In Rohtak District, about 6 per cent was spent on maintenance and the rest (1.6 per cent) on 'others'. Surprisingly, in Bhiwani District less than 1 per cent was spent on maintenance and only 1.7 per cent on 'others'. The availability of staff alone cannot improve quality of education, because a comfortable teaching environment, the provision of textbooks, stationery, sports and other facilities are also essential for improving standards of education. A meagre proportion of allocation to maintenance and other associated activities might have resulted in a poor quality of education. Some teachers report that:

> "Except for the regular payment of our salaries, we are not provided with any facility in this school. There is no chair, no chalk, no register, textbook etc. in this school. We have to spend money from our own pocket to make all sorts of teaching arrangements. Whatever funds we collect from children we do not have the authority to use them. If we spend them there will be a lot of audit objections. Earlier there was some authority to utilise these funds, but now there are restrictions. Neither can we utilise these funds nor does the Government provide us separate funds for the teaching materials. This is one of the reasons for the poor quality of education" (Teachers, Government High School, Chuliana, 1998).

Table-4.27: Expenditure on Government Schools in Rohtak and Bhiwani Districts, 1996-97

School	Million Rupees				Percent			
	Salary	Maintenance	Others	Total	Salary	Maintenance	Others	Total
Rohtak								
Senior Secondary	164.302	3.066	4.307	171.675	95.7	1.8	2.5	100
High	153.108	18.807	1.505	173.419	88.3	10.8	0.9	100
Middle	18.366	1.414	0.033	19.813	92.7	7.1	0.2	100
Total	335.776	23.287	5.845	364.907	92.0	6.4	1.6	100
Bhiwani								
Senior Secondary	120.937	1.525	2.925	125.387	96.5	1.2	2.3	100
High	151.559	1.113	2.079	154.751	97.9	0.7	1.3	100
Middle	50.231	0.331	0.744	51.305	97.9	0.6	1.4	100
Total	322.727	2.969	5.748	331.443	97.4	0.9	1.7	100

Source: District Education Office, Rohtak and Bhiwani Districts

The expenditure data given above include both rural and urban areas. To examine the situation in rural areas (as an example), expenditure data on two high schools in Kehrawar and Chuliana villages are examined here (Table-4.28).

Table-4.28: Government boys high school expenditure in Kehrawar and Chuliana villages, 1996-97

School	000 Rupees				Percent			
	Salary	Mainte-nance	Others	Total	Salary	Mainte-nance	Others	Total
Kehrawar	1386.55	4.98	18.92	1410.45	98.3	0.4	1.3	100
Chuliana	1135.53	5.07	27.35	1167.95	97.2	0.4	2.3	100

Source: District Education Office, Rohtak District

In both the schools more than 97 per cent of the total expenditure was incurred on salaries, and less than 0.5 per cent on maintenance, far below the district average for Rohtak. Such a low proportion of expenditure on maintenance helps to explain the poor quality of education in Government schools.

4.5 SUMMARY OF RESULTS AND DISCUSSION

This section is divided into two parts. The findings of the above analysis are summarised in the first part. The availability, geographical accessibility and quality of school education in the study area are discussed in the second part. It is clear from the analysis that the ambitious plans for the provision of 'basic school education' (in both rural and urban areas) have been formulated and implemented. The Haryana Government took over the task of providing school education in rural and urban areas in 1966. Since then, considerable achievements have been made.

4.5.1 Summary of Results: Expenditure on education has not been adequate due to increasing demand for school education and population growth. Within general education, a larger proportion is spent on higher education, but not on basic school education. This means that 'basic education' is not given due priority and this further substantiates Sen's (1996) conclusions in this regard. The rate of growth of development and capital expenditure has declined gradually from 1980-81 to 1995-96, which has contributed significantly towards the declining standards of education in Government schools, especially in rural areas. Besides, there has been an enormous increase in the salaries of the staff employed in schools, colleges and universities; and a major proportion of total expenditure is devoted to salaries of teachers and other support staff. This may not leave an adequate budget for the maintenance of existing schools and the expansion of new schools on the one hand, and improvement in the quality of education on the other.

The increase in the number of Government schools is lower than the state average in both Rohtak and Bhiwani Districts. In terms of percentages, the growth of non-Government schools is much higher than for Government schools. Rohtak (which is one of the most developed districts of the state) has succeeded in attracting a large number of private schools in rural areas (an annual growth of 5.3 per cent). But Bhiwani, which is a less developed district, failed to attract many private schools in rural areas (an annual growth of only 1.54 per cent). This supports the argument that developed regions attract more private sector investment as compared to less developed regions.

In both districts, the increase in girls' enrolment is significantly higher than that for boys, which is an important and positive achievement that girls' enrolment has been gradually increasing. But in absolute terms, the number of female students was significantly lower than that of males.

The availability of middle, high and senior secondary schools has increased dramatically from 1981 to 1996; and the average distance people have to travel to access a middle, high and senior secondary school has declined significantly because of the increasing number of schools. But there was no improvement in the geographical efficiency of middle and high school locations from 1981 to 1996, rather there was a decline. In the case of SSS, there was a significant improvement in their efficiency level. It is evident from the present analysis that inter-district disparities in the distribution of schools are present. The percentages of villages without middle, high and SSS schools are significantly higher in Bhiwani than in Rohtak District, which shows poor school availability in Bhiwani District.

The location of private schools has been in the favour urban and developed areas. This further strengthens doubts about private school investment in rural and less developed areas, although the number and proportion of private schools has increased in rural areas from 1992 to 1996. The developed districts have a tendency to attract a large number of private schools even in rural areas, which is evident from a comparison between Rohtak and Bhiwani Districts. In both the districts, the demand for quality of education is increasing and this might have given a considerable boost to the expansion of private schools, particularly in urban areas and accessible locations.

4.5.2 Discussion:

Expansion of Government School Education: There is no doubt that there has been a considerable expansion of school education in rural and urban areas of Rohtak and Bhiwani Districts. While describing the achievement of school education, District Education Officer (DEO), Bhiwani District (1998) mentioned that

> "When Haryana was a part of 'Joint Punjab', education facilities were weak. Earlier a primary school was available within a distance of 5 km. Now, it is available within a distance of less than one kilometre. We are planning that no child in age group of 6 to 14 years is left without school education. Informal education centres are being established (planned only, but not implemented so far). Village children, who are graduates, will be appointed as instructors. The children who cannot go to school for some reason during the daytime would be able to attend informal schools in the evening. These classes will be conducted for two hours in the evening" (DEO, Bhiwani District, 1998).

Quality of Education and, Government versus Private Schools: There is no doubt that attempts have been made to provide formal education and that the schemes for informal education are in the pipeline. Quantitatively, there has been a considerable expansion of schools education in the study area, but the quality of education in Government school is not up to people's expectation (particularly in rural areas) despite the fact that teachers in Government schools are trained and qualified. Some comments from service users and providers are instructive:

> "My daughter goes to a Government school because the teachers are at least trained and experienced. Moreover, the private schools are costlier. But they have luring facilities, which spoil children's habits, and for which children suffer later on. This is entirely against the Government's policy of *simple living and high thinking*" (Hari Singh, Bapora, 1997).

> "I am sending my daughter to a private school, but I am not satisfied at all. The teachers in private schools are not qualified and trained. We are just compelled to send our children to private schools, as there is no care and studious environment in the Government school. If teachers in Government school, who are at least trained, pay attention they can impart a better education to our children and we will not be compelled to send our children to private schools" (Rajbir Singh, Brahana, 1997).

Based on informal discussion with the service users and providers an attempt was made to investigate 'why is the quality of education deteriorating in the Government schools'? There are seven important reasons for the declining standards of education in the Government schools, which are discussed below:

1. In almost all the Government schools of the surveyed villages, some posts were lying vacant. This affects the study of children to a great extent. Teachers themselves admit that some posts remain vacant for many years:

> "In our school, some posts for the compulsory subjects are vacant and there are no staff available for those subjects for years together. The situation is almost the same in all Government schools particularly in geographically less accessible villages" (Teachers, Government High School, Brahana, 1998).

2. Some informal comments given below reveal that teachers' absenteeism, lack of accountability and monitoring are other important reasons for the deteriorating quality of education in the Government schools and people have started sending their children to private schools. One of the teachers I spoke to admits that:

> "A private school is a kind of business, and they have to pay special attention in order to make a profit, therefore staff in the private school are accountable to the head of the institution. Here in the Government school masters are not accountable to anyone, and there are not strict regulations for those do not do their duties properly. Moreover, we have over-security of job in the Government schools, whether somebody works or not he will be paid at the end of month" (Teachers, Government High School, Brahana, 1998).

3. An important reason for the poor education is unemployment. Earlier, people used to get employment after high schooling and they developed a feeling that educating children meant ensuring employment for them. But now the situation has changed and many educated people are unemployed. Therefore, many people in rural areas do not pay much attention to schooling. When I asked one respondent why his son had stopped studying the response was:

> "He would not get any job even after study, then what is the use of continuing his studies further? It will be sheer wastage of money" (Villager, Brahana, 1998).

4. Due to declining standards of education in the Government schools, people are compelled to send their children to private schools, but they are not fully satisfied. Many private schools in the villages are not even registered and they do not employ qualified staff, but they do have facilities and they are teaching in the English medium. One villager reported to me that:

"There are 4-5 private schools in this village and the number of students in these schools is more than that in Government schools. In reality the situation in the private schools is worse than the Government schools. Neither are they competent in Hindi nor the English medium, as they do not have trained and qualified staff and adequate facilities" (Suresh Verma, Bapora, 1997).

"Generally, private schools are run by those who could not get a Government job and they are neither well experienced nor trained and highly underpaid" (Hari Singh, Bapora, 1997).

5. Generally weak children and those from lower castes (Scheduled Castes and Backward Castes) and lower income households go to Government schools. Some teachers in Government schools claim that intelligent children are admitted to private schools and the rest of the weak students attend Government schools, as their parents may not be willing or able to spend money on the studies of their children.

"Better and intelligent children are sent to private schools and rest of the students to our school. Parents pay special attention to children going to private school. But the parents of the children coming to our school do not pay any attention to their cleanness, dress and books. This may develop an inferiority complex among the children in Government schools" (Teachers, Government High School, Chuliana, 1998).

6. The meagre or no fees are another reason that people do not take seriously sending their children to Government schools. One of the school mistresses reported that:

"Why will a man who is paying a tuition fee of Rs. 10 (for a year) bother about the study of his child. He thinks it is the teacher's headache; and students in Government school remain poor (in study). The tuition fee should be higher in the Government schools and these funds can then be utilised to improve the standard in the school" (Mistress, Government High School, Kehrawar, 1998).

"I have also tried a private school, but my child failed there also. Now I am sending him to a Government school, as it is not costly for me" (Ramdhari Singh, Bapora, 1997).

7. Both the Government and the *panchayat* (village assembly) are equally responsible for the deteriorating quality of education. This is clear from the discussion given below.

"Panchayats do not pay any attention to the school or to any other facility in the school, but are busy in petty politics" (Rajbir Singh, Brahana, 1997).

"Before the village panchayat checks the school it is duty of 'we officers' to ensure strict checking of schools. We do admit that there has been negligence at officers' end to monitor the available services" (DEO, Rohtak, 1998).

"One sarpanch (village headman) came to me quite frequently and told me that none of the teachers in the school come on time. In the beginning I thought that he might have personal jealousies with some teachers and that is why he is complaining. But one day when I visited the school at 8.30 AM, I found only one teacher in the school despite the fact the school starting time was 7.30 AM. After some time students started coming to school. When I asked them why are you coming so late they said that none of the teachers will come before 9.00 AM, that is why there is no use of coming early. Further I learned that some teachers come by 9.00 AM bus, some others by the 10 AM bus and some other come and go back after marking their attendance.

"Officers at the district level are meant to implement the regulations, for one reason or another we have not been able to monitor services frequently" (Senior District Magistrate, Rohtak, 1998)

Non-availability and accessibility: The Non-availability of schools (in villages) and poor transport greatly hinders access to school education, particularly that of girls'. If there is no school available in the village, the Government should provide at least transport facilities so that they can access the school. If a school (in a village) goes up to the middle class, only the highest dropout rate will be observed after the middle class:

"This school has been upgraded up to matriculation. Earlier when this school was up to middle class, hardly 10 to 15 per cent girls used to go out of village for matriculation. The general trend in the village is that we start the search for a bridegroom (for the girls) after they have passed middle school" (Teachers, Government High School, Chuliana, 1998).

"We commute to Bhiwani city, but the bus drivers do not stop the bus, rather they accelerate and we have to come by Jeep (private) which is not only costlier but unsafe as well (Plate-4.1 and 4.2). The last year, one child died in an accident as a bus ran over him" (School Children, 1998, Bapora).

"The normal procedure for the students to travel in Government buses is to get a monthly travel pass which is quite nominal in price i.e. only 4 single fares. Many students travel in Government buses without a bus pass. The number of students is too great and it is not possible for us to control and regulate bus services in each and every village. Perhaps, the education department can intervene to ensure that every student who is a commuter has a bus-pass to travel by Government buses. Therefore, there is also a need for inter-departmental co-operation. The operational cost of buses is high that we cannot afford to provide subsidies beyond the present level. And there is a conflict between private and Government vehicles plying on the road. Many passengers are picked up by private vehicles such as jeeps or other private buses and they will leave the school children for the Government bus and many of school children do not have bus travel passes" (GM, Haryana Roadways, Bhiwani, 1998).

Plate-4.1: A private three wheeler on Bapora-Bhiwani road.

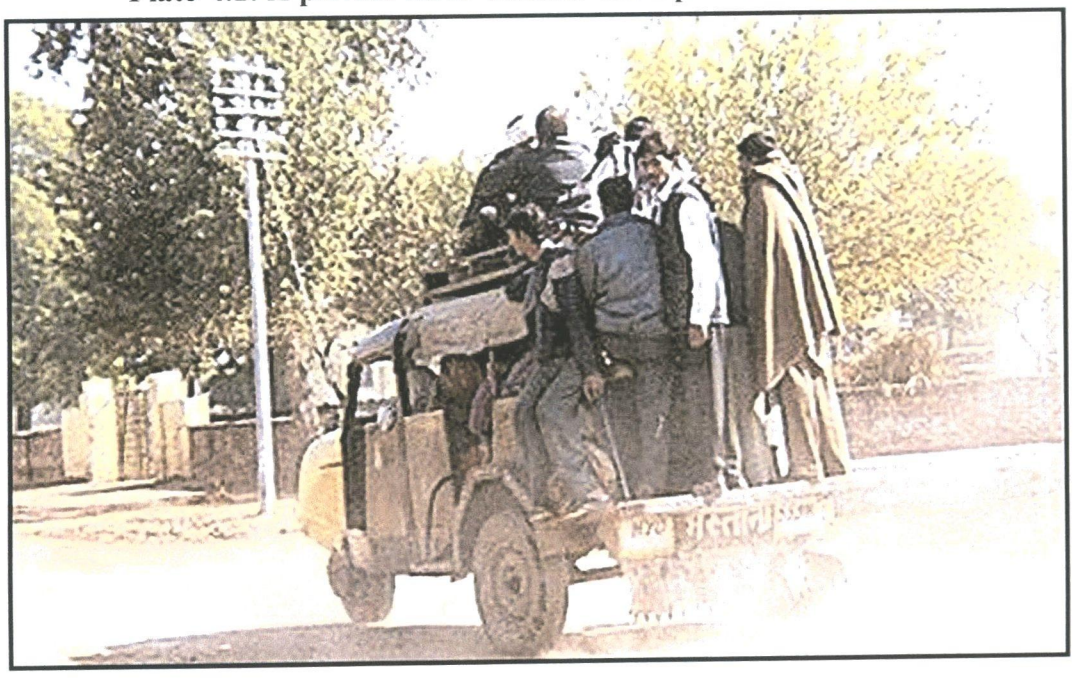


Plate-4.2: A private bus and a jeep on Kehrawar-Rohtak road

From the above discussion it is clear that the demand for primary education has been gradually increasing, which is further supported by Drèze and Gazdar's (1996) study on Uttar Pradesh. They recommended that along with the quantitative expansion of public education, there is a need to improve quality of education. In the 1990s, the Government of India started an expansion of primary school infrastructure under the scheme 'Operation Blackboard'. This scheme aimed at providing:

- A building comprising at least two reasonably large all-weather rooms with a *verandah* and separate toilets for girls and boys;
- At least two teachers in every primary school, as far as possible one male and one female;
- Essential teaching and learning equipment including blackboards, maps, charts, toys, and equipment for work experience (Government of India, 1994).

There have been many loopholes in the Government's provision of basic school education and people are not happy with the quality of education in these schools. It is well documented that teachers' absenteeism is more than that of students and learning resources and materials are inadequate (Noor, 1981). Drèze and Gazdar (1996) visited 16 villages of four different districts and found that the physical condition of the schools was very poor (due to incomplete construction work, poor maintenance etc.); about two thirds of the teachers were absent, none of the schools had a female teacher, and the actual pupil enrolment was 50 per cent lower than the official records. All this hints at the deteriorating standards of education. Therefore, building new schools is not the only issue. This will register in records only the availability of schools. The main issue is to regulate and improve the quality of education in the schools. Some school children in the study area reported that:

> "There is a senior secondary school available in this village, but the teachers remain absent most of the time. Some of them come to the school very late and after sitting there for sometime they disappear. Villagers do not do anything about it. Therefore, we have to go to schools located in the Bhiwani City" (School Children, Bapora, 1998).

It is evident that the schoolteachers are the most accessible source of knowledge and they have increasingly been involved with many additional projects. This tends to divert teachers' attention from the classroom (Noor, 1981, 33). DEO, Bhiwani reports that

> "How can the Government teachers be effective when we do have a lot of work for other departments (along with teaching). Now there is a parliamentary election in three months time, and almost all the teachers are engaged in preparing the electoral roll. When we visit schools teachers are not available despite the fact that this is the most crucial teaching time, because the end of year exams are due in March. Sometimes, they are busy with the Census, some other time with the economic census and sometimes they have to do even the patwari's work (land record related). Teachers in the Government sector are over-loaded with subsidiary work. Because of this they are not able to concentrate on teaching (DEO, Bhiwani, 1998).

The overburdening of teachers may be another important reason for the declining standards of school education. Moreover, villagers do not have any authority in monitoring schools. But wider community participation is essential in designing, operating and monitoring the successful provision of 'school education'. Local control and leadership provides the flexibility needed for the proper integration and timing of educational activities with other sectoral programmes. The Community participation, with its knowledge of locality, can use existing resources more imaginatively and can provide invaluable advice when it is necessary to modify plans in response to changing conditions. Grass-roots organisations, political parties or Government groups can generate community participation (Noor, 1981, 29). Therefore, it is necessary that villagers have some authority for school monitoring, which will help to check teachers' absenteeism. Villagers should perhaps also be assigned a role in the maintenance of school buildings, furniture and other equipment. This may help in improving the standard of school education.

As discussed earlier the non-availability of a school in a village and poor transport facilities greatly hinder access to school education. But even if a school is available within a village, many children are unable to attend it. Therefore, besides availability, some other factors control the access or the real utilisation of school education. In the next chapter, we will discuss the accessibility to and/or utilisation of different types of schools across different types of households (stratified in terms of castes and income levels) and the factors governing access to school education.

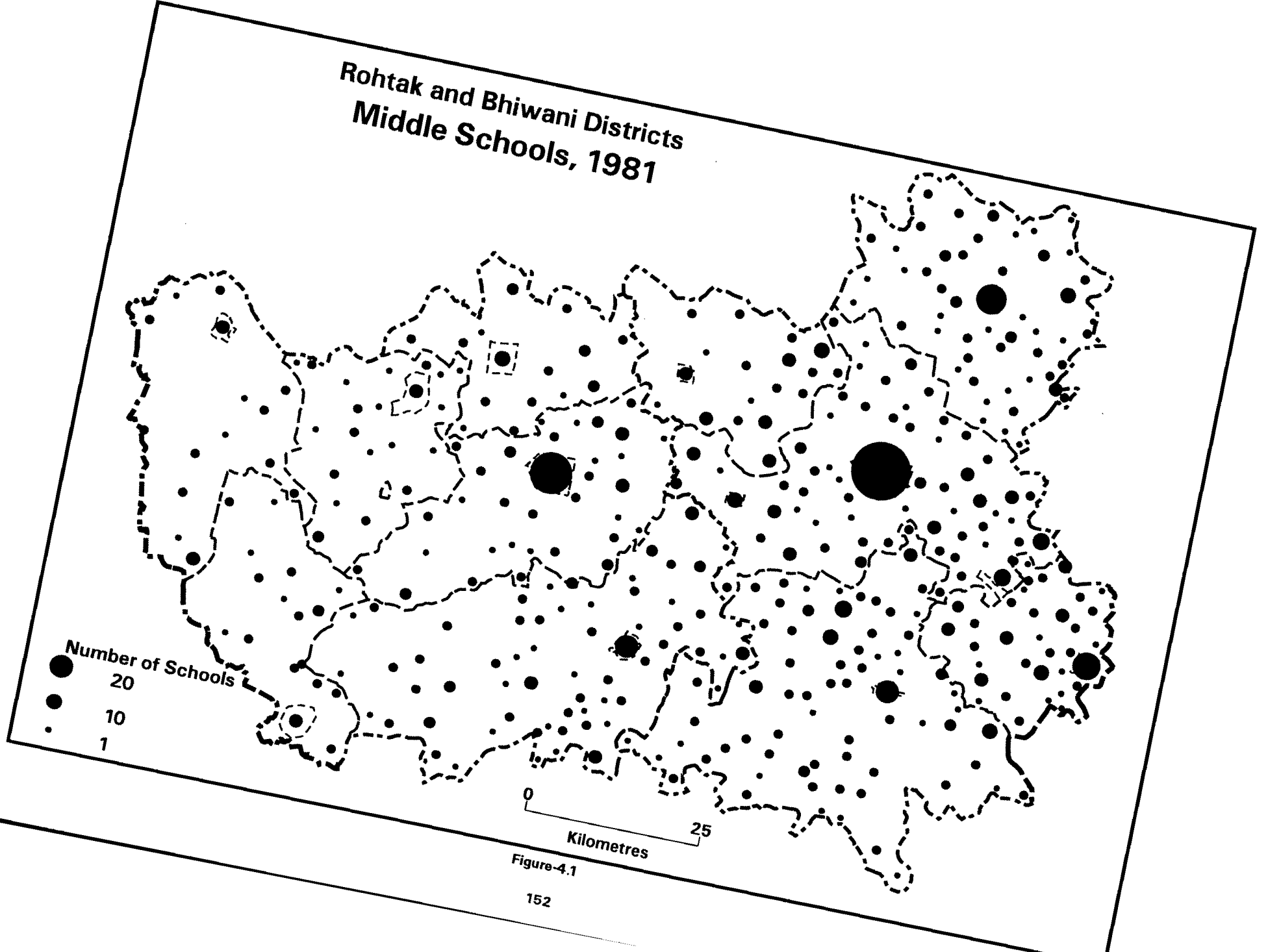

Rohtak and Bhiwani Districts
Middle Schools, 1981
Number of Schools
20
10
1
0
25
Kilometres

Figure-4.1

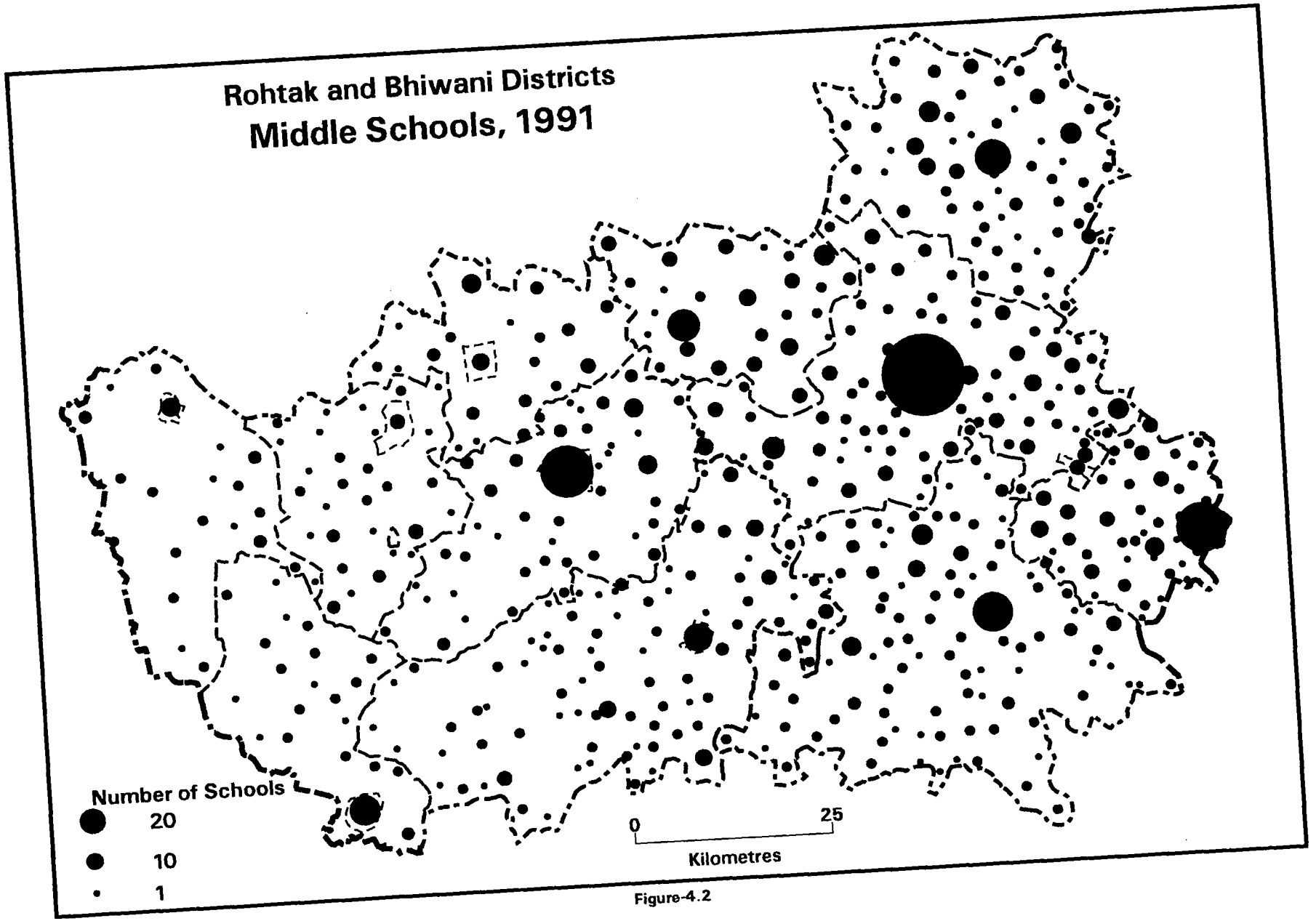

Rohtak and Bhiwani Districts
Middle Schools, 1991
Number of Schools
20
10
1
0
25
Kilometres

Figure-4.2

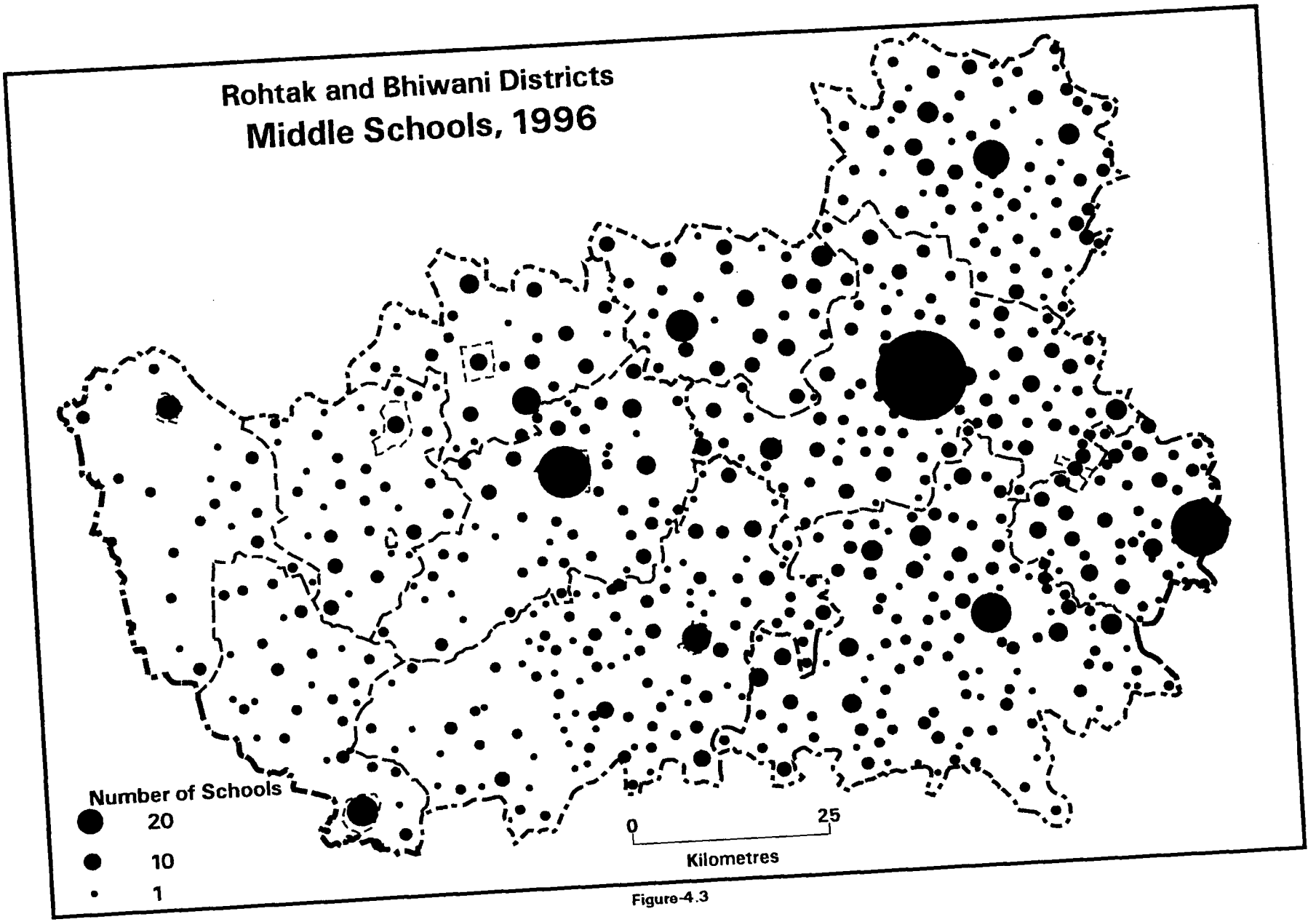

Rohtak and Bhiwani Districts
Middle Schools, 1996
Number of Schools
20
10
1
0
25
Kilometres

Figure-4.3

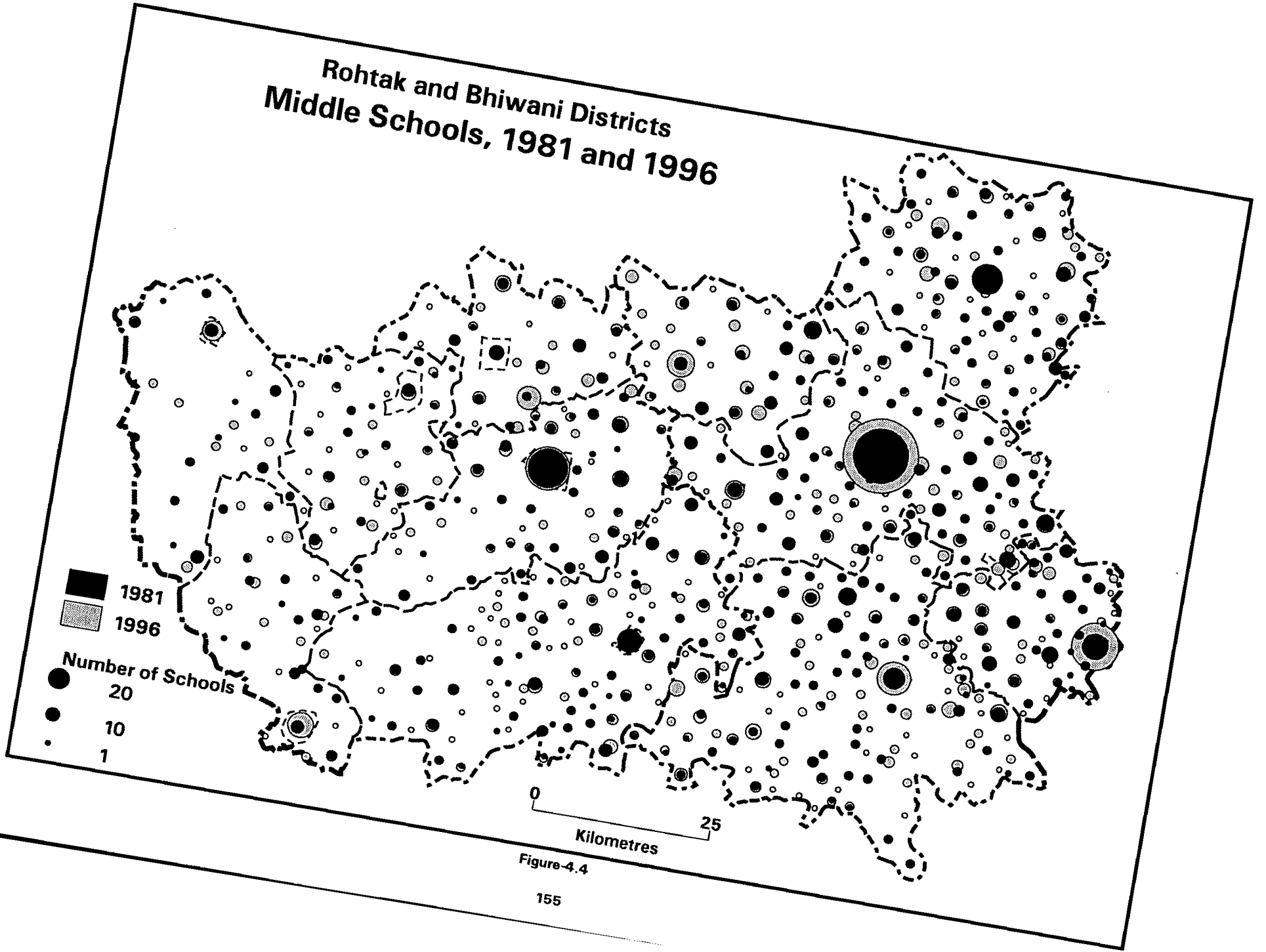

Rohtak and Bhiwani Districts
Middle Schools, 1981 and 1996
1981
1996
Number of Schools
20
10
1
0
25
Kilometres

Figure-4.4

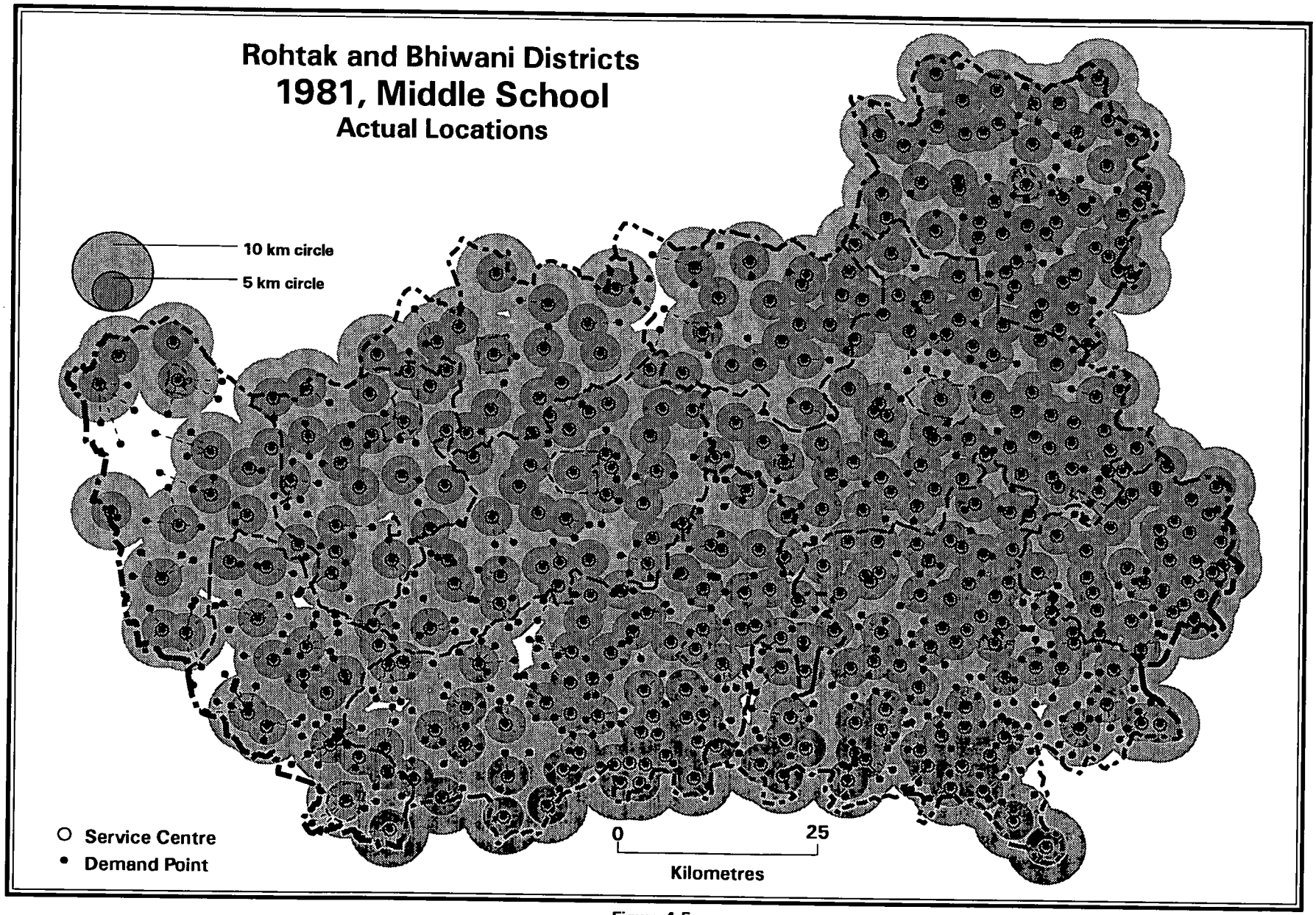

Rohtak and Bhiwani Districts
1981, Middle School
Actual Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.5

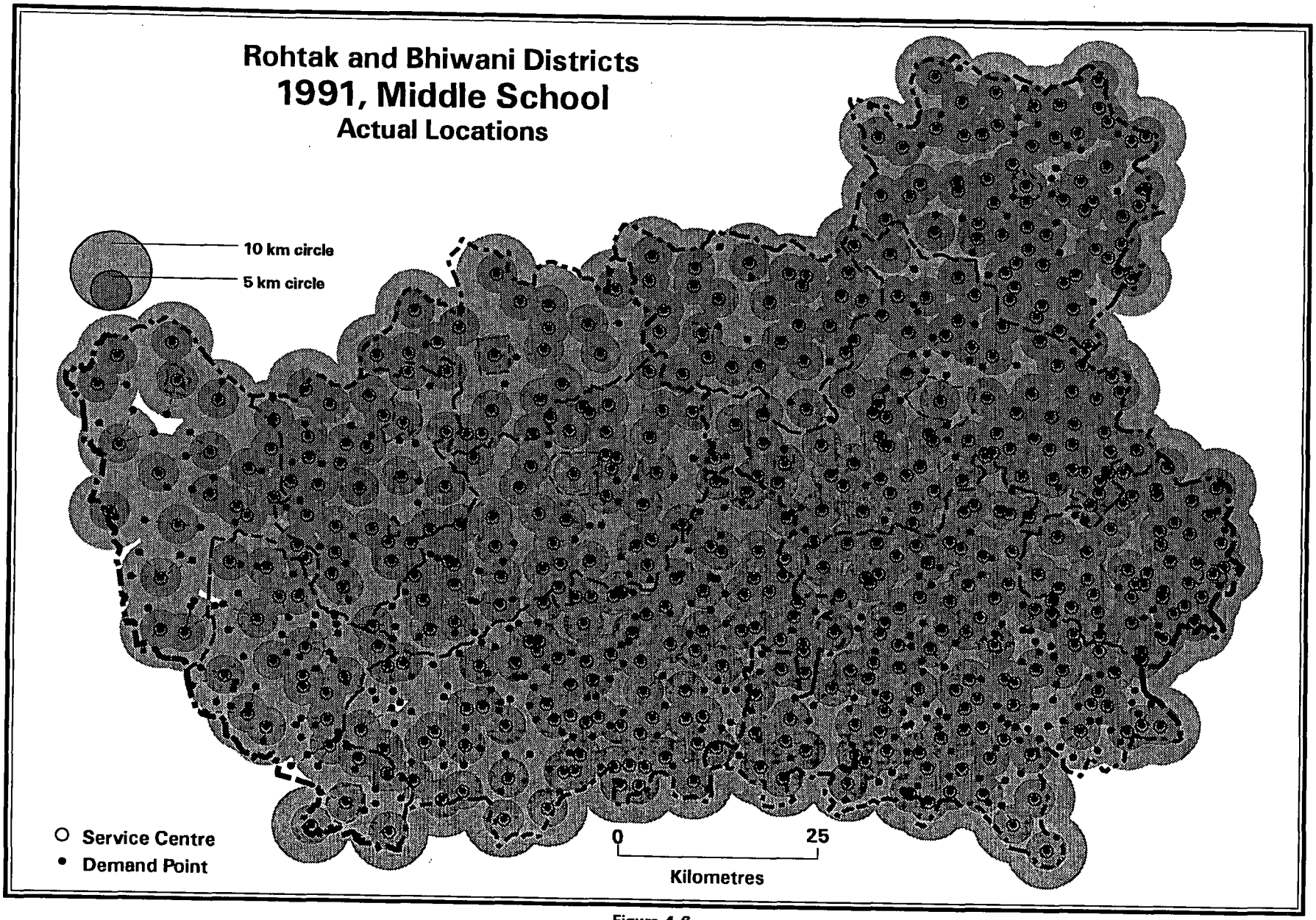

Rohtak and Bhiwani Districts
1991, Middle School
Actual Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.6

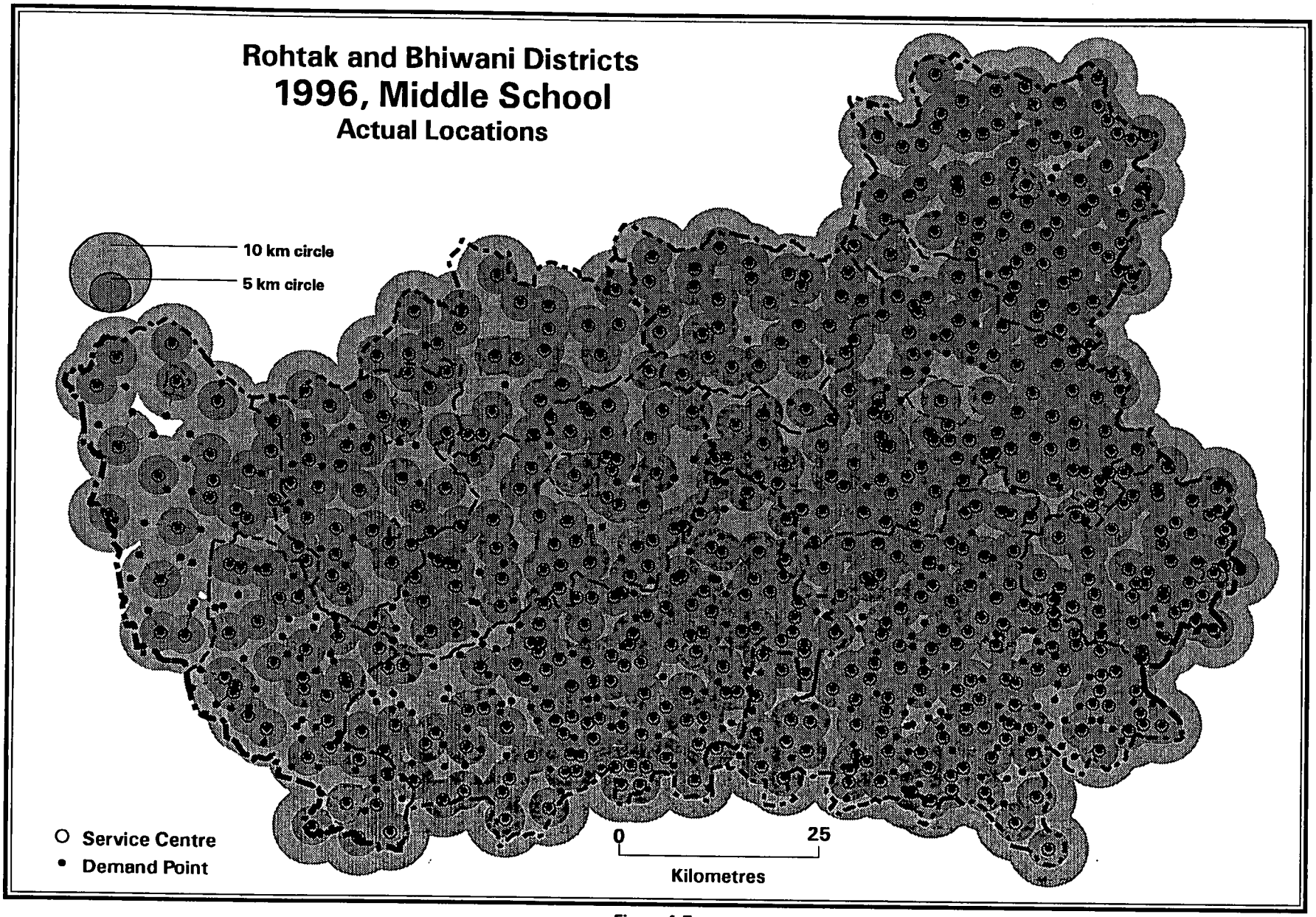

Rohtak and Bhiwani Districts
1996, Middle School
Actual Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.7

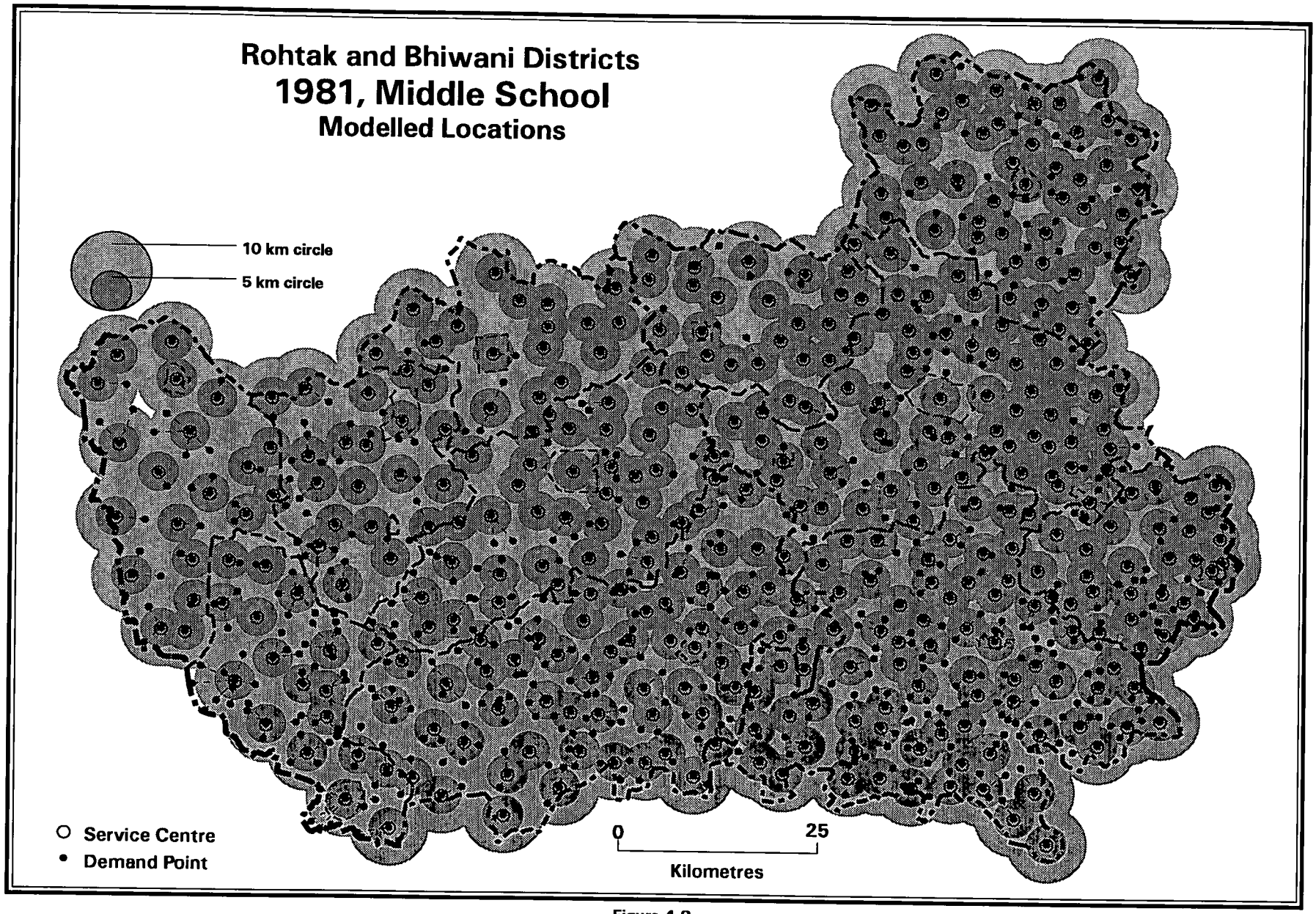

Rohtak and Bhiwani Districts
1981, Middle School
Modelled Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.8

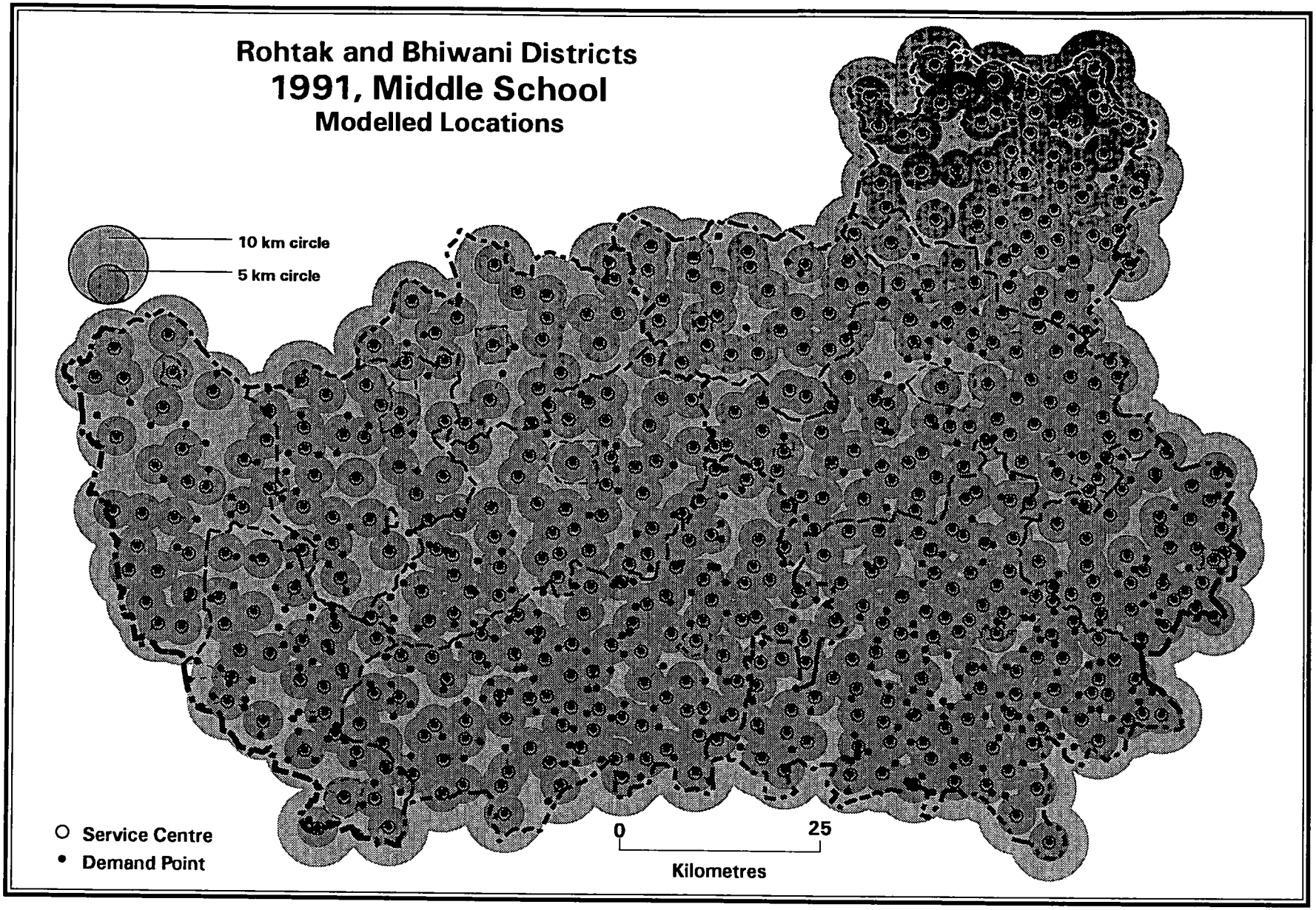

Rohtak and Bhiwani Districts
1991, Middle School
Modelled Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.9

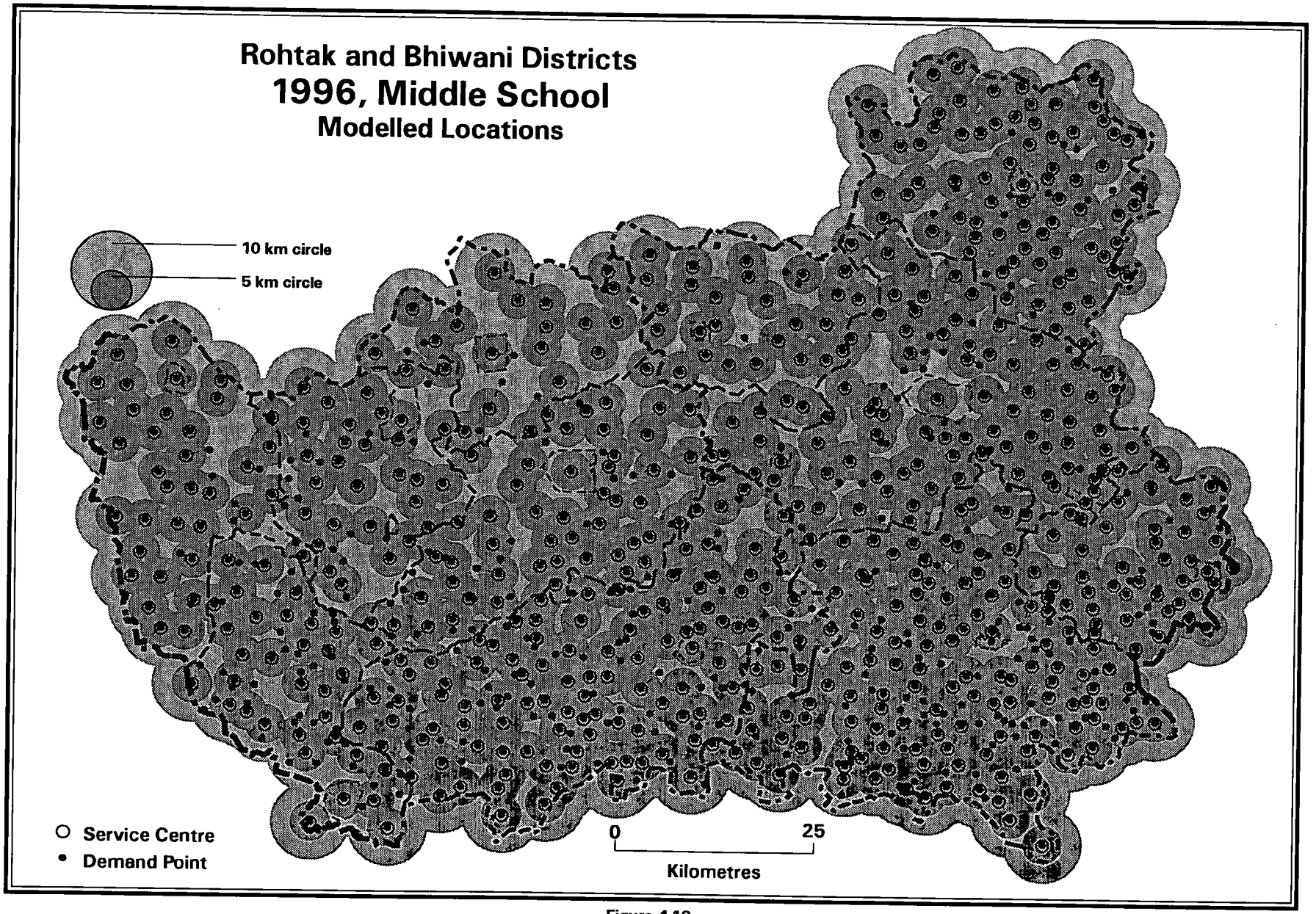

Rohtak and Bhiwani Districts
1996, Middle School
Modelled Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.10

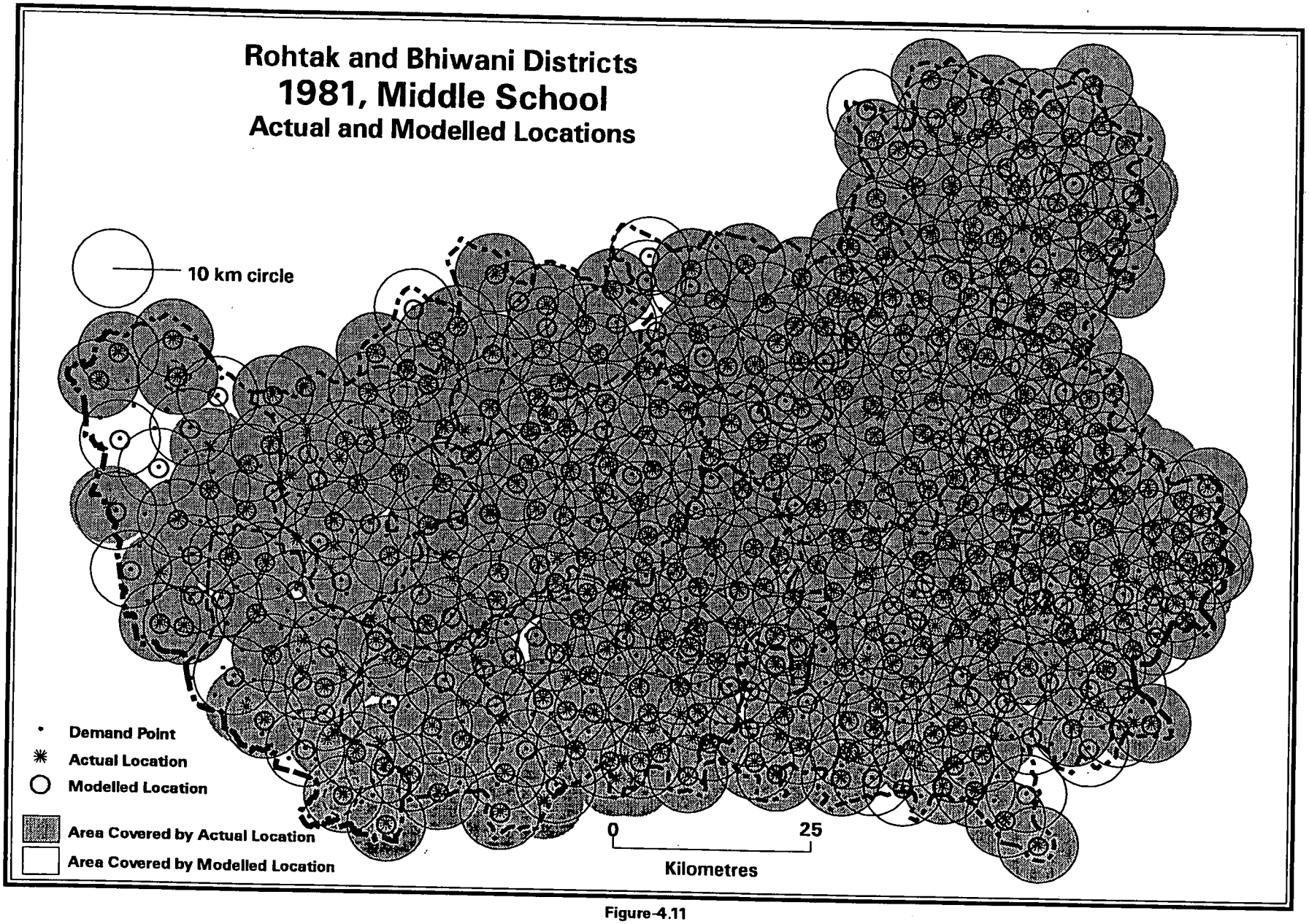

Rohtak and Bhiwani Districts
1981, Middle School
Actual and Modelled Locations
10 km circle
Demand Point
Actual Location
Modelled Location
Area Covered by Actual Location
Area Covered by Modelled Location
0
25
Kilometres

Figure-4.11

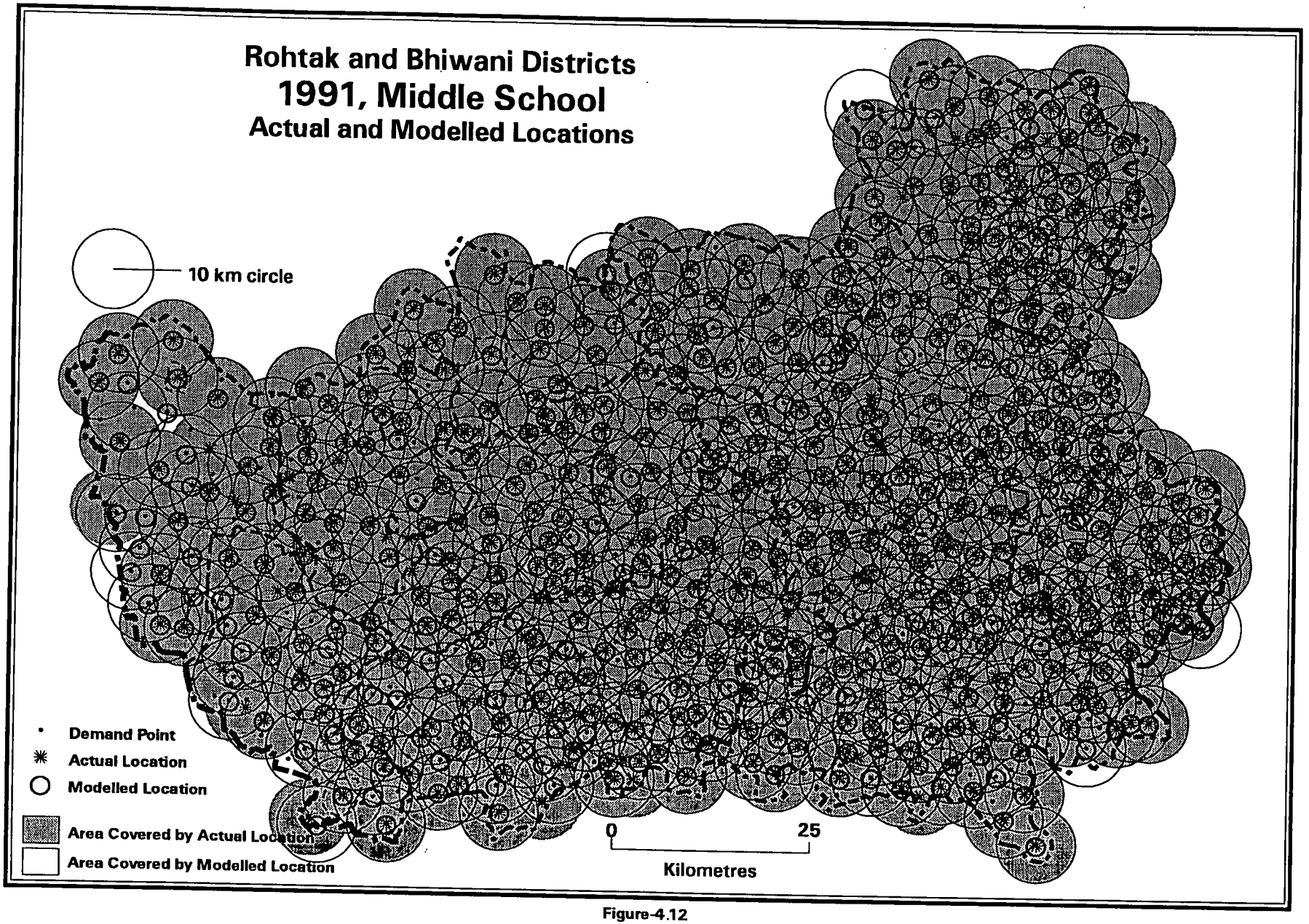

Rohtak and Bhiwani Districts
1991, Middle School
Actual and Modelled Locations
10 km circle
Demand Point
Actual Location
Modelled Location
Area Covered by Actual Location
Area Covered by Modelled Location
0
25
Kilometres

Figure-4.12

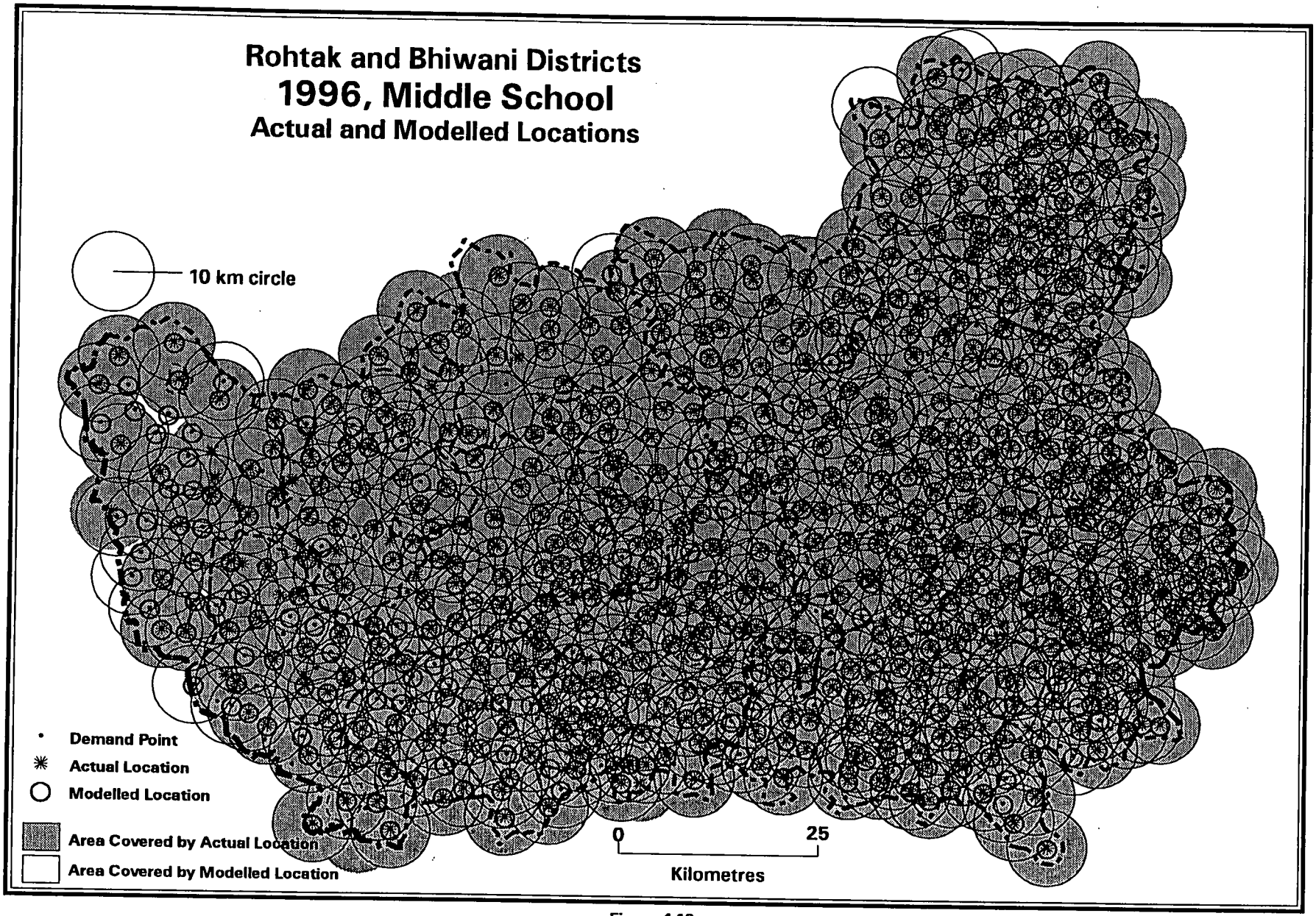

Rohtak and Bhiwani Districts
1996, Middle School
Actual and Modelled Locations
10 km circle
Demand Point
Actual Location
Modelled Location
Area Covered by Actual Location
Area Covered by Modelled Location
0
25
Kilometres

Figure-4.13

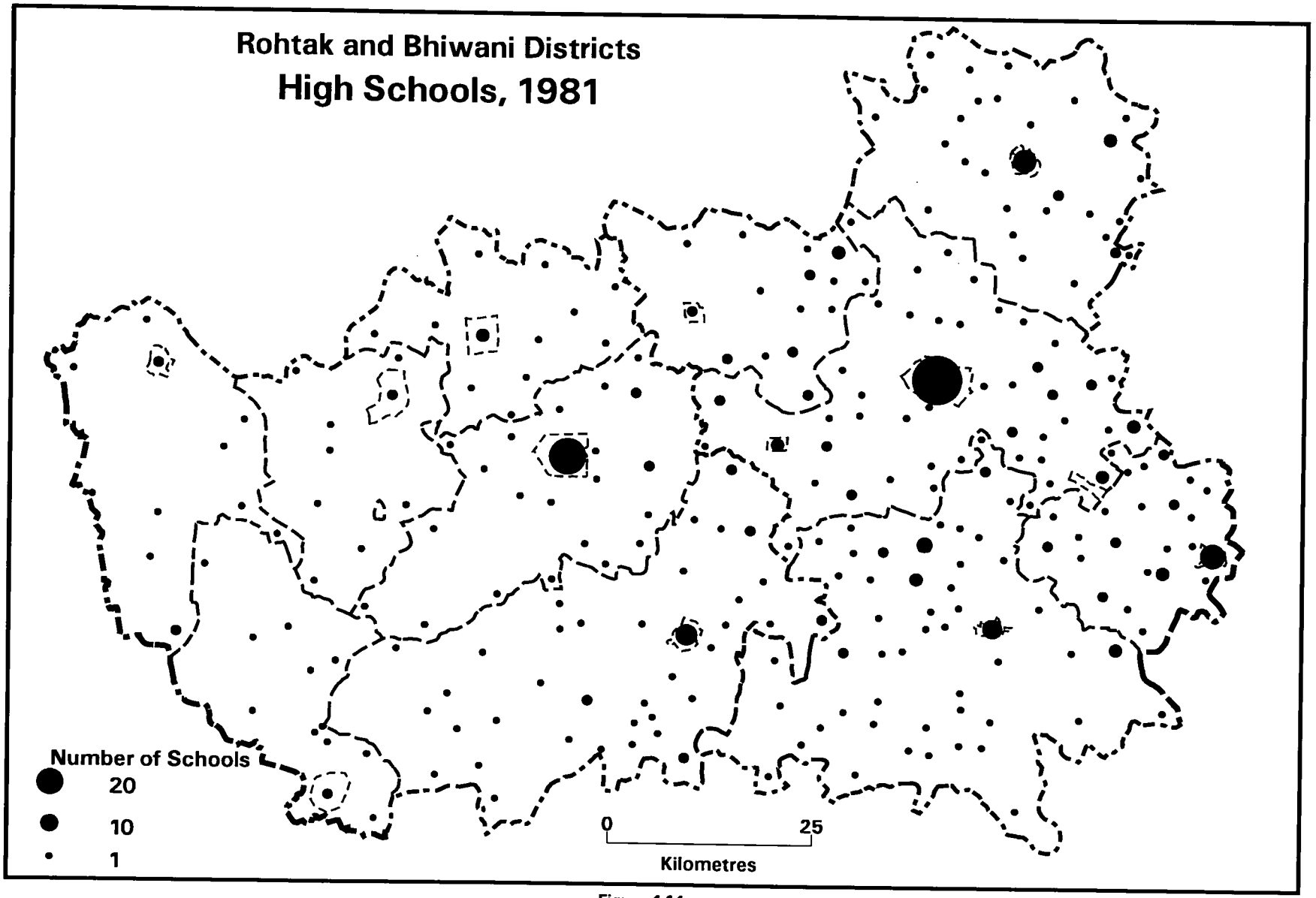

Rohtak and Bhiwani Districts
High Schools, 1981
Number of Schools
20
10
1
0
25
Kilometres

Figure-4.14

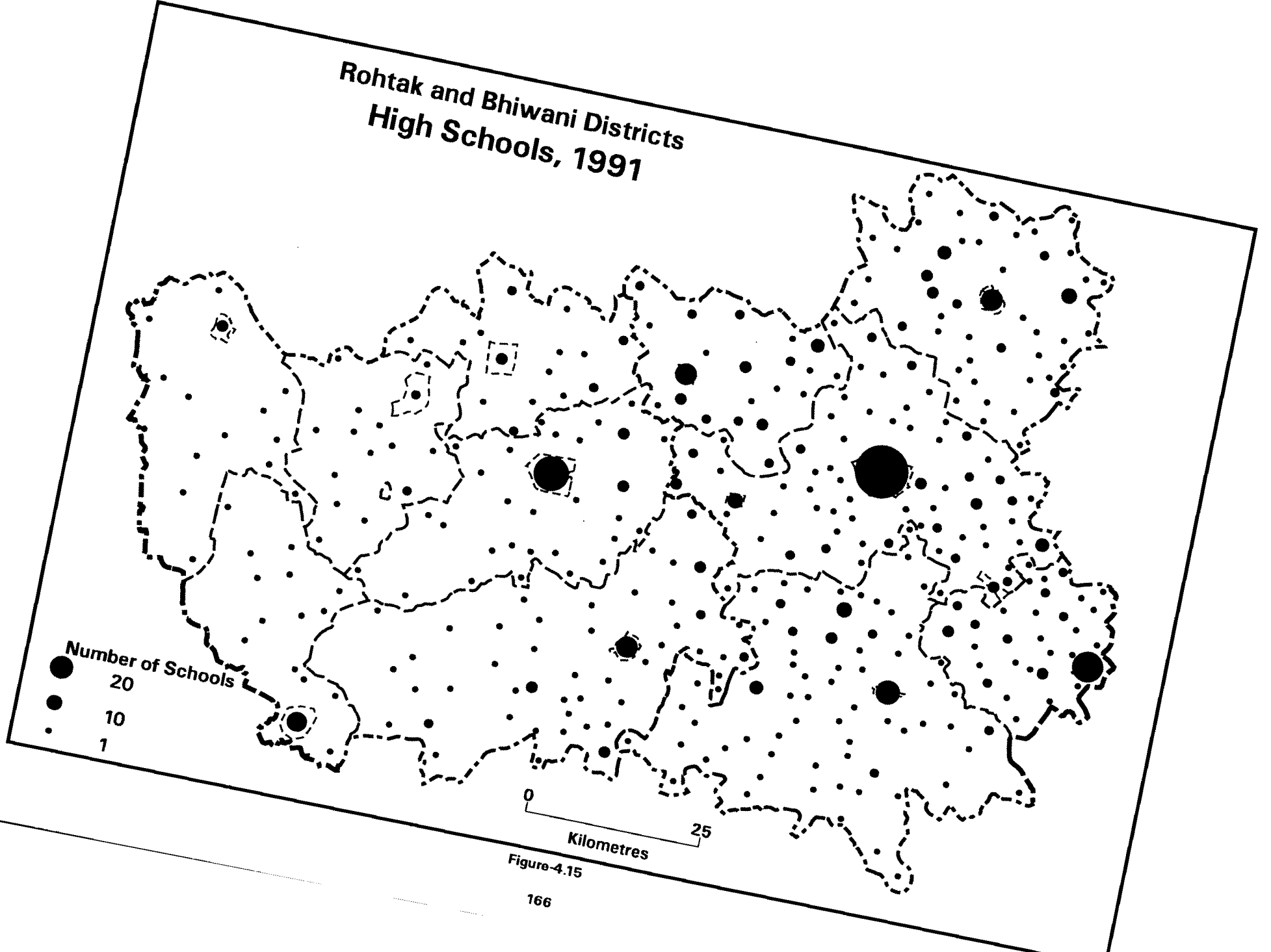

Rohtak and Bhiwani Districts
High Schools, 1991
Number of Schools
20
10
1
0
25
Kilometres

Figure-4.15

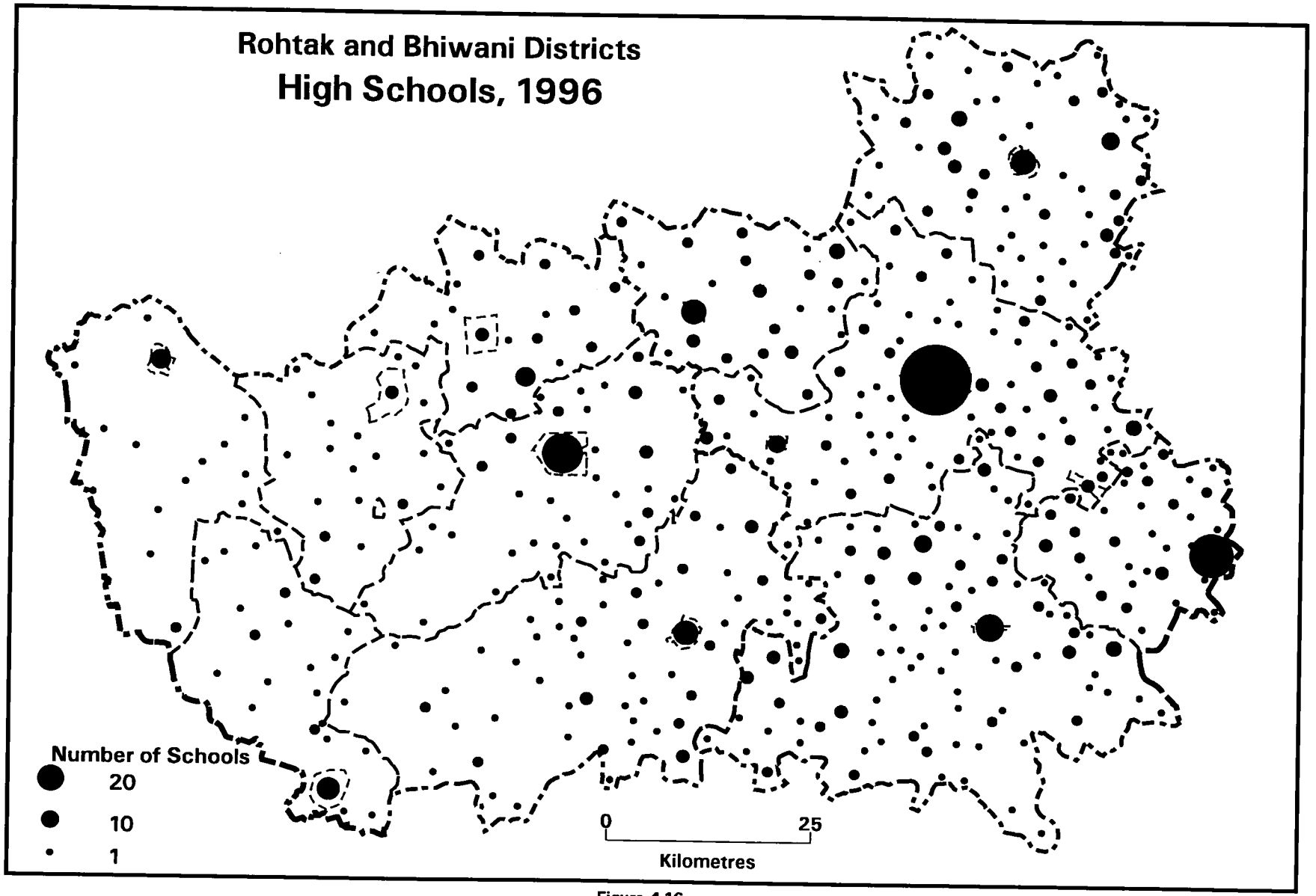

Rohtak and Bhiwani Districts
High Schools, 1996
Number of Schools
20
10
1
0
25
Kilometres

Figure-4.16

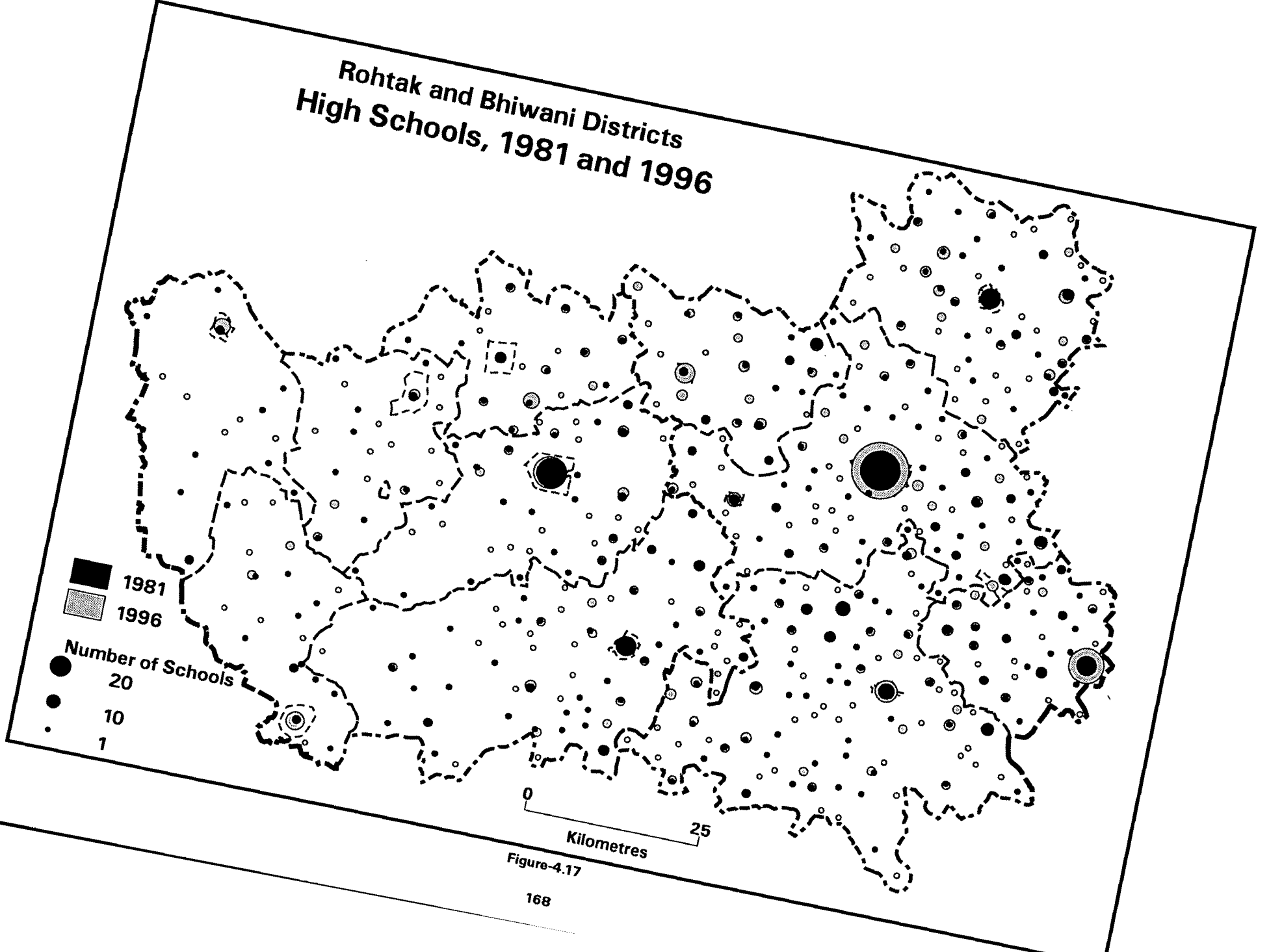

Rohtak and Bhiwani Districts
High Schools, 1981 and 1996
1981
1996
Number of Schools
20
10
1
0
25
Kilometres

Figure-4.17

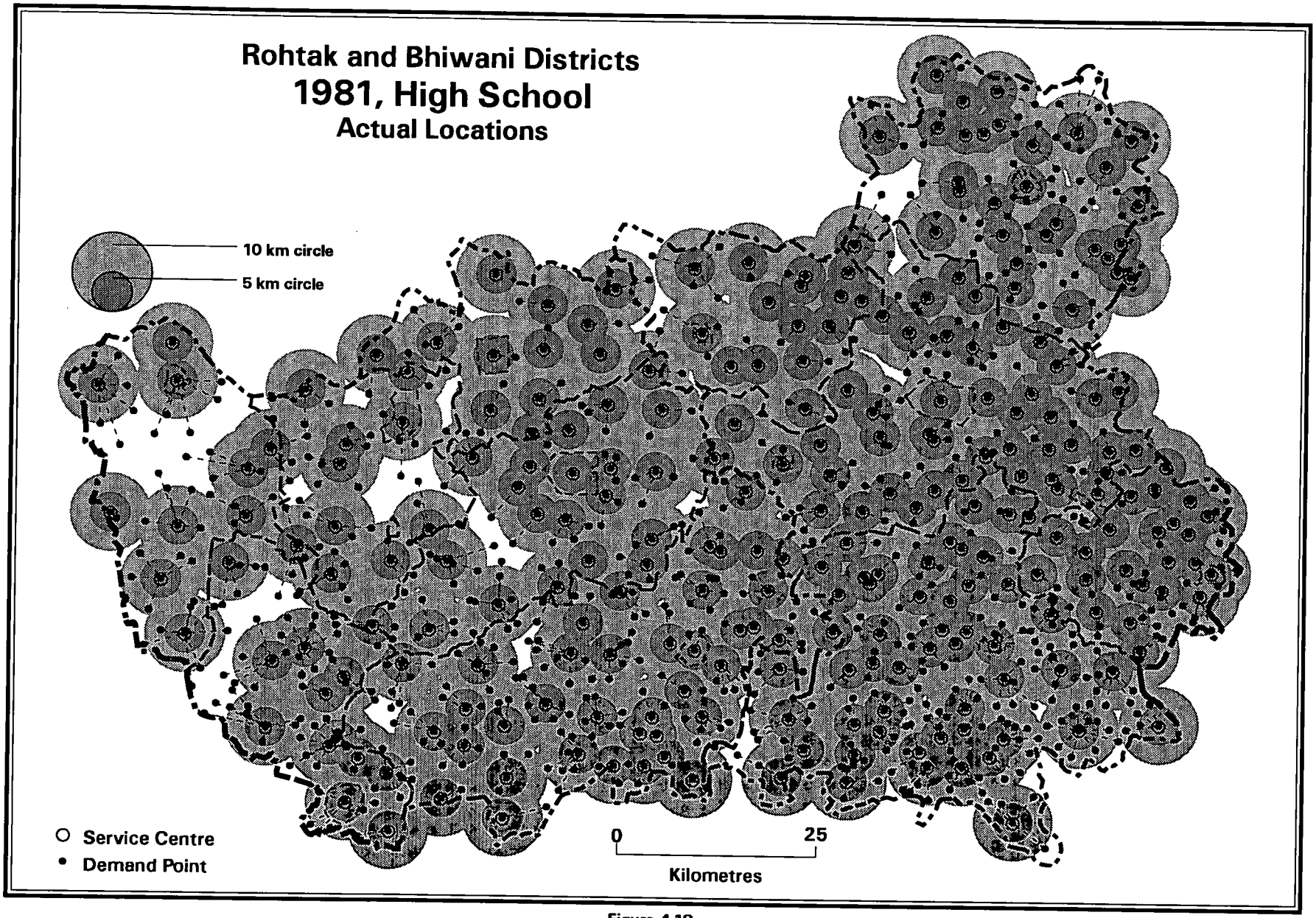

Rohtak and Bhiwani Districts
1981, High School
Actual Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.18

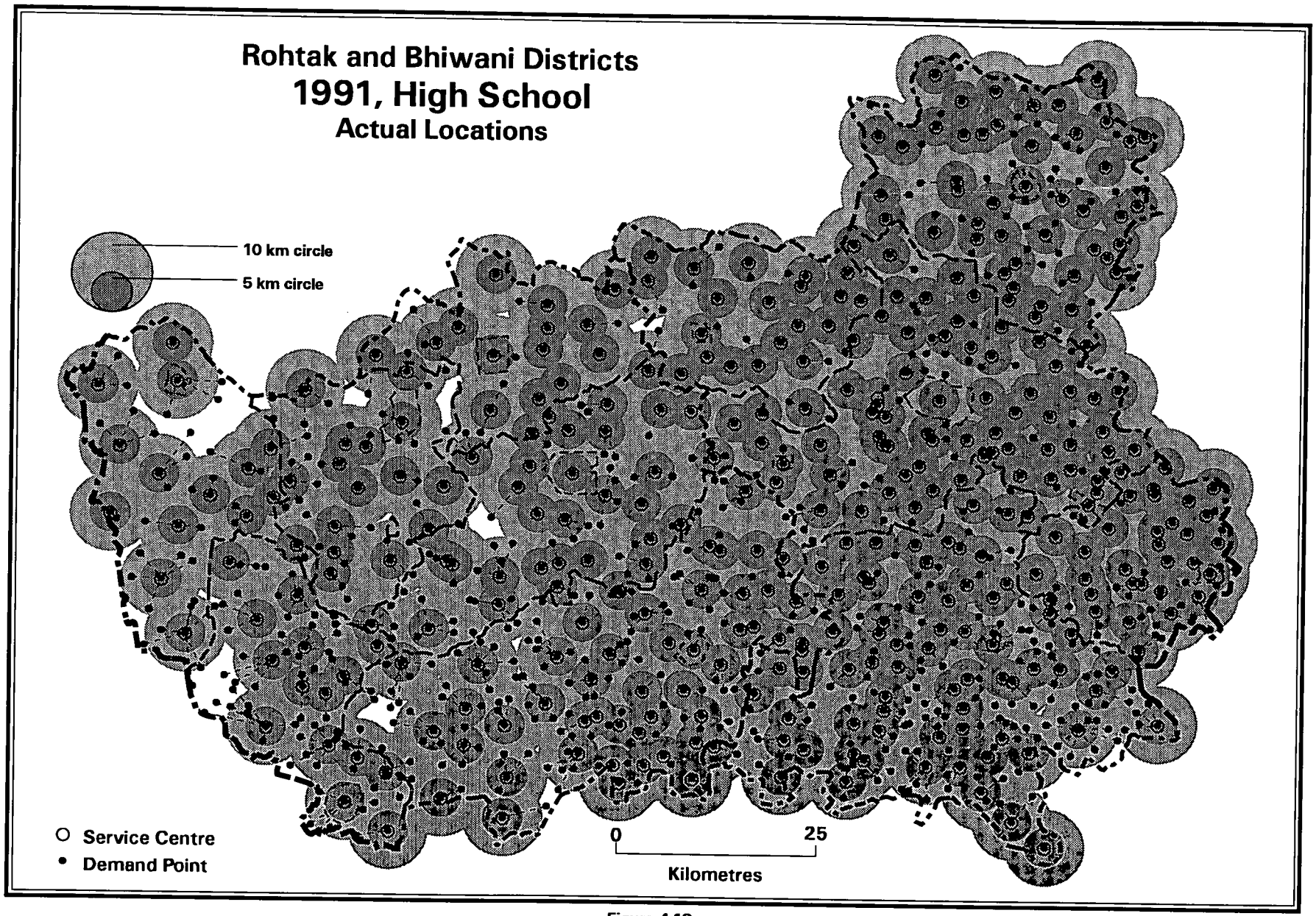

Rohtak and Bhiwani Districts
1991, High School
Actual Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.19

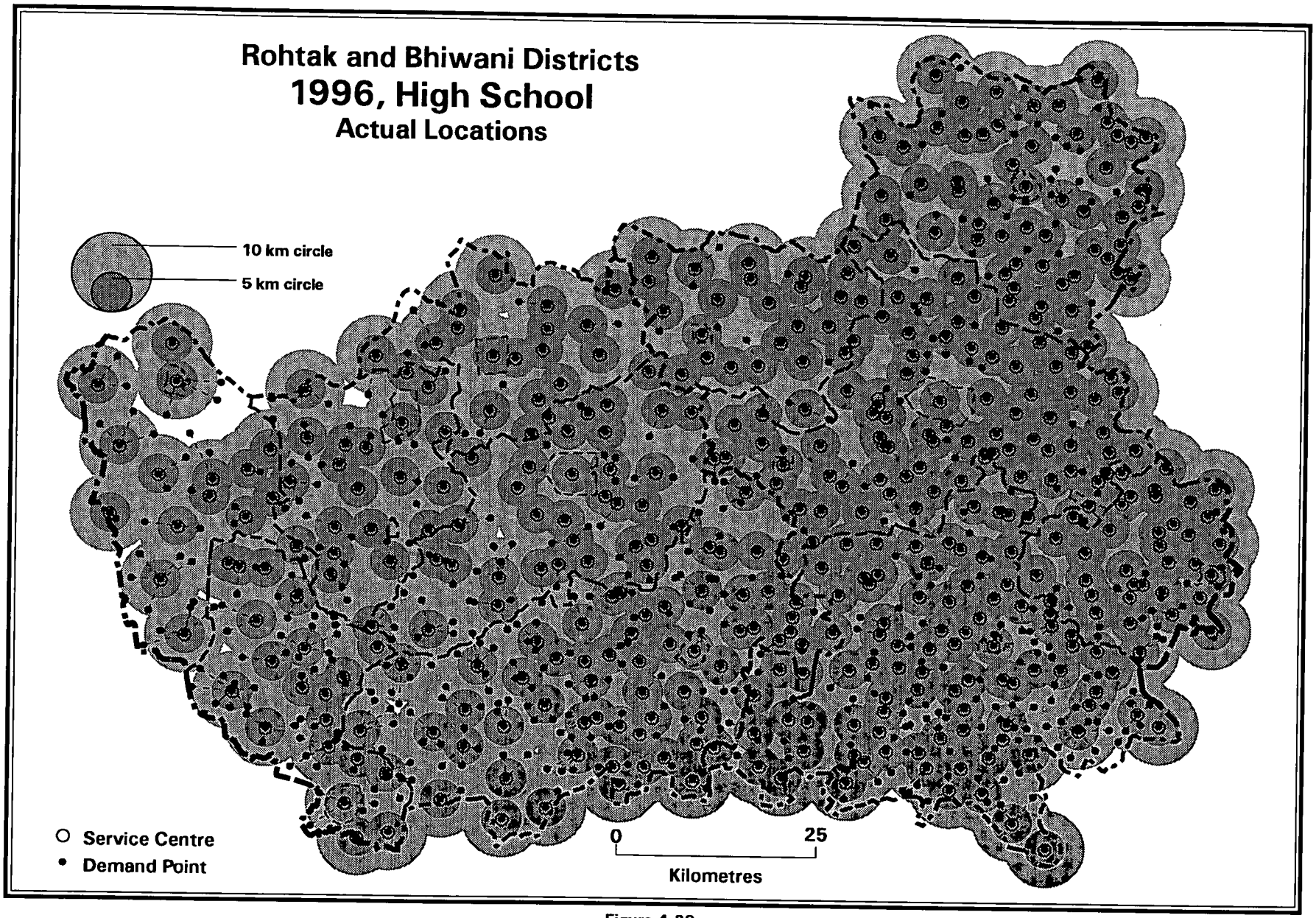

Rohtak and Bhiwani Districts
1996, High School
Actual Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.20

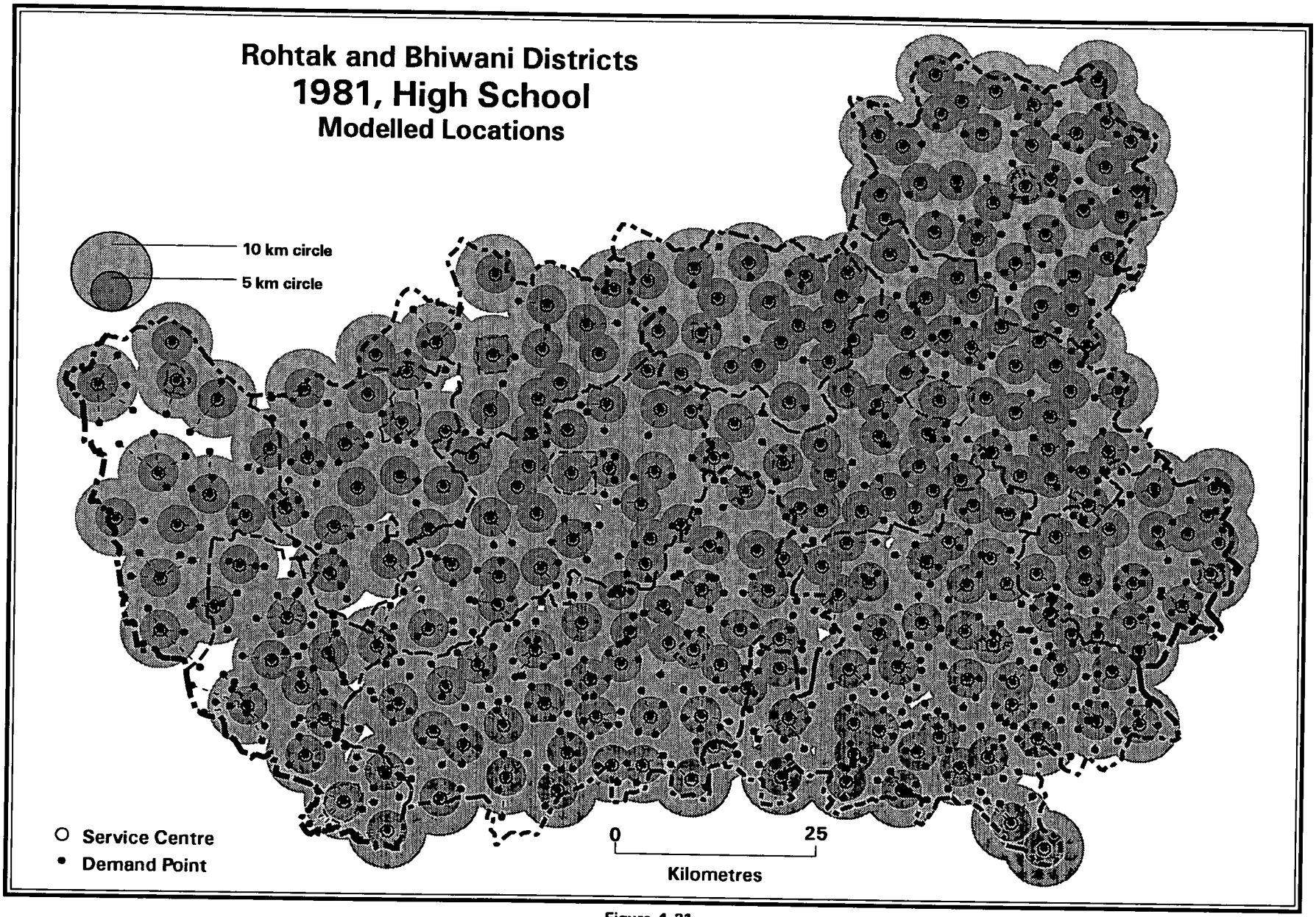

Rohtak and Bhiwani Districts
1981, High School
Modelled Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.21

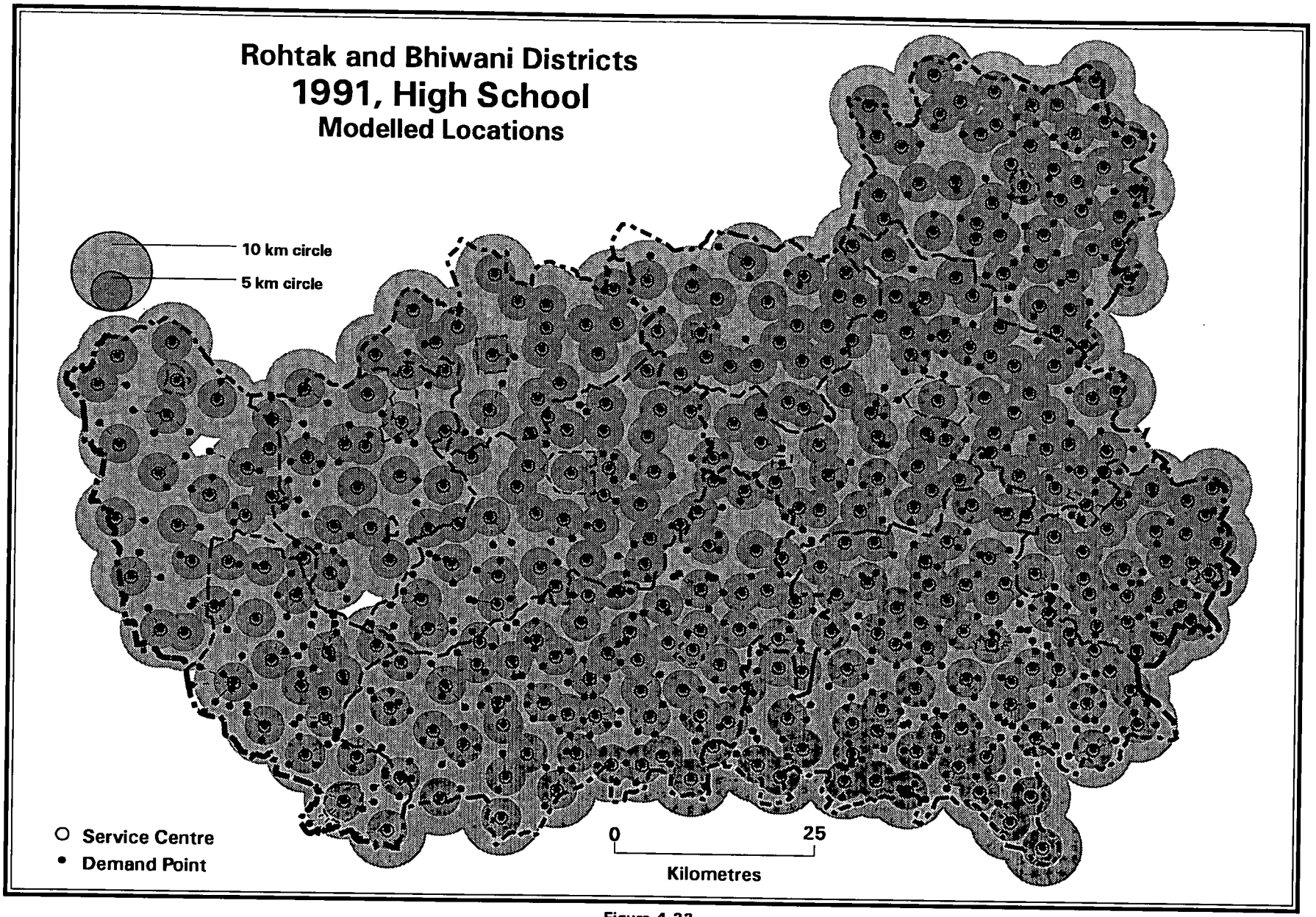

Rohtak and Bhiwani Districts
1991, High School
Modelled Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.22

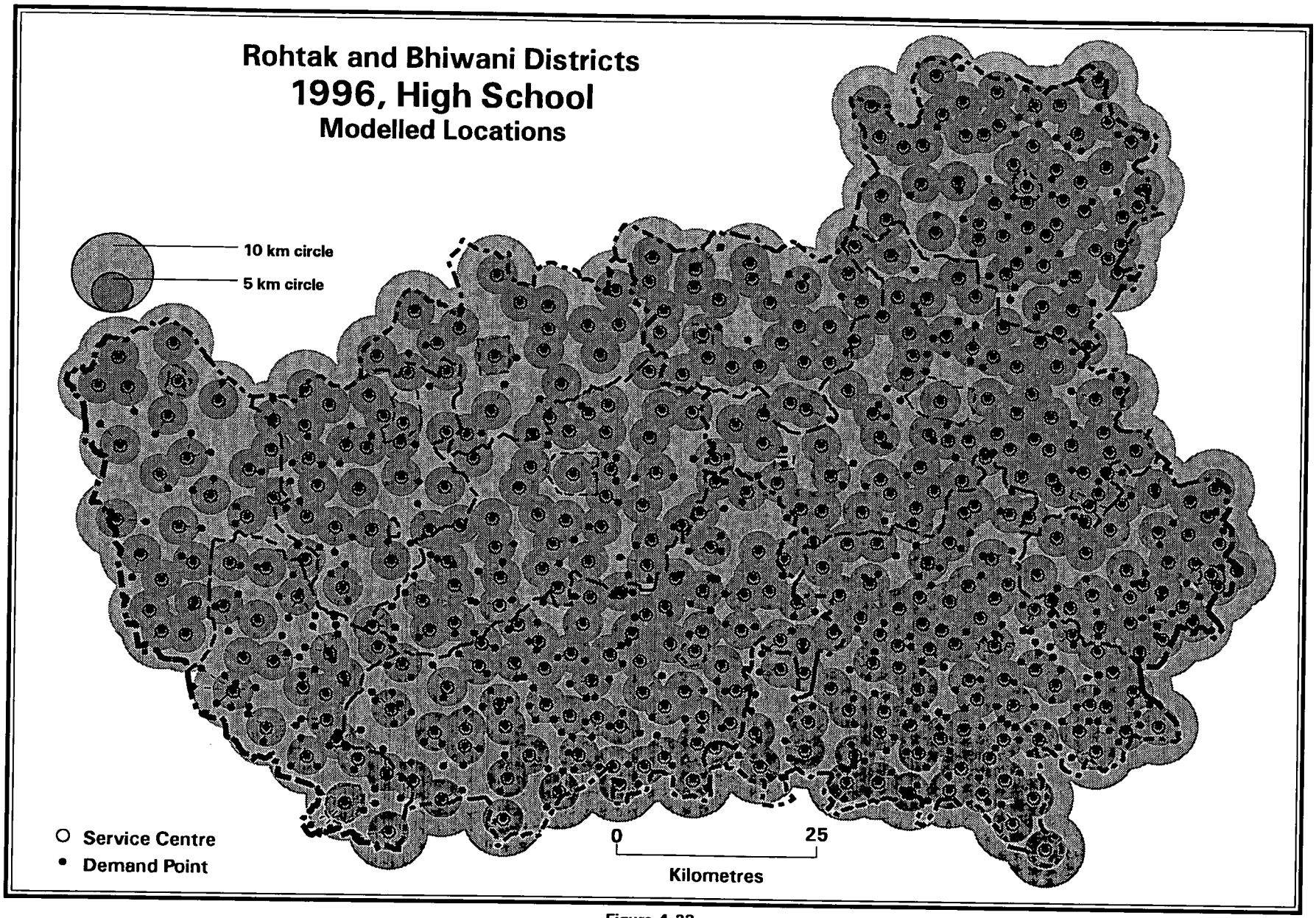

Rohtak and Bhiwani Districts
1996, High School
Modelled Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.23

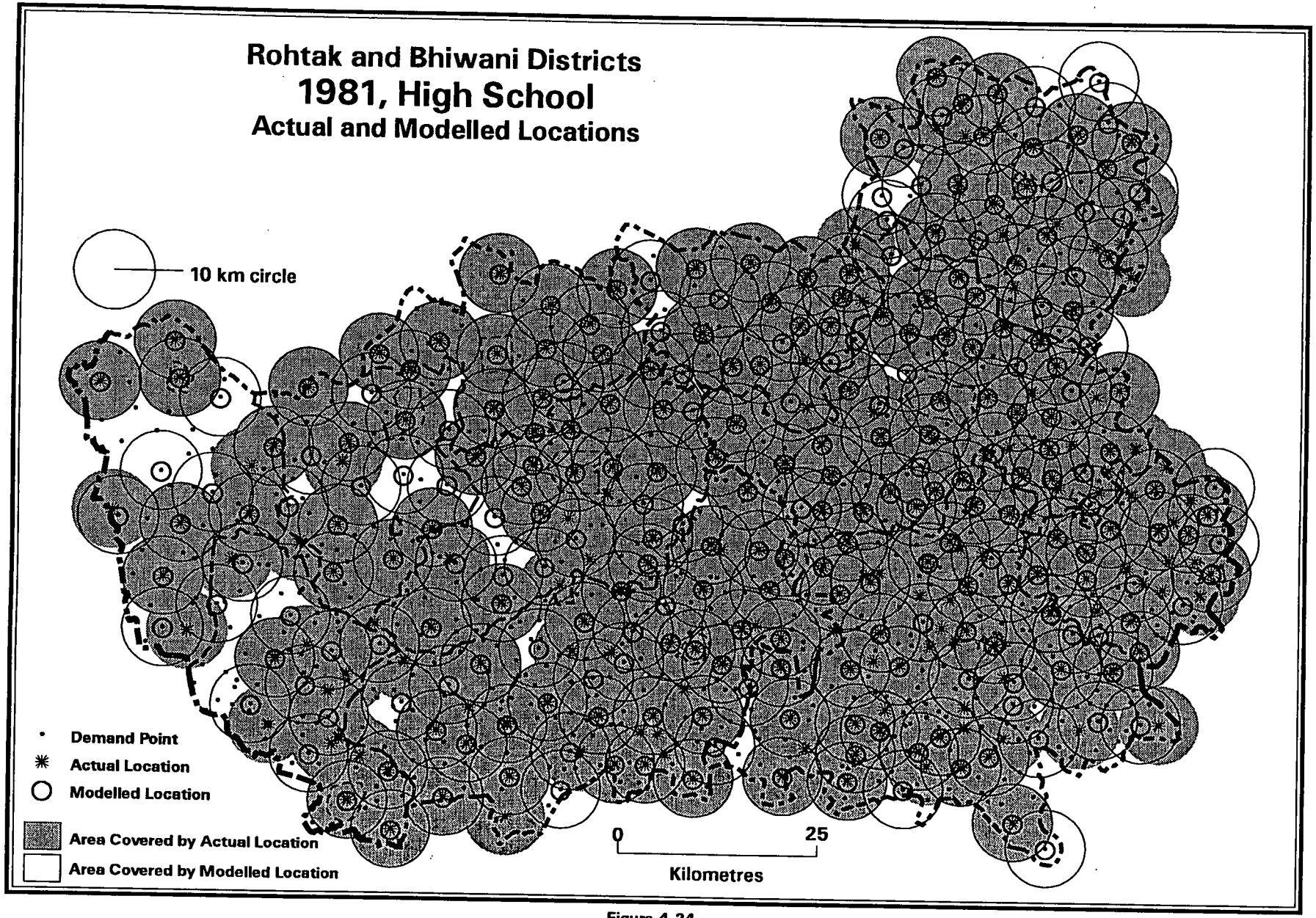

Rohtak and Bhiwani Districts
1981, High School
Actual and Modelled Locations
10 km circle
Demand Point
Actual Location
Modelled Location
Area Covered by Actual Location
Area Covered by Modelled Location
0
25
Kilometres

Figure-4.24

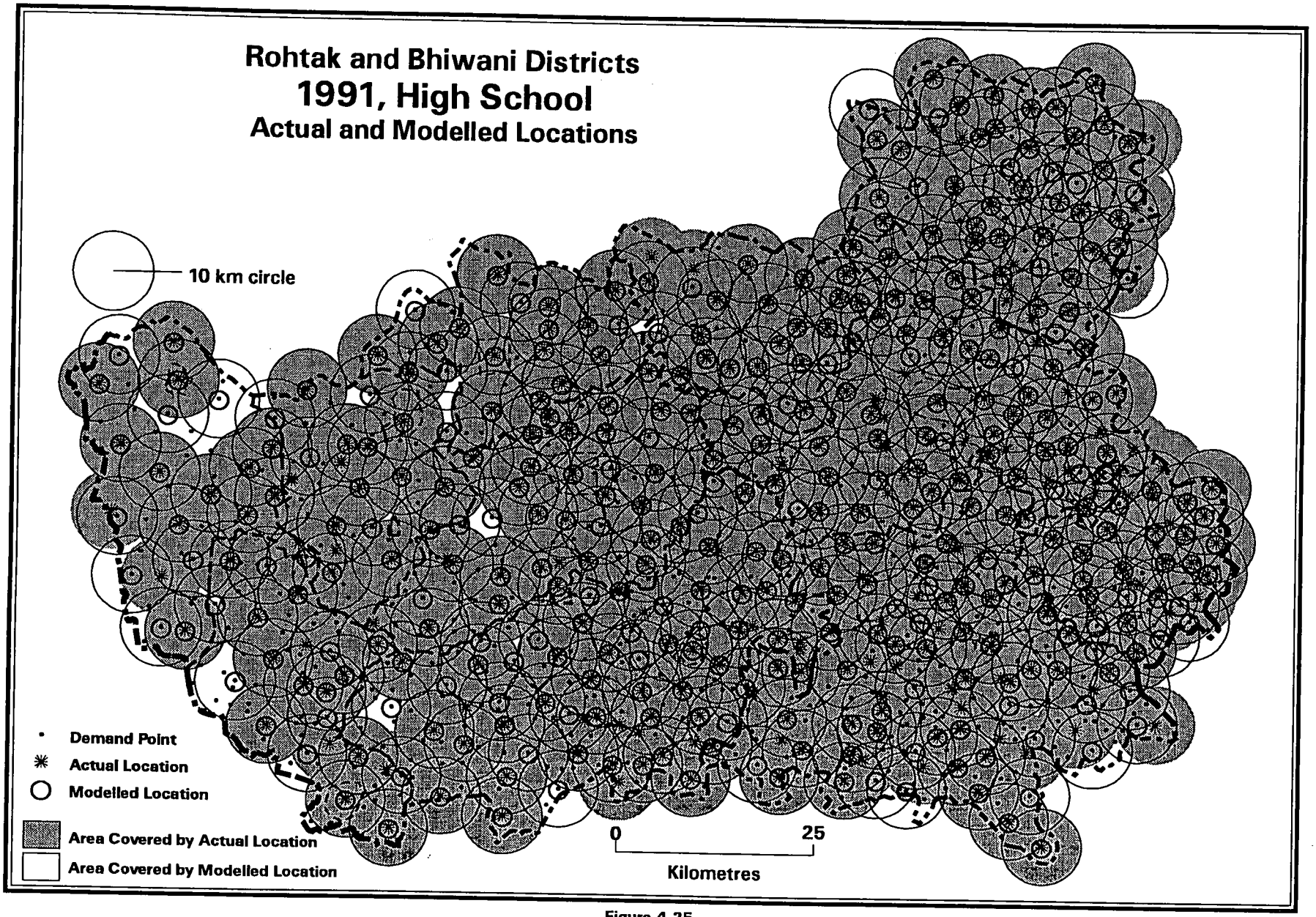

Rohtak and Bhiwani Districts
1991, High School
Actual and Modelled Locations
10 km circle
Demand Point
Actual Location
Modelled Location
Area Covered by Actual Location
Area Covered by Modelled Location
0
25
Kilometres

Figure-4.25

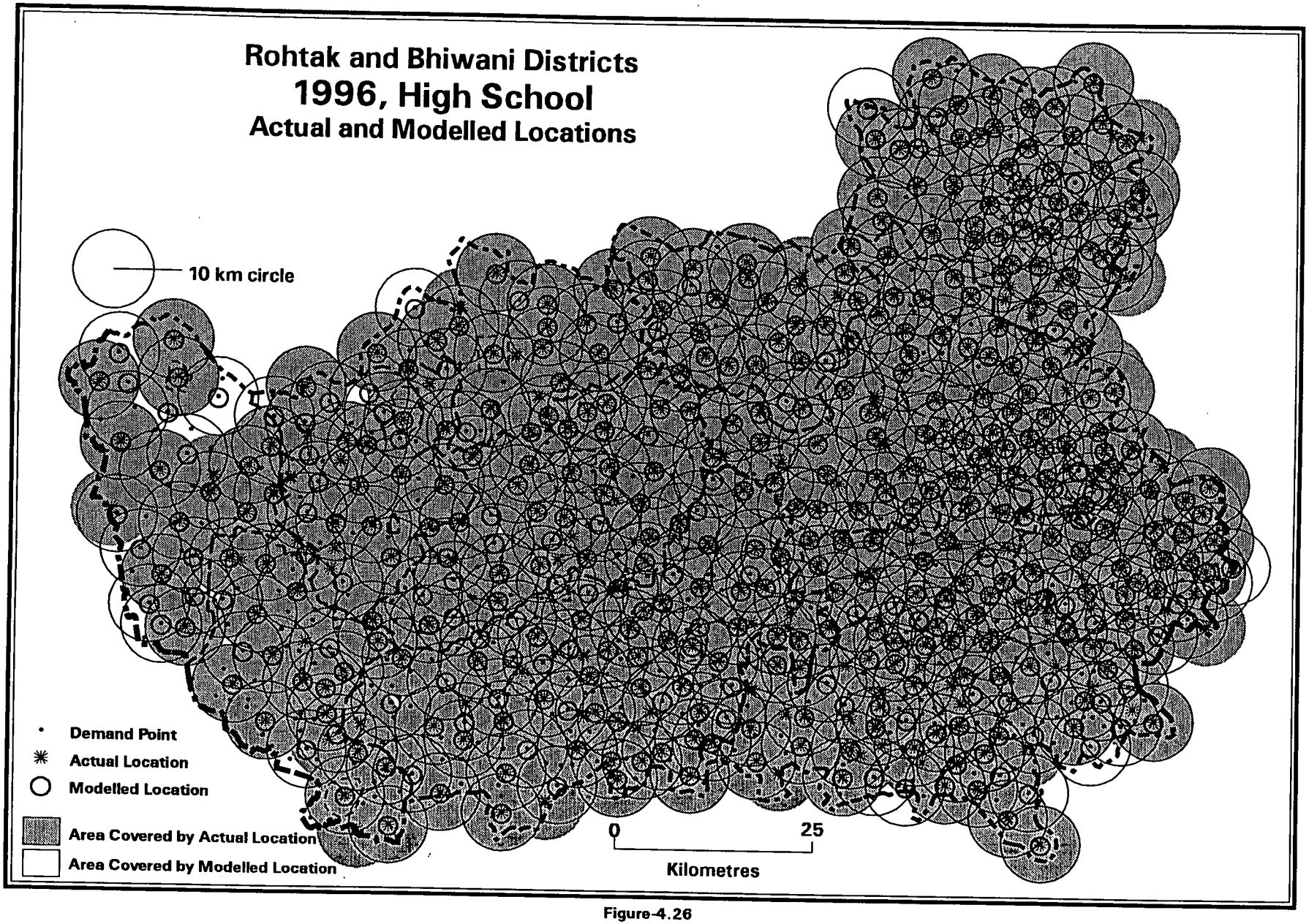

Rohtak and Bhiwani Districts
1996, High School
Actual and Modelled Locations
10 km circle
Demand Point
Actual Location
Modelled Location
Area Covered by Actual Location
Area Covered by Modelled Location
0
25
Kilometres

Figure-4.26

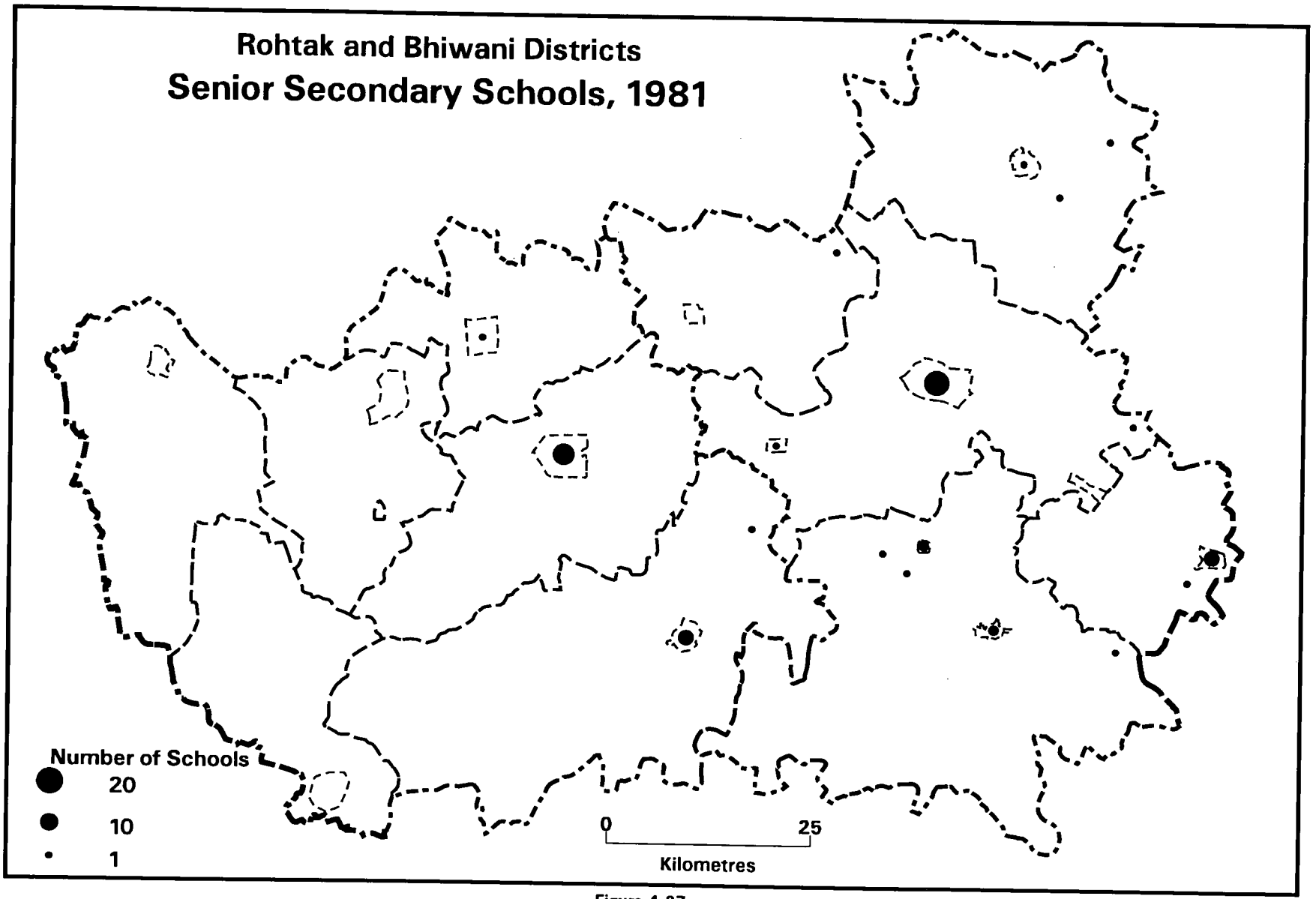

Rohtak and Bhiwani Districts
Senior Secondary Schools, 1981
Number of Schools
20
10
1
0
25
Kilometres

Figure-4.27

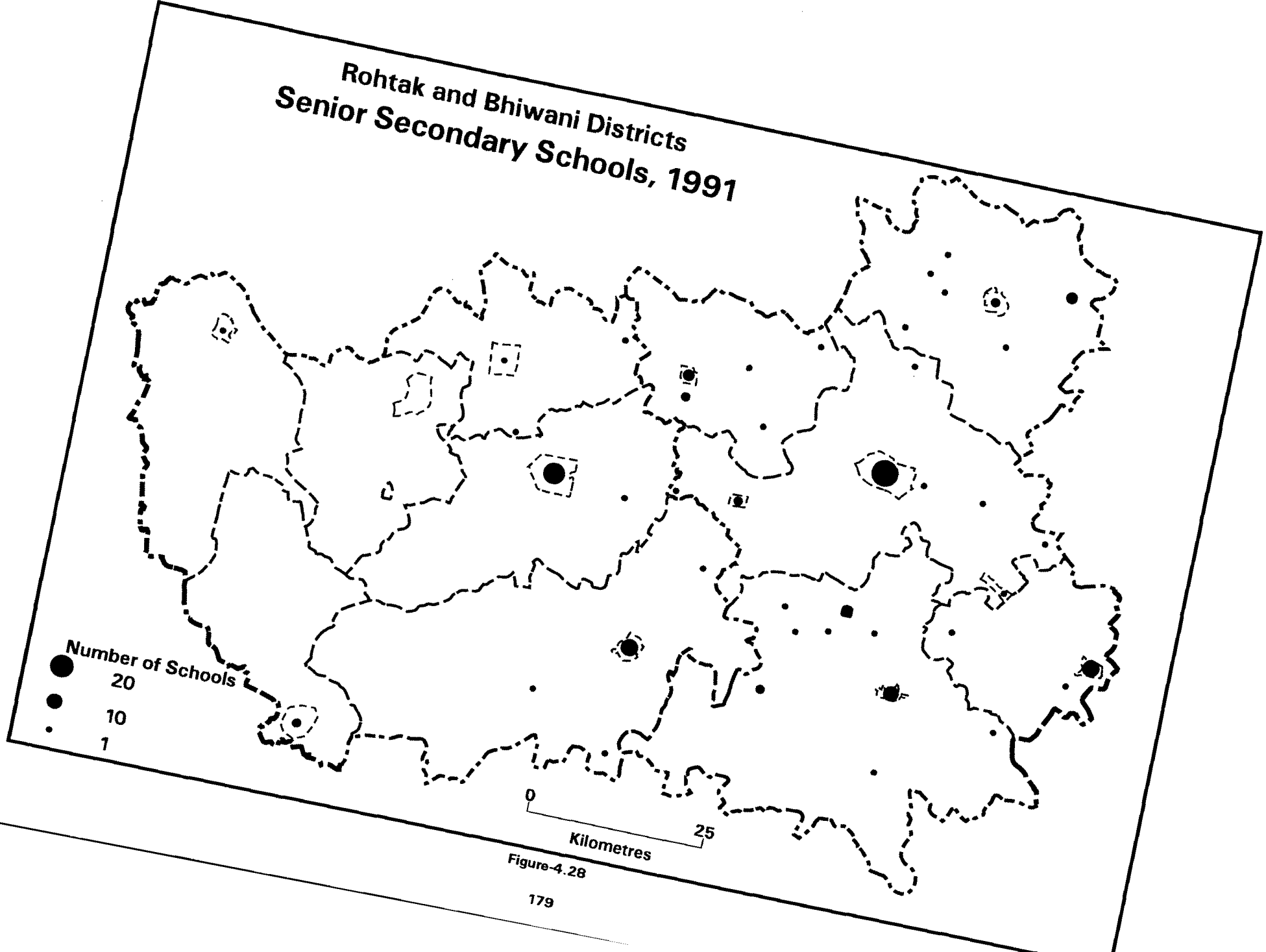

Rohtak and Bhiwani Districts
Senior Secondary Schools, 1991
Number of Schools
20
10
1
0
25
Kilometres

Figure-4.28

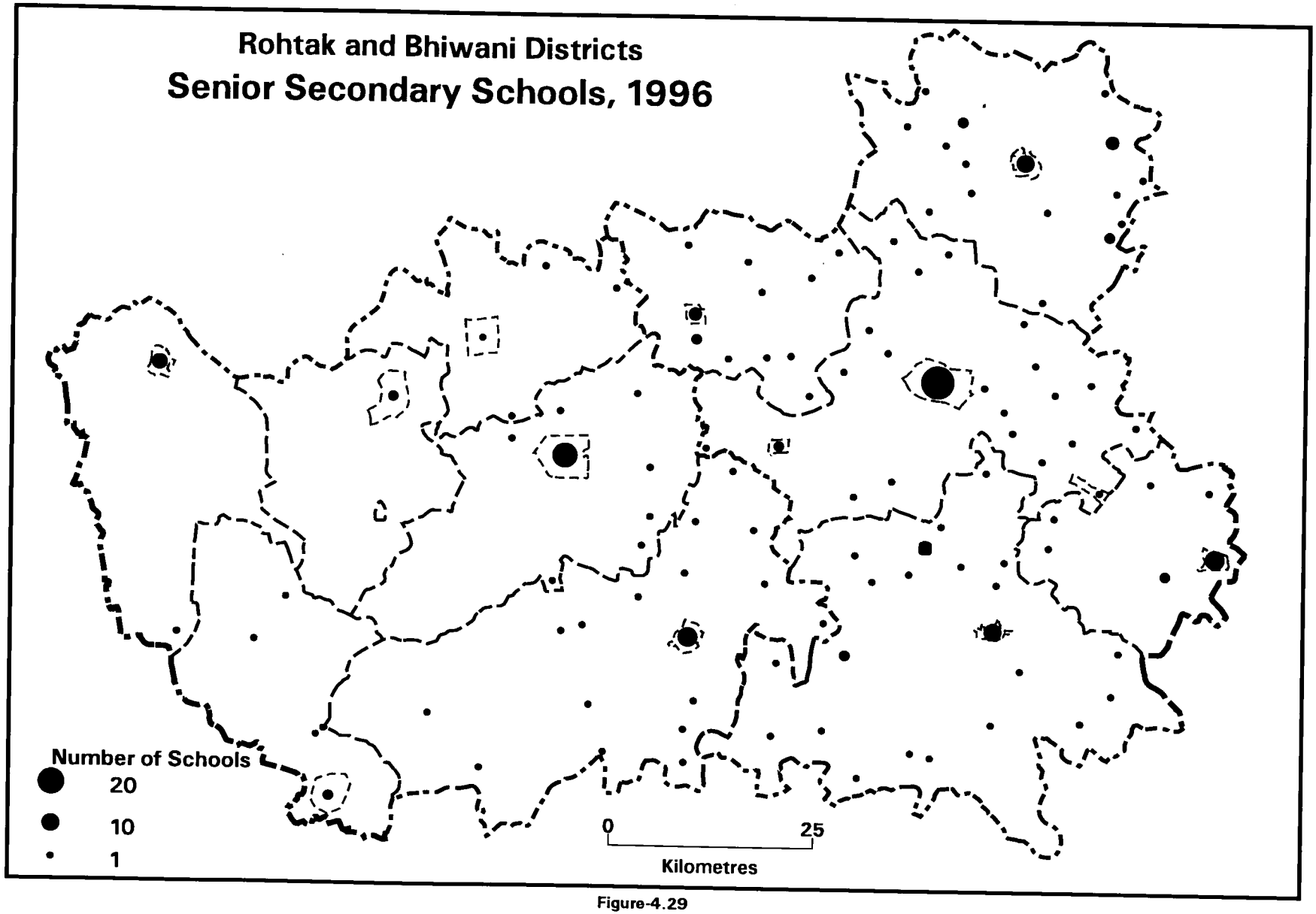

Rohtak and Bhiwani Districts
Senior Secondary Schools, 1996
Number of Schools
20
10
1
0
25
Kilometres

Figure-4.29

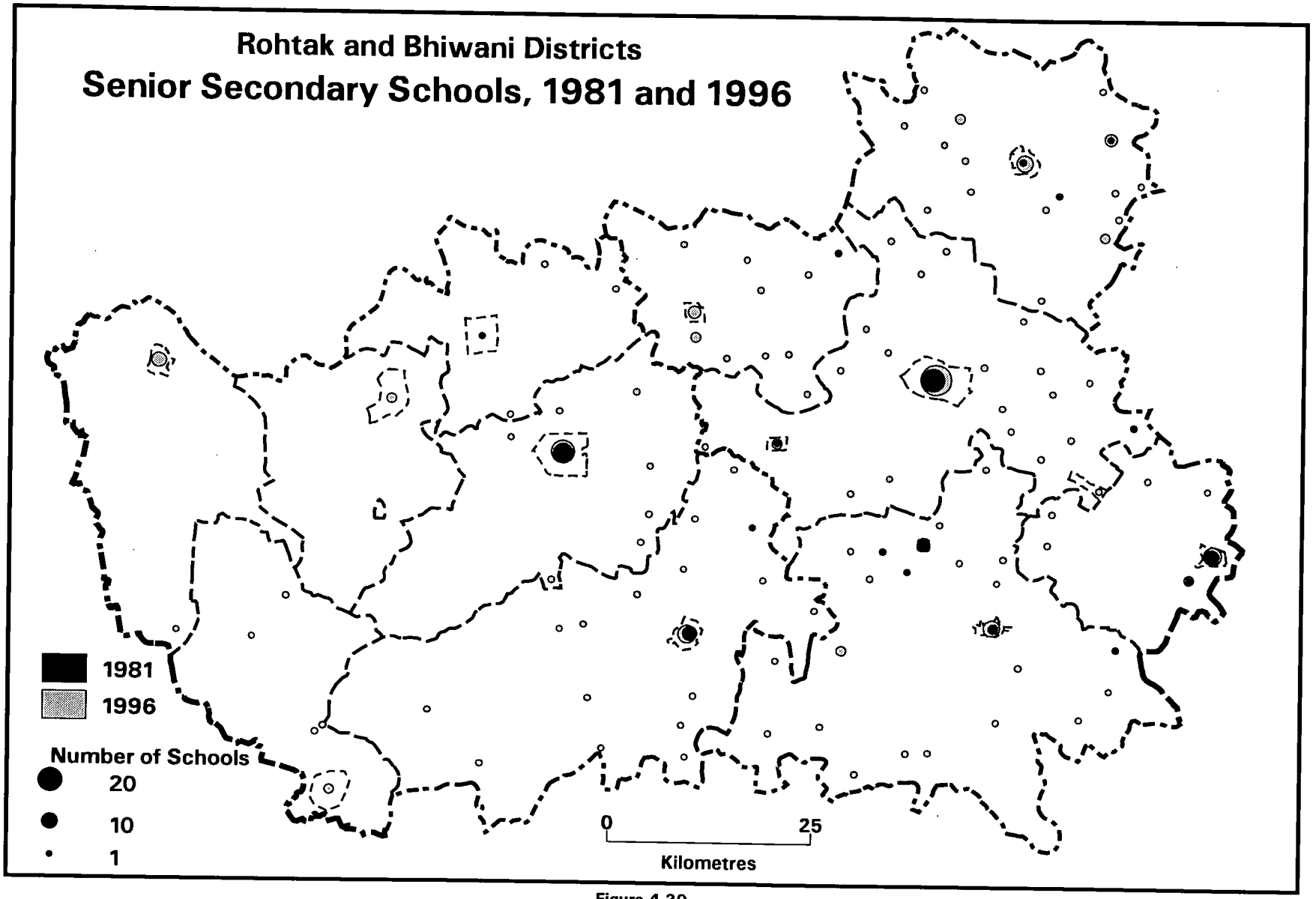

Rohtak and Bhiwani Districts
Senior Secondary Schools, 1981 and 1996
1981
1996
Number of Schools
20
10
1
0
25
Kilometres

Figure-4.30

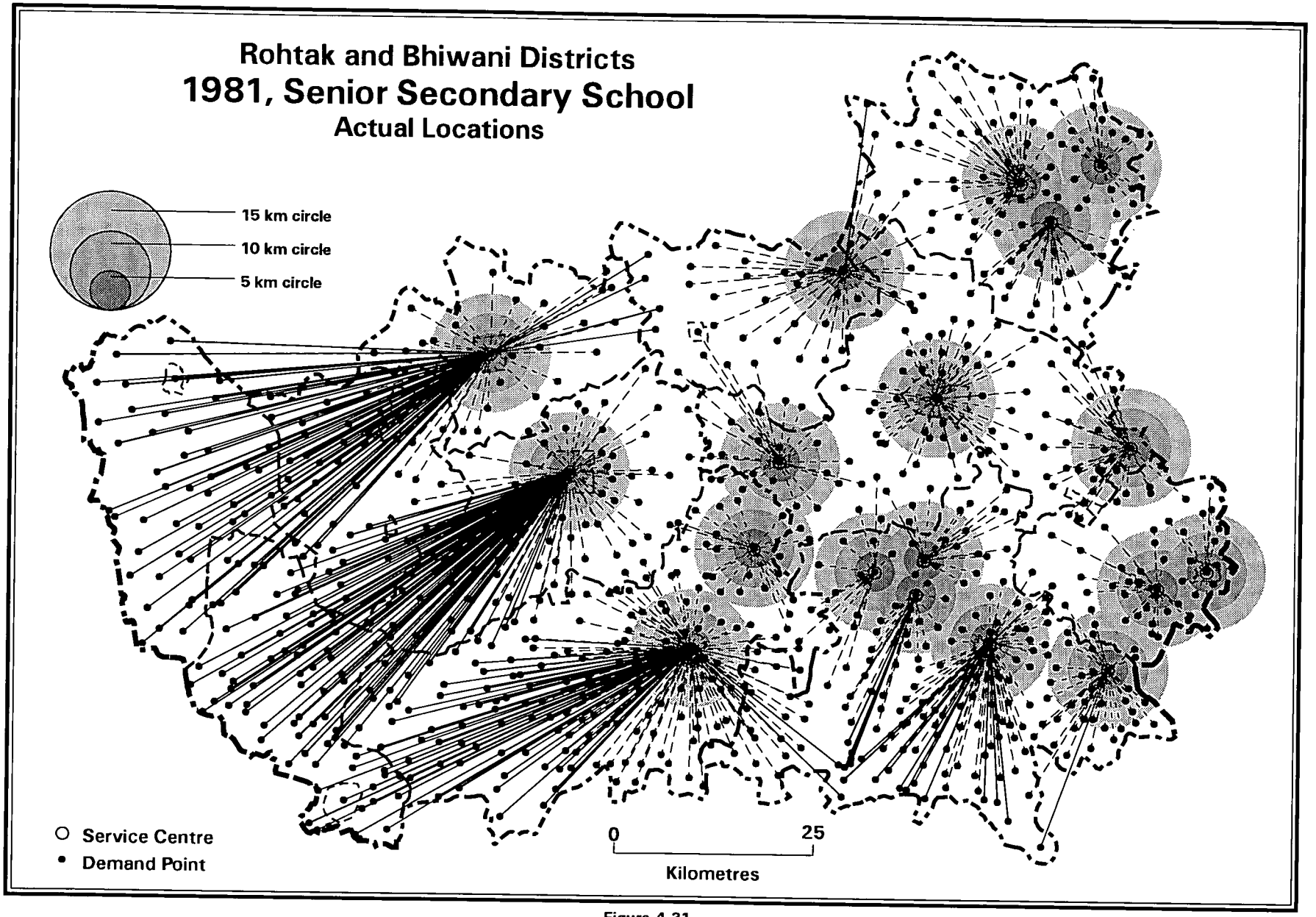

Rohtak and Bhiwani Districts
1981, Senior Secondary School
Actual Locations
15 km circle
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.31

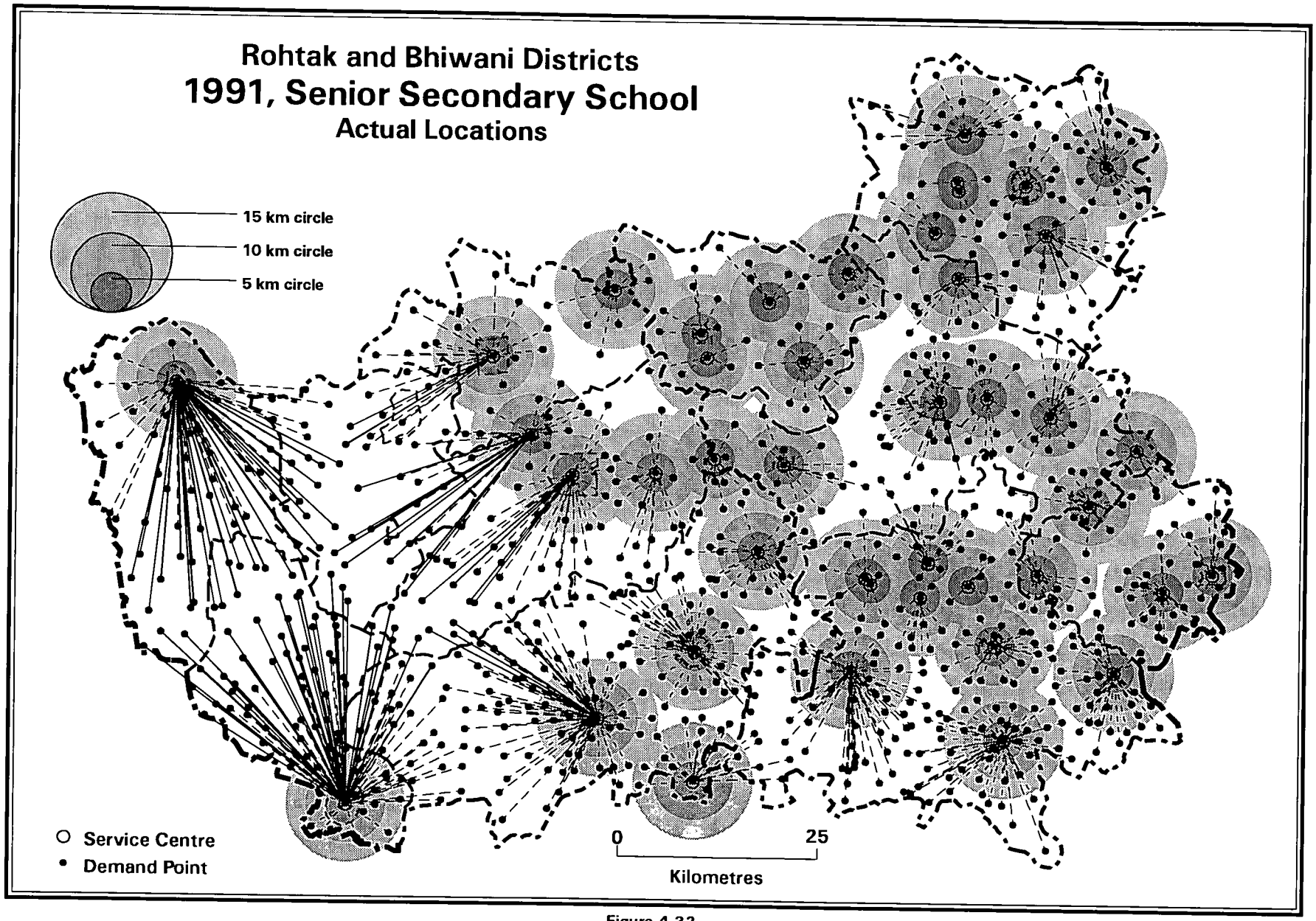

Rohtak and Bhiwani Districts
1991, Senior Secondary School
Actual Locations
15 km circle
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.32

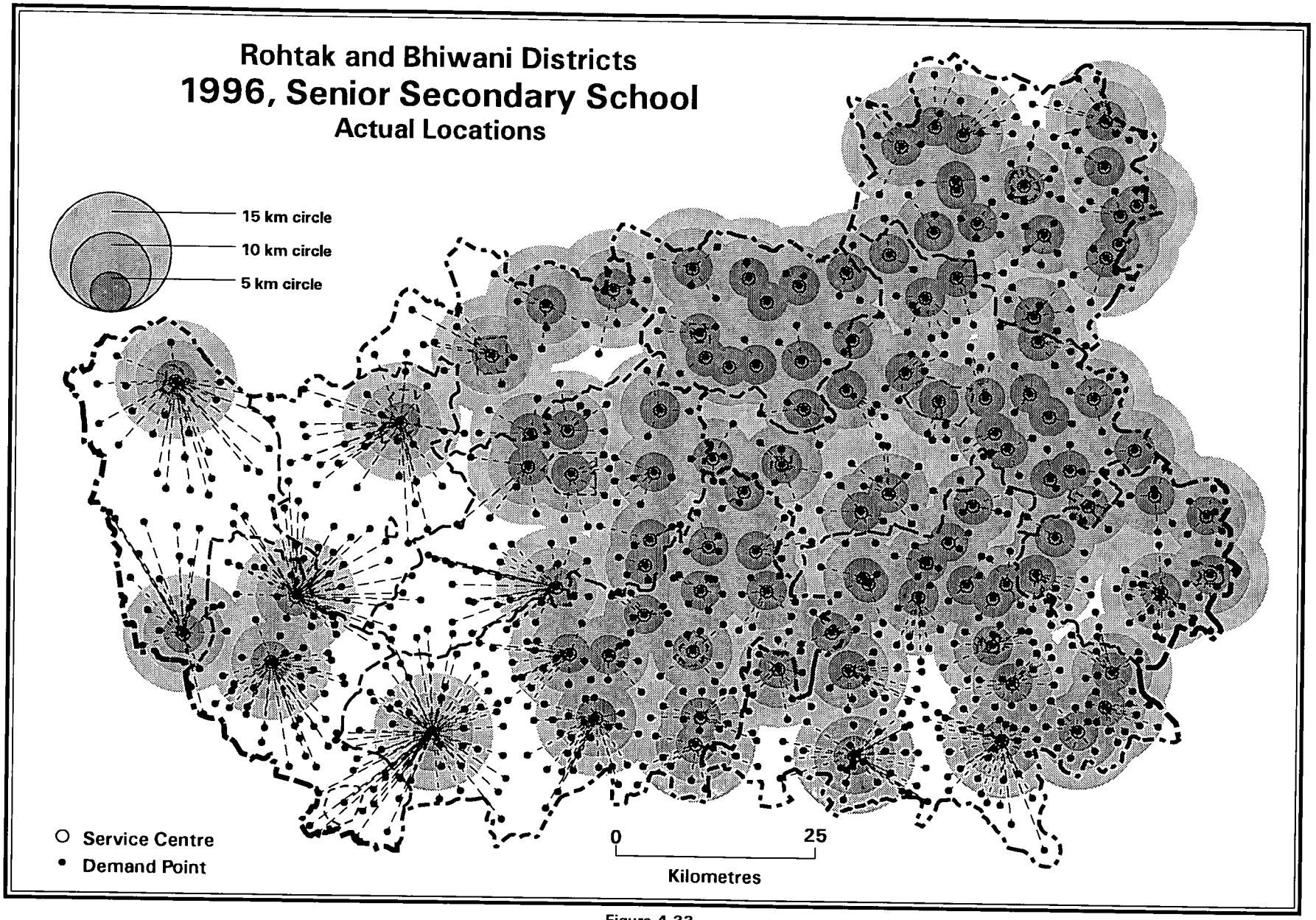

Rohtak and Bhiwani Districts
1996, Senior Secondary School
Actual Locations
15 km circle
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.33

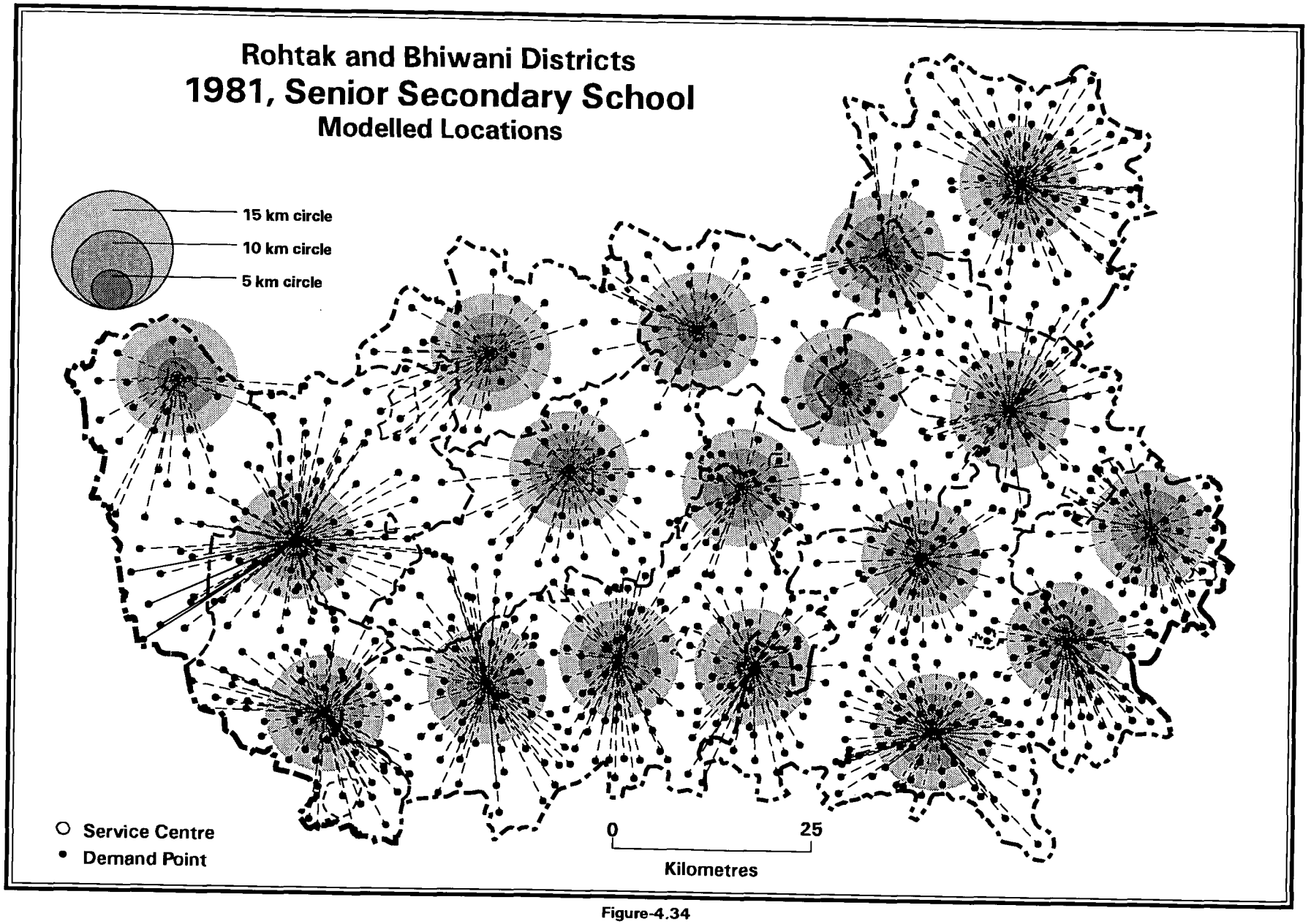

Rohtak and Bhiwani Districts
1981, Senior Secondary School
Modelled Locations
15 km circle
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.34

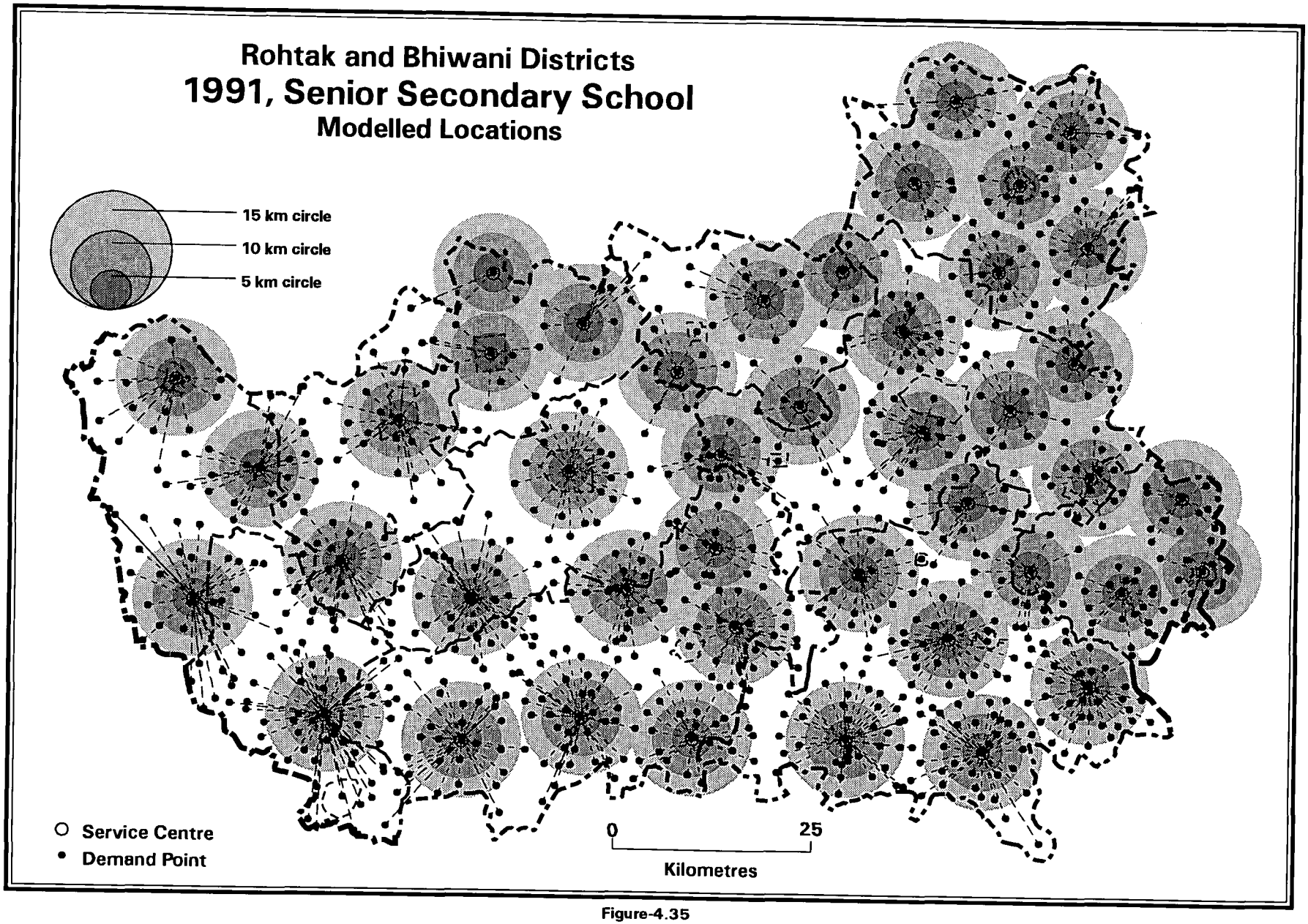

Rohtak and Bhiwani Districts
1991, Senior Secondary School
Modelled Locations
15 km circle
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.35

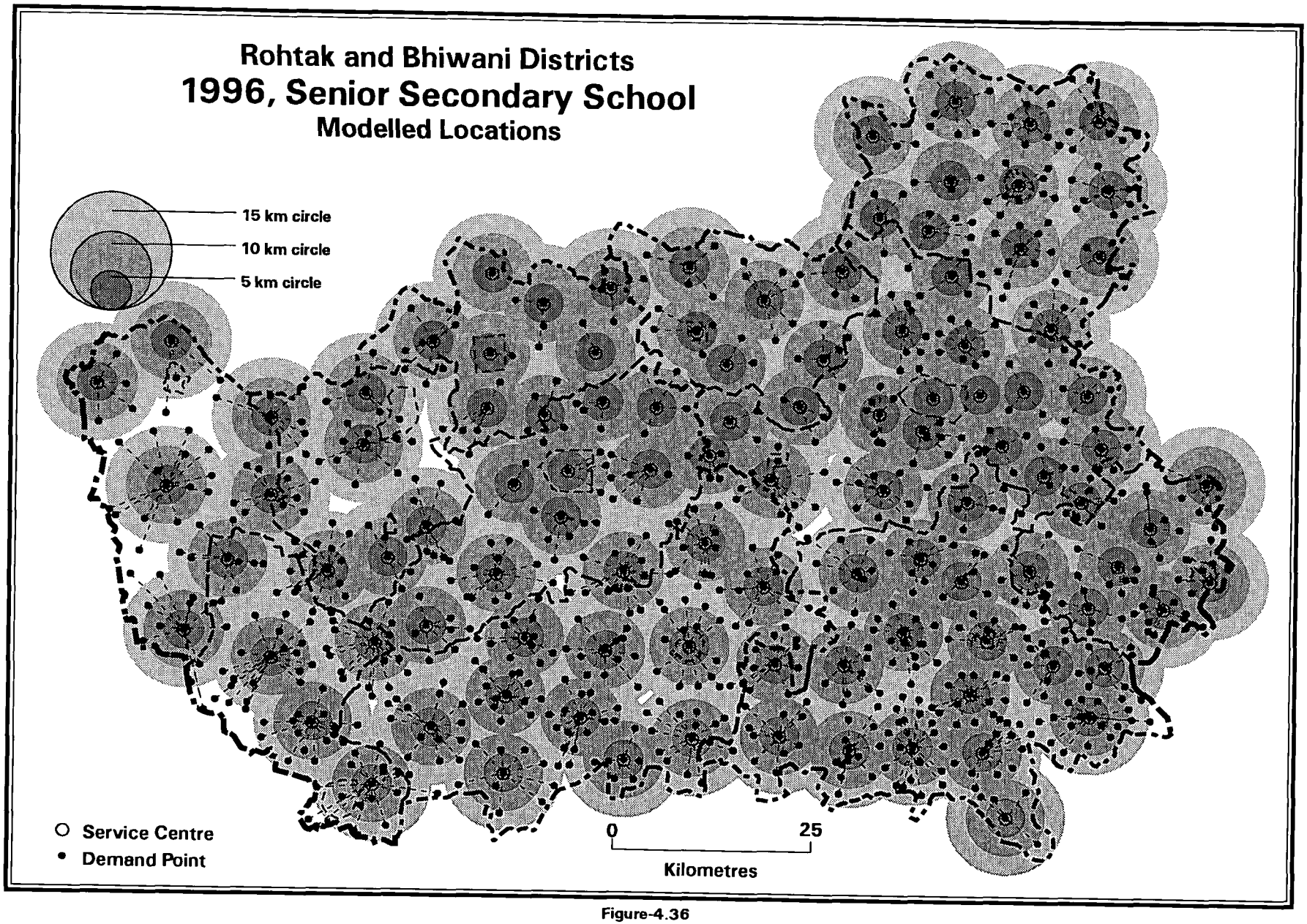

Rohtak and Bhiwani Districts
1996, Senior Secondary School
Modelled Locations
15 km circle
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-4.36

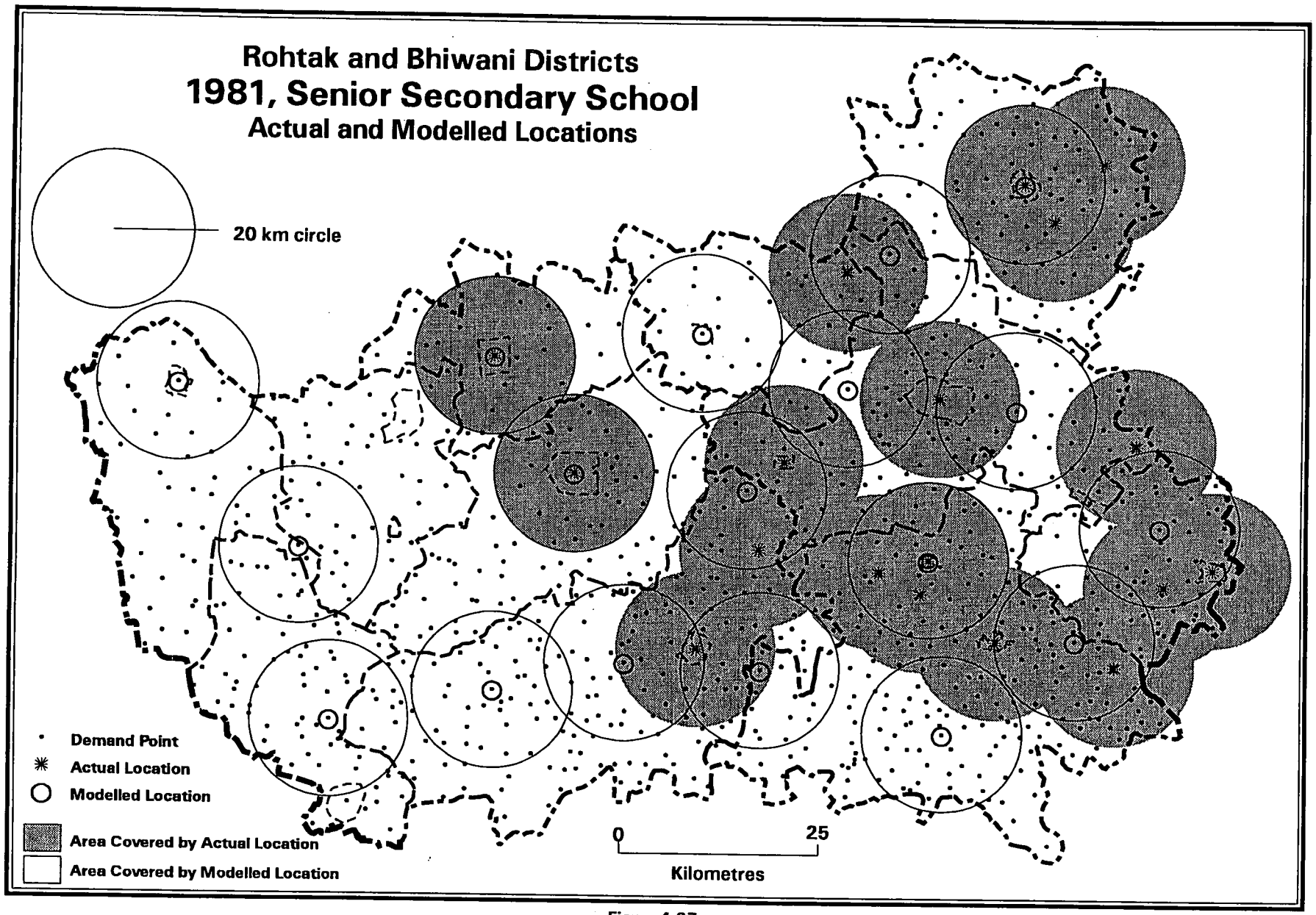

Rohtak and Bhiwani Districts
1981, Senior Secondary School
Actual and Modelled Locations
20 km circle
Demand Point
Actual Location
Modelled Location
Area Covered by Actual Location
Area Covered by Modelled Location
0
25
Kilometres

Figure-4.37

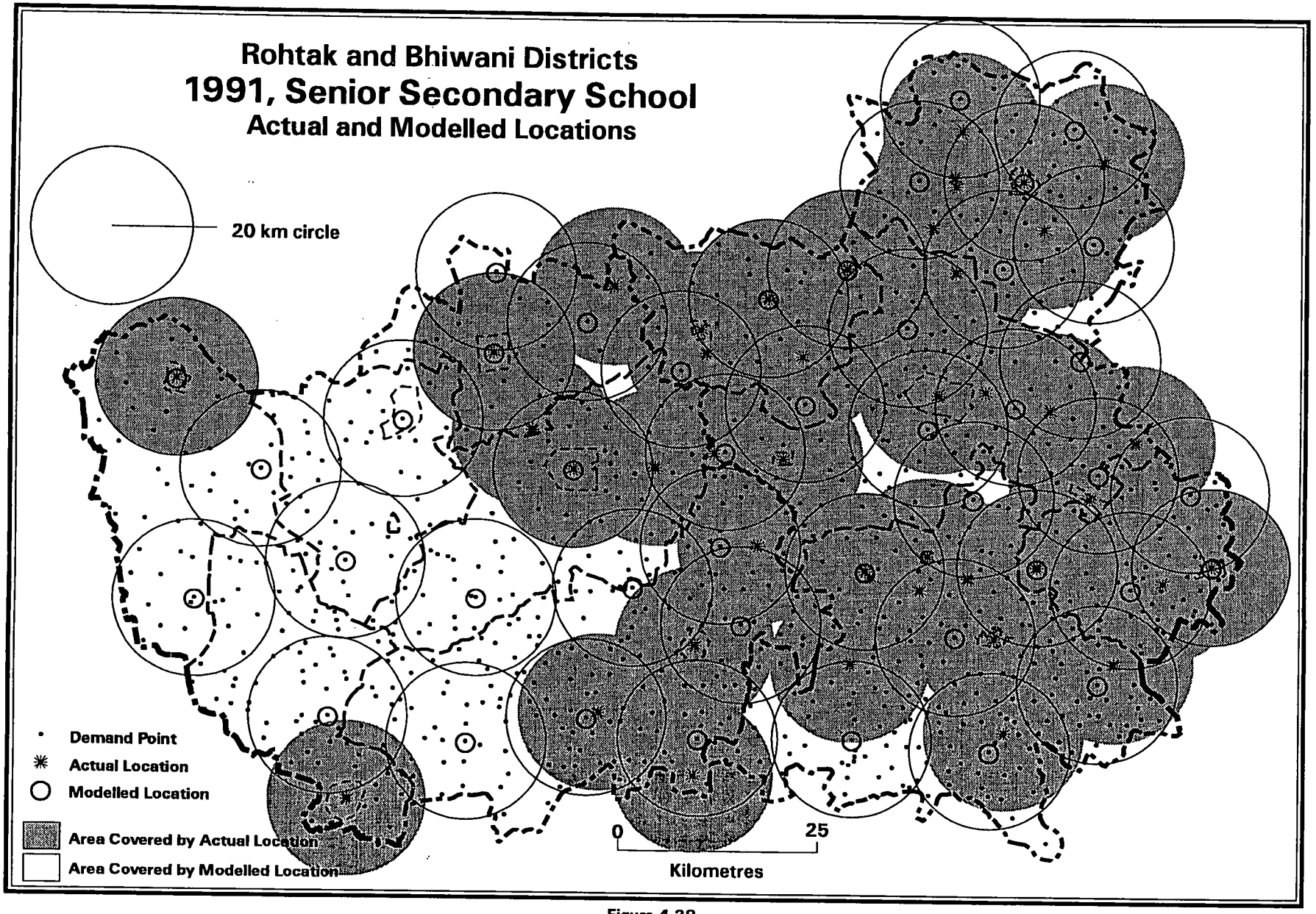

Rohtak and Bhiwani Districts
1991, Senior Secondary School
Actual and Modelled Locations
20 km circle
Demand Point
Actual Location
Modelled Location
Area Covered by Actual Location
Area Covered by Modelled Location
0
25
Kilometres

Figure-4.38

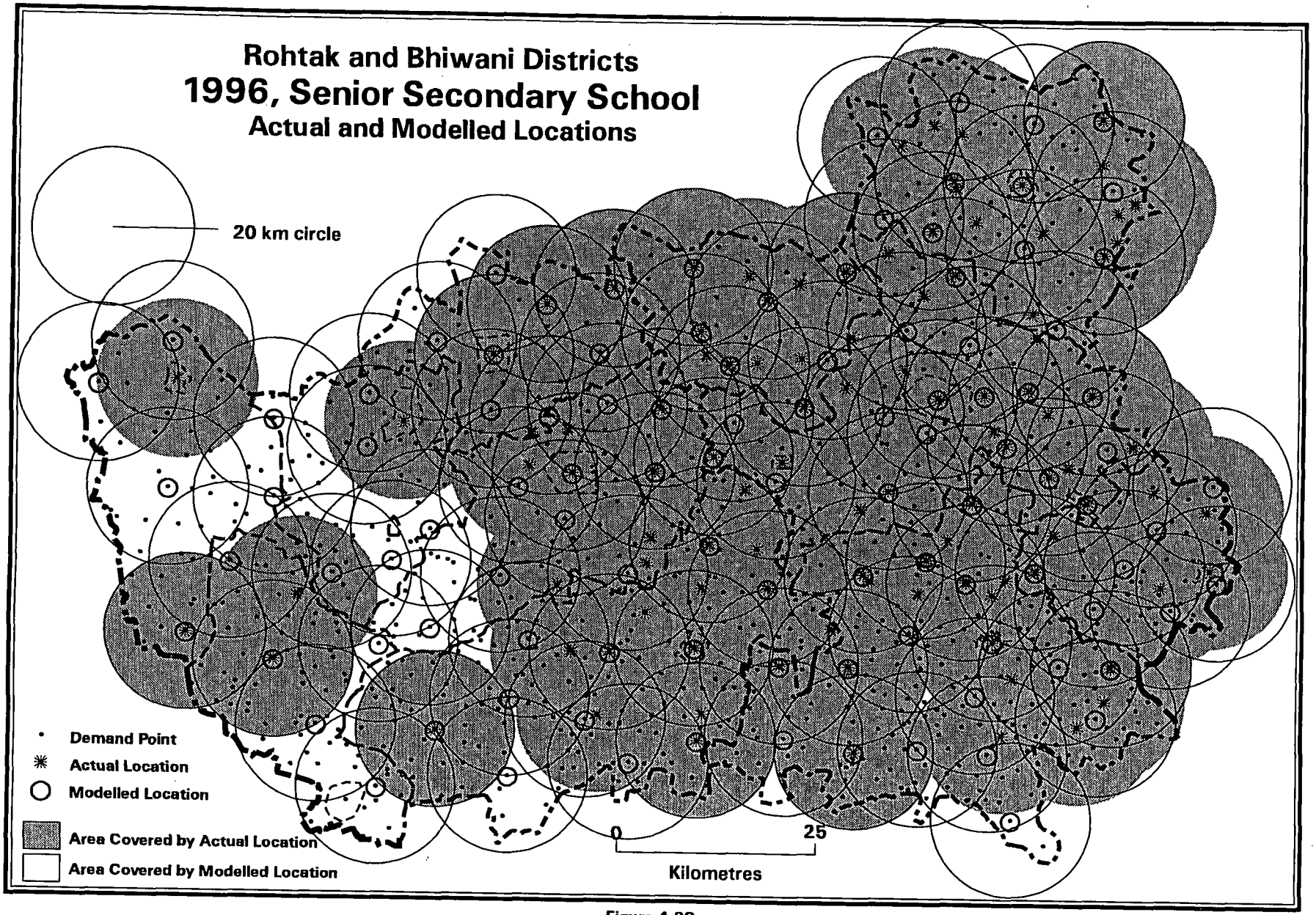

Rohtak and Bhiwani Districts
1996, Senior Secondary School
Actual and Modelled Locations
20 km circle
Demand Point
Actual Location
Modelled Location
Area Covered by Actual Location
Area Covered by Modelled Location
0
25
Kilometres

Figure-4.39

Chapter - 5

ACCESS TO AND UTILISATION OF EDUCATIONAL SERVICES

5.1 INTRODUCTION

Knowledge gives people greater control over their destinies. Better knowledge about nutrition means better health, even for those with little to spend on food (World Bank 1999). It must be observed that accessibility[1] to formal or non-formal or informal education is the central agent for the expansion of knowledge. Education also plays a crucial role in enlarging people's income-earning opportunities and enabling them to achieve better quality of life (Drèze and Saran, 1995). Therefore, investment in education has a strategic role to play, particularly in the Developing Countries. But it has widely been recognised that Government spending on social services is insufficient and inefficient, as it tends to be skewed from the people who need these services most (Noor, 1981). The result is that the poor often lack access to the most basic services.

Generally, extra spending on social services (say in education) does not automatically help the poor, because benefits are spread unequally and the poor in the Developing Countries therefore continue to suffer from illiteracy, sickness, malnutrition and early death (Noor, 1981, 88). For example, in India education is heavily biased in favour of urban dwellers and males. Urban literacy rates are twice as high as rural rates and females in both rural and urban areas have lower literacy rates than do males (Drèze and Gazdar, 1996). The low commitment to social needs in terms of Government policy is amplified by ineffective implementation at the local level[2]. Therefore, a large section of the society is deprived of access to basic education.

The provision of education has been one the most important aspects of planned development in India. Pandit Jawaharlal Nehru on the eve of independence on 14th August 1947 emphasised the need for the elimination of ignorance, poverty and disease. By the 'elimination of ignorance' he meant to eliminate illiteracy and to educate the people, but after more than five decades of planned development many people are still deprived of education

[1] The 'real accessibility' to services means their utilisation (as and when people need them) with satisfaction.

[2] Drèze and Gazdar (1996) argue that schools do exist, but teachers are frequently absent; health care facilities are provided, but are used to promote female sterilisation; poverty alleviation programmes are launched, but end up being used as instruments of patronage by the rural elite. In this situation sanctioning of programmes and resources at state level is meaningless if implementation bears no resemblance to stated policy objectives (p. 93).

even in Haryana, one of the most economically developed states of the country. Ensuring access to education means giving a chance to an individual to develop his/her ability and talent and hence his/her future career.

The Haryana Government took over the task of providing school education in rural areas from the Punjab Government on 1st November 1966. Since then the significance of education has increased day by day in the context of social development. Education level is considered to be one of the most important aspects of an individual's personality; providing school education is the task of state Government in India. There has been an improvement in the literacy rate and education level of the people since independence, but it does not prove that every one from each and every section of society has access to basic education. At present, a large number of students are enrolled in Government and private schools, but inequalities in the distribution of educational opportunities have further widened, accentuating interpersonal disparities. Enrolment, especially at the primary level has grown faster for males than for females (Sen, 1996, 6). Therefore, it becomes essential that access to education is universal, irrespective of income, caste, location or some other controlling variables. In this chapter we will examine the access and duration of access to education in the study area.

This chapter is divided into six sections. People's expectations in educating their children will be discussed in the first section. The examination of accessibility to and utilisation of educational institutions will then follow. In the third section, the relationship between distance to educational institutions and their utilisation will be examined. In the fourth section, an attempt will be made to investigate the reasons for the utilisation of different educational services. The duration of access to education (level of education) will be investigated in the fifth section. The last section of this chapter explores the reasons for children dropping out of the education system.

5.2 EXPECTATIONS FROM THE EDUCATION OF CHILDREN: People develop/have some expectations before the utilisation of any infrastructure service. For example, a patient may go to a hospital with the expectation that a doctor will diagnose his/her illness and he/she will return home cured. If these expectations are not fulfilled he/she may despair. Therefore, it becomes essential to know what people expect from the utilisation of services and whether their expectations are fulfilled. The same applies to the utilisation of educational institutions. Before independence and even until two decades ago almost all educated people had

employment either in Government or non-Government sector; this led to people's expectation that educating their children means improved employment prospects.

It is expected that different sections of society will have different expectations from educating their children and that these expectations may also vary by sex (boys/girls). Expectations for boys and girls will be analysed separately. For each household, where at least one child was using an educational service, the respondent was asked 'what are your expectations from educating him/her'? Out of the total 507 surveyed households, in 363 households at least one boy and 286 households at least one girl were going to schools or other educational institutions respectively. In the following sections, we will attempt to investigate the questions: what do people expect from educating children? Do people expect differently for boys and girls? Do these expectations differ in different castes and income groups?

There were eight main responses to the question on expectation from education. These are: (1) to become a better human being, (2) to become independent, (3) to gain employment, (4) to pass the time, (5) to become broad minded, (6) others, (7) to manage agriculture properly, (8) to educate children and manage the household properly, and (9) to improve matrimonial prospects. Numbers 1, 2 and 5 are related to the development of an individual and these are combined together in one category, i.e. the individual's development, and numbers 4 and 6 are grouped into one category, i.e. others.

Expectations from educating girls: Two decades ago, fewer women used to attend educational institutions, for their role was limited to the household and the fields. In 1997-98, the majority of surveyed households girls were going to school. This change may reflect people's changing expectations. In this study area, people expect to educate girls primarily for four reasons: for their individual development; to improve employment prospects; better household management and child care; and better matrimonial prospects (Tables-5.1). Mr. Singh told me that he is educating his daughter with the expectation that:

> "She develops some understanding of finding out what is what, and could become independent and could travel on her own, so that she need not be dependent always on someone else to tell her which bus is going where. She could read and identify for herself which bus is going where" (Ajit Singh, Patodi, 1998).

Table-5.1: Expectations from educating girls

Village/District	Number of Households					% Households				
	Individual's Development	Employment	Household Management	Matrimonial Prospects	Total	Individual's Development	Employment	Household Management	Matrimonial Prospects	Total
Kehrawar	28	10	12	4	54	51.9	18.5	22.2	7.4	100
Chuliana	15	11	6	5	37	40.5	29.7	16.2	13.5	100
Diwana	6	7	1	0	14	42.9	50.0	7.1	0.0	100
Brahana	36	22	10	1	69	52.2	31.9	14.5	1.5	100
Rohtak	**85**	**50**	**29**	**10**	**174**	**48.9**	**28.7**	**16.7**	**5.8**	**100**
Bhera	4	8	10	2	24	16.7	33.3	41.7	8.3	100
Patodi	5	6	3	3	17	29.4	35.3	17.7	17.7	100
Bapora	8	10	10	27	55	14.6	18.2	18.2	49.1	100
Dhani Mansukh	5	3	3	4	15	33.3	20.0	20.0	26.7	100
Bhiwani	**22**	**27**	**26**	**36**	**111**	**19.8**	**24.3**	**23.4**	**32.4**	**100**
Total	**107**	**77**	**55**	**46**	**285**	**37.5**	**27.0**	**19.3**	**16.1**	**100**

Source: Author's fieldwork, 1997-98

The study area experiences patriarchal types of family and a male dominated society. In the majority of cases, arranged marriages are observed. The parents of a girl have to find a suitable groom for their daughter. These days, it has become difficult to find a suitable groom for an illiterate girl. Therefore, one of the most important expectations from educating a girl is her better marriage prospects and ease of arrangement of marriage. Mr. Ganpat reports that:

> "I am educating my daughter for two reasons (1) for a better marriage arrangement, and (2) she could look after her household and children properly. But the primary aim of educating my boys is employment" (Ganpat Singh, Kehrawar, 1998).

In Rohtak District, about half of the responses about the education of girls were for their individual development, which means that they are educating girls with the intention that they should become independent, broad minded, and for their personal development. The second most important expectation is for their employment. A little more than 20 per cent of households were educating girls for better household management and better matrimonial prospects.

In contrast to Bhiwani District, in more than 50 per cent of households, expectations of girls' education are for better household management and matrimonial prospects. People in the field reported that earlier (say two decades ago) it was easy to arrange the marriage of an illiterate girl; if a girl had a high or middle school pass then it was easy to find a husband. This is no

longer the case and people now believe that an educated girl can manage her household and children better than an illiterate girl. Therefore, these two expectations of educating girls have become quite important. In both districts more than 20 per cent of respondents' expectations regarding girls' education relates to employment prospects.

There are significant differences in respondents' expectations from girls' education in Rohtak and Bhiwani Districts. The chi-squared value at 3 degrees of freedom is 47, which is statistically significant at the 1 per cent level of significance. While testing expectations of girls' education with the caste and income level of the household, there were no statistically significant associations, although some differences are apparent from the Table-5.2.

Table-5.2: Caste and expectations from educating girls (number of households)

Caste	Number of Households					% Households				
	Individual's Development	Employment	Household Management	Matrimonial Prospects	Total	Individual's Development	Employ-ment	Household Manag-ement	Matrimonial Prosp-ects	Total
General	68	48	40	34	190	35.8	25.3	21.1	17.9	100
BCs	14	8	6	5	33	42.4	24.2	18.2	15.2	100
SCs	25	21	9	7	62	40.3	33.9	14.5	11.3	100
Total	**107**	**77**	**55**	**46**	**285**	37.5	27.0	19.3	16.1	100

Source: Author's fieldwork

The first two categories of expectations do not show any kind of association with the caste. In the upper castes, less than 36 per cent of the respondents were educating girls with the expectation of their individual development, while the figures for BC and SC respondents were more than 40 per cent. It is interesting to note that one-third of the SC respondents were sending girls to school so that they will obtain employment once they complete their school education, while the figures (for the same expectation) for upper caste and BC respondents were 25 and 24 per cent respectively. A clear-cut association between caste and last two categories of expectations (household management and matrimonial prospects) can be observed. About 39 per cent of the upper caste respondents were educating girls for better household management and matrimonial prospects; about 33 per cent of BC respondents were in this category, but the figure for SC respondents was only 25 per cent. One thing seems to be clear from this analysis, that SC households expect more economic benefits from girls' education as compared to upper castes and BCs.

Table-5.3(a): Income and expectations from educating girls (number of households)

Gross per capita income (Rupees)	Individual's Development	Employment	Household Management	Matrimonial Prospects	Total
Below 250	17	11	8	3	39
250 to 500	28	20	11	12	71
500 to 1000	34	26	20	13	93
1000 to 2000	26	13	12	14	65
Above 2000	2	7	4	4	17
Total	107	77	55	46	285

Source: Author's fieldwork

Table-5.3(b): Income and expectations from educating girls (% households)

Gross per capita income (Rupees)	Individual's Development	Employment	Household Management	Matrimonial Prospects	Total
250	43.6	28.2	20.5	7.7	100
500	39.4	28.2	15.5	16.9	100
1000	36.6	28.0	21.5	14.0	100
2000	40.0	20.0	18.5	21.5	100
4000	11.8	41.2	23.5	23.5	100
Total	37.5	27.0	19.3	16.1	100

Source: Author's fieldwork

There seems to be no association between income level and expectations from girls' education except for matrimonial prospects (Table-5.3 [a] and [b]). With the increase in income level there is an increase in percentages concerned for matrimonial prospects. This means that in the higher income groups marriage arrangement for uneducated girls could be more difficult than in lower income groups. Higher income households are also more concerned with employment. About 41 per cent of the respondents with an income level of more than Rs. 4000 were educating their girls for employment and about 25 per cent of the respondents with an income level of more than Rs. 2000 were in this category.

Out of the four expectations listed above, only employment has direct economic benefits, while the rest of the other three can have some indirect economic benefits. It is explicit from the tables given above that people's expectations of girls' education are not directly associated with economic benefits. Further, it is interesting to note that in Rohtak District the objectives for educating girls are significantly different from Bhiwani District. Moreover, in the upper castes and higher income groups, people's objectives in sending girls to schools are for their better matrimonial prospects and household management.

Expectations from educating boys: Expectations from boys' education can be grouped into three categories- individual's development, employment and others (Table-5.4).

Table-5.4: Expectations from educating boys

Village/District	Number of Households				% Households			
	Individ-ual's Devel-opment	Employ-ment	Others	Total	Individ-ual's Devel-opment	Employ-ment	Others	Total
Kehrawar	1	66	1	68	1.5	97.1	1.5	100
Chuliana	3	48	0	51	5.9	94.1	0.0	100
Diwana	3	13	1	17	17.7	76.5	5.9	100
Brahana	3	80	0	83	3.6	96.4	0.0	100
Rohtak	**10**	**207**	**2**	**219**	**4.6**	**94.5**	**0.9**	**100**
Bhera	0	34	0	34	0.0	100.0	0.0	100
Patodi	2	24	0	26	7.7	92.3	0.0	100
Bapora	2	60	1	63	3.2	95.2	1.6	100
Dhani Mansukh	1	20	0	21	4.8	95.2	0.0	100
Bhiwani	**5**	**138**	**1**	**144**	**3.5**	**95.8**	**0.7**	**100**
Total	**15**	**345**	**3**	**363**	**4.1**	**95.0**	**0.8**	**100**

Source: Author's fieldwork

More than 90 per cent of respondents' expectations for boys' education is for employment, except Diwana village where it is just over 75 per cent. Predominantly, people correlate boys' education with employment, particularly Government employment in both Rohtak District and Bhiwani Districts, this expectation is further evident from the comments given below:

> "We are educating our children (especially boys) with the hope that they will get employment once they complete their education" (Group Discussion in SC colony, Patodi, 1997).

There are no statistically significant variations in expectations among different castes and income groups (Tables-5.5 and 5.6). It is important to note that if expectations are not fulfilled then frustration develops. The major expectation for educating boys was observed as employment, but it was also observed in the field that many of the educated boys were unemployed. Mr. Suraj (an unemployed educated youth) reported that:

> "When I started my education I had an ambition to get a Government job. We do not have enough agricultural land to subsist. I tried for a job for a long time, but I could not get any. My understanding is that I did well in both the physical, and the interview, but I have not got any job until now because I do not have any political influence and money

to pay bribes. Some educated friends also returned without any employment. At last, I have started a tailoring job (non-traditional for his caste). To overcome the unemployment problem we must start more productive activities in the village, such as small scale industries and provide more technical education to the younger generation" (Suraj Singh, Brahana, 1997).

Table-5.5: Caste and expectations from educating boys (number of households)

Caste	Number of households				% Households			
	Individ-ual's Devel-opment	Employ-ment	Others	Total	Individ-ual's Devel-opment	Employ-ment	Others	Total
General	12	231	3	246	4.9	93.9	1.2	100
BCs	1	44	0	45	2.2	97.8	0.0	100
SCs	2	70	0	72	2.8	97.2	0.0	100
Total	15	345	3	363	4.1	95.0	0.8	100

Source: Author's fieldwork

Table-5.6: Income and expectations from educating boys (number of households)

Income (Rupees)	Individ-ual's Devel-opment	Employ-ment	Others	Total	Individ-ual's Devel-opment	Employ-ment	Others	Total
250	0	50	0	50	0.0	100.0	0.0	100
500	2	78	0	80	2.5	97.5	0.0	100
1000	7	107	1	115	6.1	93.0	0.9	100
2000	5	83	1	89	5.6	93.3	1.1	100
4000	1	27	1	29	3.4	93.1	3.4	100
Total	15	345	3	363	4.1	95.0	0.8	100

Source: Author's fieldwork

Because of unemployment many people show less interest even in boy's education, especially after high school studies. This finding leads me to investigate another question 'do people get appropriate employment after education'? Also are they educated enough for an appropriate employment? If the response is no then it raises another question: what are the reasons that people in rural areas do not get appropriate employment? What are the reasons that they are not qualified enough for an appropriate job they are looking for? These issues will be discussed in detail later in the thesis.

5.3 ACCESSIBILITY TO AND UTILISATION OF EDUCATIONAL INSTITUTIONS

Frequency of utilisation of a service is one of the indicators of accessibility to it. This section has two sub-divisions. The first sub-section deals with the people who have never attended an

educational institution. The second sub-section deals with those people who have attended at least one educational institution.

In the study area, not all people have good access to an educational institution. In the following sections, an attempt will be made to investigate how many people have never attended an educational institution, followed by the investigation of where they are located and to which section of society they belong.

Non-attendance data have been processed for all eight villages of Rohtak and Bhiwani Districts. In the following section only people aged five years or more have been included, as the probability of children less than five years of age going to school is very low[3]. These data will be examined both for all ages (only five years and above) together, the younger generation (5 to 20 years) and for the older generation (20 to 50 years) separately. The younger group can be considered as the school-going age. People in this generation not attending any educational institution represent those currently not having access to education. There may be some people in this generation (particularly those less than 10 years of age) who have not yet had any education but may have this opportunity in their future life. The probability of attending an educational institution in future for people in the older generation is lower.

Out of the total number of persons in the 507 surveyed households, 3029 were aged 5 and above. Of these 901 (29.7%) had never had access to any educational institution. In Bhiwani District, the percentage of people who have never attended any school is greater than in Rohtak District for both sexes. It is important to note that in the more accessible, large villages such as Kehrawar and Bapora, the percentage is lower as compared to less accessible villages such as Chuliana, Patodi and Bhera (Table-5.7).

[3] Data on education accessibility were examined separately for younger and older age groups. It is assumed that the availability and accessibility to education have changed over the last two decades. Therefore, dividing the data into age groups 5 to 20 years (younger) and 20 to 50 years (older) will help in understanding access to education in younger and older age groups separately, and also in examining change in access to education from older to younger generations.

Table-5.7: People who never attended any educational institution

District/Village Name	Number of people						% people		
	Aged 5 years and above			Never attended any educational institution			Never attended any educational institution		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Kehrawar	329	253	582	54	91	145	16.4	36.0	24.9
Chuliana	255	198	453	61	98	159	23.9	49.5	35.1
Diwana	68	54	122	6	23	29	8.8	42.6	23.8
Brahana	344	254	598	58	106	164	16.9	41.7	27.4
Rohtak	**996**	**759**	**1755**	**179**	**318**	**497**	**18.0**	**41.9**	**28.3**
Bhera	163	134	297	22	73	95	13.5	54.5	32.0
Patodi	140	116	256	31	67	98	22.1	57.8	38.3
Bapora	314	266	580	45	121	166	14.3	45.5	28.6
Dhani Mansukh	76	65	141	15	30	45	19.7	46.2	31.9
Bhiwani	**693**	**581**	**1274**	**113**	**291**	**404**	**16.3**	**50.1**	**31.7**
Total	**1689**	**1340**	**3029**	**292**	**609**	**901**	**17.3**	**45.4**	**29.7**

Source: Author's fieldwork, 1997-98

There are apparent sex differences in access to educational institutions. More than 45 percent of women (aged 5 years and above) have never had access to education as compared to only 17 per cent of men (Table-5.7). It is further interesting to note that in the villages of Bhiwani the percentage of men who have never had access to an educational institution is slightly lower than the villages of Rohtak District. But in the case of women, there is a reverse trend. More than 50 per cent of women in Bhiwani never attended any educational institution, while this was only 42 per cent for Rohtak District.

Out of the total, 3.7 per cent of boys and 13.2 per cent of girls in the younger generation (5 to 20 years) have had no education. In the older generation, however, the percentages are much higher at 12.9 and 58.5 per cent for men and women respectively (Table-5.7). It must be observed that social and cultural factors, which governed women's access to school in villages, were stronger 20 years ago. Moreover, girl's schools were not available in a large number of villages. Availability of schools has improved, people have started to realise the importance of girls' education and social factors (which constrained women's access to education) have become weaker. These might have helped in improving women's access to school education in the younger generation.

In both age groups the percentage of women who have never attended any educational institution is higher than that of men. But there is sharp decline in the percentages of women non-attendees from the older to the younger generation. In the case of Rohtak District the percentage of uneducated women is lower than in Bhiwani. For all the villages of Rohtak and

Bhiwani Districts, up to 4 per cent of boys had never had access to education, which was 10 per cent for the older generation. It is worth noting that in Kehrawar village (which is a quite advanced and accessible village in terms of infrastructure services) none of the boys in the younger generation is deprived of an educational institution. In the case of all girls in the younger generation it is more than ten percent, except for Kehrawar, Brahana and Dhani Mansukh (Table-5.8).

It is apparent from the analysis that the percentage of women, who could never attend any of the educational institutions, is higher than that for men. Therefore, it can be concluded that males have better access[4] to education as compared to females in both the generations. Access to education also varies across the two districts; access to education for both sexes is better in Rohtak as compared to Bhiwani District. Also the gender differences in access to educational institutions in Rohtak District are less than for Bhiwani.

Table-5.8: Percentage of people who never attended any educational institution

Village	Age 5 to 20 years			Age 20 to 50 years		
	Male	Female	Total	Male	Female	Total
Kehrawar	0.0	3.2	1.4	9.3	45.4	25.3
Chuliana	6.5	15.6	10.7	23.9	69.2	42.8
Diwana	5.6	10.5	8.1	7.5	51.7	26.1
Brahana	3.9	8.1	5.7	10.3	50.0	26.6
Rohtak	**3.5**	**8.9**	**5.9**	**13.0**	**53.0**	**29.9**
Bhera	4.3	25.9	14.2	11.4	69.6	37.3
Patodi	3.7	27.1	14.7	16.4	72.9	42.7
Bapora	3.3	15.0	8.9	12.6	59.1	32.2
Dhani Mansukh	6.1	3.3	4.8	10.3	76.0	40.7
Bhiwani	**4.0**	**18.5**	**10.8**	**12.8**	**66.1**	**36.2**
Total	**3.7**	**13.2**	**8.0**	**12.9**	**58.5**	**32.5**

Source: Author's fieldwork

Educational Institutes Used

In this sub-section, an attempt is made to investigate the following issues:

- The type of educational institutes available in the study area- categorisation and their characteristics.

[4] Many people did not have any chance to attend any educational institution throughout their life. Non-availability of a school, economic and social conditions or other factors might have prevented them going to school. Therefore, it can be assumed that people who could not attend any school or other institutions of learning did not have access to education.

- The type of educational institutes used overall, and by age groups 5-20, and 20-50 years.
- Educational institutes used and controlling variables- caste, income, sex and village accessibility.

The broad types of educational services can be classified into two categories- Government and private (non-Governmental). The location of these services may be within a village itself or in a town and/or city. The availability of private schools in rural areas is a recent development, within the last 10 years or so. Before that, only Government schools were available in rural areas and people had to travel to urban areas to access private educational services. Over the last decade many private schools have appeared in rural areas, especially in the villages with larger populations and where frequent transport services are available.

Public schools[5] are owned, controlled and managed by the Government. The teachers in these schools are qualified and trained, but their posting is not to the village of their residence and the majority of them do not live in the village in which they are posted. Government teachers are paid far better rates than the private school teachers. For Government teachers commuting to the village where they are posted is the major problem, for frequent bus or rail services are not available in most of the villages. It was observed that many times teachers arrive later and leave earlier than the official school timings. Fees in Government schools are nominal and the poor can afford to send their children to Government schools only if a school is located within the village. Yet not all villages have a Government middle or high school. In the surveyed eight villages, only two have senior secondary schools. In two others only primary schools were available and these were not fully staffed.

There are two types of private schools in rural areas- 'recognised' and 'unrecognised'. The State Government approves private recognised schools and teachers employed in these schools must have appropriate qualifications, but it does not follow that they will be paid as much as those in Government schools with the same qualifications and experience. On average, they earn three to four times less than they would in a Government school. Also teachers in private schools are accountable to the head of the institution. Unrecognised private schools are opened without any approval from the Government. These schools are not affiliated to the Government and therefore it is not necessary for the school owner to employ

[5] The term Government school is used in place of public school. Public school in the study area refers to an English convent school with a good quality of education.

trained and experienced staff. Generally these are primary or middle schools, and teachers' pay is low.

Private schools located in urban areas are generally better in terms of quality of education than Government and private schools in rural areas. School fees and commuting costs, however, prevent a majority of poor households from sending their children to these schools. Keeping in mind the quality of education, private schools have been categorised into two separate groups: 'private rural' and 'private urban'.

This section is based on two sets of people, namely (1) those currently enrolled in an educational institution and (2) those who have attended in the past. It is expected that people in the age group 5 to 20 years must be enrolled in some educational institution and that this represents the young generation of school-going children. While conducting my field survey it was observed that the type of educational services used by the two groups is somewhat different and so the utilisation of educational institutions will be processed separately for the younger and older generations. One of the important objectives of this study is to understand the change over time in the type of educational services used. This can be explored by examining the type of educational institutions used by the people in different age groups.

In case a person is still attending some educational institution the respondent was asked to identify him/her, and educational institutions he/she attended. In case a person has already completed or dropped out of education, respondents were asked a question: 'what was the last educational institution he/she attended'? It is quite probable that these people might have attended more than one educational institution, but we focus upon the last educational institution attended.

Out of the total of 2128 persons who have attended at least one educational institution, as many as 1750 have attended Government and only 378 private educational institutions (Table-5.9). As mentioned earlier, one decade ago there were not many private educational institutions available in the villages. The majority of people in rural areas were dependent on Government schools located within their own or neighbouring villages. These data were for all age groups and it is quite probable that these figures will be different when the data are examined for the younger and older generations separately.

A large majority is relying or has relied on Government educational institutions. Table-5.9 shows that only a small percentage (17.8) of people have access to private schools; and a larger percentage of people (80 per cent) have to rely on Government provision. It is interesting to note that the percentage of people using private educational institutions is higher in more accessible villages such as Kehrawar, Bapora and Dhani Mansukh. In these villages more than 20 per cent of males have access to private schools, while in the case of females the percentages are relatively low (Table-10).

Table-5.9: Number of people using/used different educational institutions

Village	Male			Female			Total		
	Govern-ment	Pri-vate	Total	Govern-ment	Pri-vate	Total	Govern-ment	Pri-vate	Total
Kehrawar	216	59	275	150	12	162	366	71	437
Chuliana	169	25	194	91	9	100	260	34	294
Diwana	51	11	62	30	1	31	81	12	93
Brahana	238	48	286	120	28	148	358	76	434
Rohtak	**674**	**143**	**817**	**391**	**50**	**441**	**1065**	**193**	**1258**
Bhera	115	26	141	55	6	61	170	32	202
Patodi	91	18	109	43	6	49	134	24	158
Bapora	194	75	269	118	27	145	312	102	414
Dhani Mansukh	43	18	61	26	9	35	69	27	96
Bhiwani	**443**	**137**	**580**	**242**	**48**	**290**	**685**	**185**	**870**
Total	**1117**	**280**	**1397**	**633**	**98**	**731**	**1750**	**378**	**2128**

Source: Author's fieldwork, 1997-98

While surveying the villages of Rohtak District, people did not report many complaints against the Government schools or the teachers employed in those schools. In Bhiwani District, however, in almost every village there were many complaints against the Government schools and the staff employed in them. My informal discussion with Mr Balwan illustrates this:

> "In fact, we are compelled to send our children to private school because of three reasons: (1) negligence in the Government school, (2) English is not introduced in the Government schools for primary classes and (3) non-availability of full staff in the Government schools. Also private schools are preferred because of better care and study. Moreover, teachers spend more time on children in private school as compared to Government school" (Balwan Singh, 1997, Bhera).

People reported that many posts of major subjects such as maths or sciences lie vacant for more than two years. Moreover uncertainty of transfer is another reason that teachers do not pay much attention towards developing a studious environment in the school.

> "The posting of Government teachers is not stable. They are transferred very frequently (maybe every year or every second year). Uncertainty of transfer is another reason that teachers in Government schools are unable to concentrate on the study of their pupils. If they are transferred frequently they may not bother to work hard at one place and improve the study environment, as they know they may not stay in the same school for a long time" (Teachers Government High School, Kehrawar, 1998).

Secondly, villagers also reported that teachers fail to pay sufficient attention to their pupils. The parents are illiterate and cannot themselves help their children with their studies, so they have to rely on the teachers. Many send their children to private schools where not only the quality of education is better, but teachers are more conscientious. Some informal discussion with villagers and service providers reveals that the non-availability of English language and the higher admission age (6 years) in Government schools explains the increasing popularity of private schools in the study area.

> "There is definitely a demand for English language in the primary schools, but due to certain constraints we really have not been able to introduce English in the Government school" (DEO, Bhiwani, 1998).

> "Some parents send their children to private school, because of non-availability of English language in our school" (Teachers, Government High School, Kehrawar, 1998).

When asked why don't you introduce English in Government school, one teacher reported that:

> "This is a policy matter and Government is thinking on these lines as the Punjab State Government has already introduced English in primary schools" (Teachers, Government High School, Kehrawar, 1998).

There was unanimous agreement (among the teachers) that English must be introduced right at the beginning of the first class and it must not be elective, but it must be compulsory (Teachers, Government High School, Chuliana, 1998). These reasons may help to explain the higher percentage of people who have used private educational institutions in the villages of Bhiwani District.

Education for girls in Government schools is almost free. In both districts only 13.4 percent of females have attended private educational institutions, which is 6.6 per cent less than for men. This may be because people are not willing to invest in the education of girls. Larger

percentages of girls have access only to Government educational institutions. Schoolteachers further substantiate this argument:

> "Generally, girls are admitted to Government school, while more boys (especially from better off households) go to private schools. The main reason is that parents are not happy spending money on the girls' education, but prefer to spend on their boys. They think investing on boys is a kind of property for them" (School Teacher, Government Middle School, Brahana, 1998).

Table-5.10: Percentage of people using different educational institutions

Village	Male			Female			Total		
	Government	Private	Total	Government	Private	Total	Government	Private	Total
Kehrawar	78.5	21.5	100.0	92.6	7.4	100.0	83.8	16.2	100.0
Chuliana	87.1	12.9	100.0	91.0	9.0	100.0	88.4	11.6	100.0
Diwana	82.3	17.7	100.0	96.8	3.2	100.0	87.1	12.9	100.0
Brahana	83.2	16.8	100.0	81.1	18.9	100.0	82.5	17.5	100.0
Rohtak	**82.5**	**17.5**	**100.0**	**88.7**	**11.3**	**100.0**	**84.7**	**15.3**	**100.0**
Bhera	81.6	18.4	100.0	90.2	9.8	100.0	84.2	15.8	100.0
Patodi	83.5	16.5	100.0	87.8	12.2	100.0	84.8	15.2	100.0
Bapora	72.1	27.9	100.0	81.4	18.6	100.0	75.4	24.6	100.0
Dhani Mansukh	70.5	29.5	100.0	74.3	25.7	100.0	71.9	28.1	100.0
Bhiwani	**76.4**	**23.6**	**100.0**	**83.4**	**16.6**	**100.0**	**78.7**	**21.3**	**100.0**
Total	**80.0**	**20.0**	**100.0**	**86.6**	**13.4**	**100.0**	**82.2**	**17.8**	**100.0**

Source: Author's fieldwork, 1997-98

There are differences in the quality of education institutions located in the villages and in the towns. Therefore, it is important to study the difference in utilisation of educational services. These educational institutions have been divided into four categories: Government within village, Government within town and/or city, private within village and private in towns.

In all of the surveyed households, the largest proportion of people relies on Government educational institutions located in the villages. Out of the total 2128 who have attended at least one educational institution, 1576 people (74.1 per cent) have attended only Government schools in the villages (Table-5.11), while the figure for Rohtak District is 12 per cent higher than in Bhiwani District (Table-5.12). There are two possible reasons for this. Firstly, Government educational institutions in the villages of Rohtak District are more accessible. Secondly, the quality of education in these institutions may be better.

In each of the four surveyed villages of Rohtak District, more than 75 percent of people have used only Government educational institutions. In Chuliana and Diwana, which are relatively

less accessible villages, this rises to more than 80 per cent. But in the villages of Bhiwani District less than 75 per cent of people have attended Government schools except in Patodi village. This figure is very low i.e. only 33.3 per cent for Dhani Mansukh where teaching is only up to fifth class. Therefore, people have to rely on either Government or private educational institutions located at in the town of Loharu which is about 4 kilometres away.

In the villages such as Brahana and Bapora, where more than 3 private schools are available, more than 10 per cent people have attended private educational institutions, which supports the argument that the availability of private schools in the villages enhances the chances of accessibility. In three villages namely- Diwana, Bapora and Dhani Mansukh, more than 10 per cent of people have attended private educational institutions located in the towns. In two of these three, in Dhani Mansukh and Diwana villages, there is no private school available.

Again, there are explicit sex differences in the utilisation of educational institutions located within village and in towns and/or cities. More than 27 per cent of males in Bhiwani and 18 per cent in Rohtak District have attended educational institutions located in towns and/or cities, which, respectively, is 13.4 and 13 per cent higher than for females. Except in Dhani Mansukh, more than 75 per cent of women have attended only Government educational institutions located within villages. This means that females' access to educational institutions located in town and/or city is relatively poorer as compared to that of males, as people do not allow girls to travel out of village alone, and frequent and safe bus and/or rail services are not available in the majority of villages.

There are noticeable differences in the utilisation of different educational institutions between the younger and older generations. In the younger generation only 71.3 per cent of people have attended Government schools available within the village against 75.7 per cent in the older generation (Table-5.13 and 5.14). In the younger generation 15.7 per cent of people have attended private schools located within the village against only 1.8 per cent for the older generation. It is further interesting to note that in the older generation 12.9 per cent people have attended Government educational institutions located in the town and/or city, which is 9.2 per cent less than the younger generation.

There are no obvious differences in the percentages of people attending private educational institutions located in town and/or city from the younger to the older generation. It is quite

probable that certain sections of society might have been sending their children to private educational institutions in a town or city for the better quality of education (from about 10 to 15 years ago). Now this section of society has started sending their children to private educational institutions located within the village where they assume that the quality of education is better than the state schools.

There are two important questions, which must be investigated-'why private schools are being located in villages' and 'in which villages are these schools located'. Have Government schools in the villages failed to cater for the needs and demands of villagers? Or has the quality of education deteriorated in Government educational institutions? From informal discussion with the villagers it was evident that people feel the need for a better quality of education. They have many complaints against the Government schoolteachers especially in the villages of Bhiwani District. Secondly, the number of Government schools and staff in the surveyed villages has remained almost the same, but there has been an increase in population and hence an increase in the demand for school education. Deteriorating quality of education and increasing demand have both played a vital role in the location of private schools in these villages.

Private schools are generally located in bigger and more accessible villages. Out of the 8 villages surveyed, there are no private schools in the smaller villages such as Diwana and Dhani Mansukh. In less accessible villages[6] such as Patodi and Bhera there is only one private school in each village. In other words private schools in the village are located only if there is enough demand.

[6] An index of accessibility was prepared for all the 8 villages surveyed (see chapter 3 for details).

Table-5.11: People aged 5 years and above using/used different educational institutions.

Village/District Name	Male					Female					Total (Male+Female)				
	Village		Town		Total	Village		Town		Total	Village		Town		Total
	Government	Private	Government	Private		Government	Private	Government	Private		Government	Private	Government	Private	
Kehrawar	191	21	25	38	275	144	10	6	2	162	335	31	31	40	437
Chuliana	156	6	13	19	194	85	8	6	1	100	241	14	19	20	294
Diwana	47	1	4	10	62	29	0	1	1	31	76	1	5	11	93
Brahana	226	22	12	26	286	116	27	4	1	148	342	49	16	27	434
Rohtak	620	50	54	93	817	374	45	17	5	441	994	95	71	98	1258
Bhera	94	12	21	14	141	51	5	4	1	61	145	17	25	15	202
Patodi	78	6	13	12	109	41	3	2	3	49	119	9	15	15	158
Bapora	173	39	21	36	269	113	19	5	8	145	286	58	26	44	414
Dhani Mansukh	16	0	27	18	61	16	0	11	8	35	32	0	38	26	96
Bhiwani	361	57	82	80	580	221	27	22	20	290	582	84	104	100	870
Total	981	107	136	173	1397	595	72	39	25	731	1576	179	175	198	2128

Source: Author's fieldwork, 1997-98

Table-5.12: Percentage of people aged 5 years and above using/used different educational institutions.

Village Code	Male					Female					Total (Male+Female)				
	Village		Town		Total	Village		Town		Total	Village		Town		Total
	Government	Private	Government	Private		Government	Private	Government	Private		Government	Private	Government	Private	
Kehrawar	69.5	7.6	9.1	13.8	100.0	88.9	6.2	3.7	1.2	100.0	76.7	7.1	7.1	9.2	100.0
Chuliana	80.4	3.1	6.7	9.8	100.0	85.0	8.0	6.0	1.0	100.0	82.0	4.8	6.5	6.8	100.0
Diwana	75.8	1.6	6.5	16.1	100.0	93.5	0.0	3.2	3.2	100.0	81.7	1.1	5.4	11.8	100.0
Brahana	79.0	7.7	4.2	9.1	100.0	78.4	18.2	2.7	0.7	100.0	78.8	11.3	3.7	6.2	100.0
Rohtak	75.9	6.1	6.6	11.4	100.0	84.8	10.2	3.9	1.1	100.0	79.0	7.6	5.6	7.8	100.0
Bhera	66.7	8.5	14.9	9.9	100.0	83.6	8.2	6.6	1.6	100.0	71.8	8.4	12.4	7.4	100.0
Patodi	71.6	5.5	11.9	11.0	100.0	83.7	6.1	4.1	6.1	100.0	75.3	5.7	9.5	9.5	100.0
Bapora	64.3	14.5	7.8	13.4	100.0	77.9	13.1	3.4	5.5	100.0	69.1	14.0	6.3	10.6	100.0
Dhani Mansukh	26.2	0.0	44.3	29.5	100.0	45.7	0.0	31.4	22.9	100.0	33.3	0.0	39.6	27.1	100.0
Bhiwani	62.2	9.8	14.1	13.8	100.0	76.2	9.3	7.6	6.9	100.0	66.9	9.7	12.0	11.5	100.0
Total	70.2	7.7	9.7	12.4	100.0	81.4	9.8	5.3	3.4	100.0	74.1	8.4	8.2	9.3	100.0

Source: Author's fieldwork, 1997-98

Table-5.13: Percentage of people in younger generation (5 to 20 years) using/used different educational institutions.

Village Code	Male					Female					Total				
	Village		Town		Total	Village		Town		Total	Village		Town		Total
	Govern-ment	Private	Govern-ment	Private		Governm ent	Private	Governm ent	Private		Governm ent	Private	Governm ent	Private	
Kehrawar	67.0	13.9	3.5	15.7	100.0	88.6	9.1	1.1	1.1	100.0	76.4	11.8	2.5	9.4	100.0
Chuliana	82.6	6.5	1.1	9.8	100.0	86.1	11.1	1.4	1.4	100.0	84.1	8.5	1.2	6.1	100.0
Diwana	76.5	0.0	0.0	23.5	100.0	100.0	0.0	0.0	0.0	100.0	87.9	0.0	0.0	12.1	100.0
Brahana	71.4	19.6	0.9	8.0	100.0	69.4	28.2	2.4	0.0	100.0	70.6	23.4	1.5	4.6	100.0
Rohtak	**73.2**	**13.1**	**1.8**	**11.9**	**100.0**	**82.4**	**15.3**	**1.5**	**0.8**	**100.0**	**77.2**	**14.1**	**1.7**	**7.0**	**100.0**
Bhera	73.3	15.0	3.3	8.3	100.0	83.3	11.9	4.8	0.0	100.0	77.5	13.7	3.9	4.9	100.0
Patodi	63.0	10.9	6.5	19.6	100.0	73.1	11.5	3.8	11.5	100.0	66.7	11.1	5.6	16.7	100.0
Bapora	57.3	35.9	1.0	5.8	100.0	73.8	19.0	1.2	6.0	100.0	64.7	28.3	1.1	5.9	100.0
Dhani Mansukh	17.9	0.0	25.0	57.1	100.0	28.0	0.0	40.0	32.0	100.0	22.6	0.0	32.1	45.3	100.0
Bhiwani	**57.8**	**21.5**	**5.5**	**15.2**	**100.0**	**69.5**	**13.6**	**7.9**	**9.0**	**100.0**	**62.8**	**18.1**	**6.5**	**12.6**	**100.0**
Total	**66.8**	**16.6**	**3.3**	**13.3**	**100.0**	**77.2**	**14.6**	**4.1**	**4.1**	**100.0**	**71.3**	**15.7**	**3.7**	**9.3**	**100.0**

Source: Author's fieldwork, 1997-98

Table-5.14: Percentage of people in older generation (20 to 50 years) using/used different educational institutions.

Village Code	Male					Female					Total				
	Village		Town		Total	Village		Town		Total	Village		Town		Total
	Govern-ment	Private	Govern-ment	Private		Govern-ment	Private	Govern-ment	Private		Govern-ment	Private	Govern-ment	Private	
Kehrawar	70.1	2.9	13.9	13.1	100.0	88.4	2.9	7.2	1.4	100.0	76.2	2.9	11.7	9.2	100.0
Chuliana	75.9	0.0	12.6	11.5	100.0	82.1	0.0	17.9	0.0	100.0	77.4	0.0	13.9	8.7	100.0
Diwana	70.3	2.7	10.8	16.2	100.0	86.7	0.0	6.7	6.7	100.0	75.0	1.9	9.6	13.5	100.0
Brahana	82.2	0.0	7.5	10.3	100.0	90.0	5.0	3.3	1.7	100.0	84.5	1.5	6.3	7.8	100.0
Rohtak	**75.7**	**1.2**	**11.1**	**12.0**	**100.0**	**87.8**	**2.9**	**7.6**	**1.7**	**100.0**	**79.3**	**1.7**	**10.0**	**9.0**	**100.0**
Bhera	58.5	3.1	27.7	10.8	100.0	83.3	0.0	11.1	5.6	100.0	63.9	2.4	24.1	9.6	100.0
Patodi	80.0	0.0	14.0	6.0	100.0	95.5	0.0	4.5	0.0	100.0	84.7	0.0	11.1	4.2	100.0
Bapora	69.1	1.4	11.5	18.0	100.0	82.1	5.4	7.1	5.4	100.0	72.8	2.6	10.3	14.4	100.0
Dhani Mansukh	25.9	0.0	66.7	7.4	100.0	90.0	0.0	10.0	0.0	100.0	43.2	0.0	51.4	5.4	100.0
Bhiwani	**64.4**	**1.4**	**21.0**	**13.2**	**100.0**	**85.8**	**2.8**	**7.5**	**3.8**	**100.0**	**70.3**	**1.8**	**17.3**	**10.6**	**100.0**
Total	**71.1**	**1.3**	**15.1**	**12.5**	**100.0**	**87.1**	**2.9**	**7.6**	**2.5**	**100.0**	**75.7**	**1.8**	**12.9**	**9.6**	**100.0**

Source: Author's fieldwork, 1997-9

Accessibility to educational institutions and controlling variables:

This section focuses on the factors which govern access to different educational institutions. This accessibility is considered as a response variable. It is further assumed that accessibility to different educational institutions is a function of four major controlling variables: caste, income, village accessibility and sex. This section is sub-divided into two sections. In the first section association between response and controlling variables will be examined in the form of cross tabulation. In the second section maximum likelihood logit and multinomial logistic regression models will be used to examine the impact of the control variables.

Caste and accessibility to educational institutions: Table-5.15 shows the caste-wise distribution of people and accessibility to educational institutions. Out of the total scheduled caste people, more than 40 percent have never attended any educational institution, whereas in the upper castes this percentage is lowest at 26.8. There seems to be another interesting association between caste and access to a private educational institution. Informal discussion with the schoolteachers supports the argument that lower caste households, as compared to upper caste households, prefer Government schools.

> "Most of the educated and well off households are sending their children to the private schools either in the village or in the town or city. The majority of students particularly boys in our school either belong to SC or BC, which are relatively poor as compared to other castes" (Mistresses, Government Girls School, Kehrawar, 1998).

More than 15 per cent of people in the upper castes have been educated in private schools. In other castes, however, this is less than 10 per cent. The association between caste and accessibility to educational institutions is statistically significant, at the 1 per cent level of significance with 4 degrees of freedom. The impact of caste on accessibility to educational institution will be explored further in the section on regression analysis.

Table-5.15: Caste and access to educational institutions

Caste	Number				%			
	Not Accessible	Govern -ment	Private	Total	Not Accessible	Govern -ment	Private	Total
Upper Caste	556	1186	334	2076	26.8	57.1	16.1	100
BCs	102	240	27	369	27.6	65.0	7.3	100
SCs	243	325	16	584	41.6	55.7	2.7	100
Total	901	1751	377	3029	29.8	57.8	12.5	100

Source: Author's calculation, 1997-98

Income and accessibility to educational institutions: It has been observed that income has a major effect on the consumption of goods and services. A positive relationship is expected between income and consumption patterns. We will attempt to investigate whether income has some association with the utilisation of different educational institutions. Table-5.16 shows a cross-classification between gross per capita income and accessibility to educational institutions.

Table-5.16: Income and access to educational institution

Gross per capita income (Rs.)	Number				%			
	Not Accessed	Gover- nment	Private	Total	Not Accessed	Gover -ment	Private	Total
Below 250	163	219	12	394	41.4	55.6	3.1	100
250-500	244	402	42	688	35.5	58.4	6.1	100
500-1000	278	611	129	1018	27.3	60.0	12.7	100
1000-2000	171	412	134	717	23.9	57.5	18.7	100
2000-4000	41	97	46	184	22.3	52.7	25.0	100
Above 4000	4	10	14	28	14.3	35.7	50.0	100
Total	901	1751	377	3029	29.8	57.8	12.5	100

Source: Author's fieldwork

There seems to be a positive association between income level and accessibility to educational institutions. The calculated chi-squared value for income and accessibility to educational services is 173.7, which is statistically significant at the 0.1 per cent level of significance. Two things are clear from the table. Firstly, there is an inverse relationship between income and people who have never had access to education. Secondly, there is a gradual increase in the percentages of people currently attending private educational institutions with income level. This means that the higher the income level, the higher the percentages of people using

private educational institutions and vice-versa. Mr. Singh Ram, who is a rich landlord, reports that:

> "I have chosen a private school for my son because of the better environment, study and care. The standard of education is very poor in the Government school. I can spend as much money on his studies as needed, but I do not want him to continue agricultural work, as we (Mr Singh and his wife) are enough in the fields" (Sigh Ram, Dhani Mansukh, 1998).

Many poor households still rely on Government schools, as they cannot afford sending their children to private schools. Some schoolteachers admit that:

> "Rich people prefer to send their children to private schools, but SC and BC households (who are relatively poor as compared to other castes) prefer Government school primarily because they a get stipend" (Teachers, Government High School, Brahana, 1998).

Nirmala (a female respondent) reported that:

> "I am educating my daughters and sons in a Government school primarily because we can not afford private school tuition fee. I can not educate my daughter in college because of poor economic conditions, but I would like my sons to continue their college education" (Nirmala Devi, Kehrawar, 1998).

Village accessibility and access to educational institutions: Access to educational institutions is cross classified by village accessibility (see Chapter-3 for the calculation of village accessibility). The percentages of people who have never attended an educational institution are higher in less accessible villages. The percentage of people who have access to both Government and private educational institutions is higher in more accessible villages and vice-versa (Table-5.17). The calculated chi-squared value for village accessibility and access to an educational institution is 16.51. Although this value is not very high, it is statistically significant at the 0.1 per cent level, which indicates a strong association between village accessibility level and access to educational institutions.

Sex and access to educational institutions: The surveyed area has a predominantly patriarchal society. Traditionally, women's role outside of the household has been limited: they are primarily engaged in household and agricultural activities. But gradually the role of women is changing in the study area. In the following section, an attempt is made to explore the relationship between sex and access to education.

Table-5.17: Village accessibility level and accessibility to educational institutions

Village Accessibility	Number				%			
	Not Accessed	Govern -ment	Private	Total	Not Accessed	Govern -ment	Private	Total
More	311	678	173	1162	26.8	58.4	14.9	100
Less	590	1073	204	1867	31.6	57.5	10.9	100
Total	901	1751	377	3029	29.8	57.8	12.5	100

Source: Author's fieldwork, 1997-98

Out of the total females aged 5 years and above, more than 45 per cent have never attended any educational institution, which is 25 per cent more than for men (Table-5.18). Access to Government and private educational institutions for women are only 47.3 and 7.24 per cent respectively; far less than that for men. The chi-squared value for sex and accessibility to educational institutions is 297. This value is statistically significant at the 0.1 per cent level of significance, with 2 degrees of freedom. Mr Sher Sigh's comment will further substantiate the argument that there is a gender discrimination in access to school education. He has three daughters and three sons. He is sending his sons to school, but not his daughters. When asked why are you not sending your daughters to school he stated that

> "I am poor and cannot educate my daughter" (Sher Sigh, Culiana, 1997).

But when I further asked why are you sending your sons to school and not daughters? He told me that:

> "There is lack of social security in the village, and in such an environment I can not send my daughters to school" (Sher Sigh, Culiana, 1997).

To me it appears that besides a feeling of social insecurity people can spend more resources on boys even if they are in severe poverty, but not on girls. The impact of sex on access to educational institutions will be explored further in the section on regression analysis.

Table-5.18: Sex and accessibility to educational institutions

Sex	Number				%			
	Not Accessible	Govern -ment	Private	Total	Not Accessible	Govern -ment	Private	Total
Male	292	1117	280	1689	17.29	66.13	16.58	100
Female	609	634	97	1340	45.45	47.31	7.24	100
Total	901	1751	377	3029	29.75	57.81	12.45	100

Source: Author's fieldwork, 1997-98

Accessibility to educational institutions and controlling variables: So far, we have tabulated and cross-tabulated, and run chi-square tests between access to education and controlling variables (separately). We noticed that there is some association among them that is not enough to suggest the nature and strength of association and establish a cause-effect relationship, and to infer the effect of multiple explanatory variables on response variables. Therefore, regression models will be used to examine the nature, strength and cause-effect relationship between access to education and controlling variables.

An important aspect of social science research has been to examine the effect of an explanatory variable X on a response variable Y. Ordinary linear regression models have been used most frequently to study cause-effect relationship. But when the response variable is categorical (not on a continuous scale) ordinary linear models cannot be a good-fit (Agresti, 1996). Based on data scale, categorical variables can be classified into two categories: nominal and ordinal. Good-fitting models are needed, which describe the patterns of association and interaction (between categorical variables) and determine the strength and importance of the effects (Agresti, 1996). A wide range of Generalised Linear Models (GLM) has been suggested to deal with the categorical variables. Agresti identified two groups: (1) GLM for binary data (two responses) and GLM for count data (more than two responses). Both these models were used in our analysis.

This section is divided into four parts. The first three parts are based on a maximum likelihood logit model[7], where the response variables are binary, for instance accessibility to services (yes or no), location (village or out of village and service type- Government or private). In the fourth we will deal with the multinomial logistic regression model (mlogit[8]) where the response variable 'type of educational institutions' has four categories. It is necessary to understand the coding of response and control variables before the results can be interpreted and understood (Table-5.19[a] and [b]).

[7] This is also known as logistic regression model. This model is used when dependent variable has only two responses (see chapter 3; Agresti, 1996; Gilbert, 1993 for detailed discussion on logit models).
[8] This model is used when dependent variable has more than 2 responses. Like logit, this model also works on odd ratios (see chapter 3; Agresti, 1996; Gilbert, 1993 for detailed discussion on mlogit)

Table-5.19a: Coding for binary variables

Education Accessibility	Location	Type	Sex	Village Accessibility
0 No	0 Within Village	0 Government	0 Male	1 Less
1 Yes	1 Out of Village	1 Private	1 Female	2 More

Table-5.19b: Coding for multi-category variables

Type and Location	Caste
1 Government within village	1 Upper
2 Private within village	2 BCs
3 Government in Town	3 SCs
4 Private in Town	

Accessibility to educational institutions and controlling variables: People aged 5 years and above can be grouped into two categories: those who never had access and those who have/had access to education. People who had never attended any educational institution are kept in the first category, while the others are put in the second category. There is a statistically significant association between caste and income, but income is a continuous variable, while the caste is discrete (categorical). The z-value in the Table-5.20 shows that all four independent variables (income, caste, village accessibility and sex) have a statistically significant impact on accessibility to education. Out of these four control variables, the z-value for sex is the highest that proves the highest impact of sex on access to education. Regression analysis suggests that sex works against women's and in the favour of men's access to education. In other words, girls/women have/had significantly lower access to education as compared to boys/men.

Table-5.20: Accessibility to educational institution and controlling variables

Variable name	Coefficient	Standard Error	Z-value	P>|z|
Gross per capita income	0.0002	0.0000	3.4490	0.0010
Caste	-0.2427	0.0555	-4.3690	0.0000
Village accessibility	0.2308	0.0880	2.6230	0.0090
Sex	-1.4035	0.0857	-16.3780	0.0000
Constant	2.8527	0.2192	13.0140	0.0000

Source: Author's calculation

After sex, caste has the most statistically significant positive impact on access to education (note that the regression coefficient for caste has a positive impact on access to education). In the upper caste the chances of access to educational institutions are significantly more than for the lower castes (BCs and SCs). The third most important variable, which has statistical

significance, is income. The regression coefficient for income is statistically significant at the 0.1 per cent level (Table-5.20). This reveals that the higher the income, the greater the access to education. Village accessibility also has a statistically significant positive impact, which indicates that the better village the accessibility, the greater is the access to educational institutions.

Location of educational institution in/out of village and controlling variables: The location of educational institutions has been grouped into two categories: within the village of residence and out of the village of residence (this could be towns/cities or neighbouring villages). Of the four control variables, income has the highest statistically significant impact on access to educational institutions located at different points (Table-5.21). Thus the higher the income levels, the greater the chances of access to an educational institution located out of the village of residence (town/cities).

Table-5.21: Location of educational institution and controlling variables

Variable name	Coefficient	Standard Error	Z-value	P>|z|
Gross per capita income	0.0004	0.0000	8.3750	0.0000
Caste	-0.2549	0.0988	-2.5790	0.0100
Village accessibility	-0.1813	0.1238	-1.4640	0.1430
Sex	-1.1552	0.1525	-7.5760	0.0000
Constant	-0.0590	0.2977	-0.1980	0.8430

Source: Author's fieldwork

After income, sex shows the second highest impact on access to educational institutions at different locations, which works against women's access to educational institutions located out of the village. This means that the chances for girls' schooling in town/cities or in the neighbouring villages are significantly lower than for boys. After sex, it is village accessibility that has the third highest impact on this response variable. It is evident from the regression coefficient that people in more accessible villages rely more on Government and private schools available in the village. However, in the less accessible village school availability schools is poor, which may compel people to use schools out of their village. The fourth controlling variable, caste, also shows a low, but statistically significant impact, and it can be concluded that among the lower castes such as BCs and SCs there is reduced chance that they will study in schools located out of the village.

Type of educational institutions used and controlling variables: Educational institutions can be grouped into two categories: Government and private. On the examination of

regression results, it was observed that out of the four controlling variables, income has the most significant impact on the type of educational institution to which people had/have access (Table-5.22). The regression coefficient for income is positive, which suggests the richer people have better access to private educational institutions, while poorer people have to rely more on Government institutions. Caste has the second highest positive impact on access to private educational institutions. In simple terms, it can be said that upper caste people have better access to private educational institutions as compared to lower caste people. In this regression analysis, gender, which is the third most important controlling variable, also significantly determines access to different types of educational institutions. The regression coefficient indicates that the probability of women accessing a private source of education is significantly lower than that for men. In this analysis, village accessibility does not show much of a significant impact on the access to the type of educational services.

Table-5.22: Type of educational institution and controlling variables

Variable name	Coefficient	Standard Error	Z-value	P>|z|
Gross per capita income	0.0002	0.0000	6.1780	0.0000
Caste	-0.7189	0.1193	-6.0280	0.0000
Village accessibility	0.2565	0.1186	2.1620	0.0310
Sex	-0.5219	0.1320	-3.9520	0.0000
Constant	-0.6615	0.2945	-2.2460	0.0250

Source: Author's fieldwork.

Accessibility to multi-categories of educational institutions and controlling variables: Mlogit[9] was run to examine the impact of four controlling variables on access to four different types of educational institutions (see Table-5.19[b]). In this model, Government school located within the village (coded as 1) is considered as a base of comparison. This will be compared with the rest of the other three categories: private within the village, Government out of the village and private out of the village of residence.

Government versus private educational institutions within the village of residence: Regression coefficients for only two controlling variables (caste and village accessibility) are statistically significant for the first set of comparisons (Table-5.23). Caste shows the highest negative impact on change from Government to private educational institutions. In other

[9] Like logit, mlogit also works on odd ratios. One response is kept constant and the chances of success of other responses (categories) are compared with this constant response (base category) (see Aldrich and Nelson, 1984; Greene, 1993; Stata, 1997).

words, the higher castes have a statistically significant higher probability of attending a private school in their village of residence. In the lower castes, children generally attend Government schools, as these are not only less expensive but they also get a stipend. After caste, it is sex which has a statistically significant impact. If the sex is male, the probability of attending a private school is significantly greater than for females.

Government within village versus Government out of the village of residence: In this set of comparisons three controlling variables (income, village accessibility and sex) experience statistically significant regression coefficients. Income has the highest positive impact on access to Government educational facilities out of the village of residence. Village accessibility, however, has a negative impact: higher village accessibility reduces the probability of attending a Government school elsewhere, because more accessible villages have a good range and choice of educational institutions.

Table-5.23: Multi-categories of educational institutions and controlling variables

Variable name	Coefficient	Standard Error	Z-value	P>|Z|
Private within village				
Gross per capita income	0.0001	0.0001	1.3980	0.1620
Caste	-0.8844	0.1731	-5.1090	0.0000
Village accessibility	0.3886	0.1600	2.4300	0.0150
Sex	0.0802	0.1632	0.4910	0.6230
Constant	-1.8274	0.4113	-4.4430	0.0000
Government in town				
Gross per capita income	0.0003	0.0001	5.1300	0.0000
Caste	-0.1270	0.1213	-1.0470	0.2950
Village accessibility	-0.3323	0.1717	-1.9350	0.0530
Sex	-0.7811	0.1911	-4.0870	0.0000
Constant	-0.9767	0.3924	-2.4890	0.0130
Private in town				
Gross per capita income	0.0004	0.0001	8.6330	0.0000
Caste	-0.5782	0.1600	-3.6130	0.0000
Village accessibility	0.0455	0.1622	0.2810	0.7790
Sex	-1.5825	0.2336	-6.7740	0.0000
Constant	-0.1561	0.4134	-0.3780	0.7060
Base of comparison: Government in the village				

Source: Author's fieldwork.

The regression coefficient for sex is statistically significant, which shows that females have a significantly lower probability of attending an educational institution located out of the village as compared to males.

Government within the village versus private out of the village of residence: Three controlling variables (income, sex and caste) have statistically significant regression coefficients. Income has the highest positive impact on this comparison. The regression coefficient for income is 8.68, which shows that the higher the income level, the greater is the probability of access to a private educational institution out of the village. After income, it is sex which has the second highest impact on this set of comparisons. If the sex is female, the probability of not attending private educational institutions located out of the village of residence is greater at the 0.1 per cent level of significance. Caste, which is highly associated with income, also has a statistically significant impact. The higher the caste the greater is the probability of attending a private school out of the village.

5.4 GEOGRAPHICAL DISTANCE AND ACCESS TO EDUCATIONAL INSTITUTIONS

Distance plays a vital role in access to educational institutions. It has been observed that the longer the commuting distance (which also determines time and cost) to school, the lower the access to education. An attempt will be made here to examine access to educational institutions located at different distance intervals. In the following description, educational institutions have been categorised into five distance zones- 0 (within the village of residence), 1 to 10, 11 to 20, 20 to 40 and more than 40 kilometres. The role of sex, caste, income and village accessibility will be examined in terms of these different distance zones.

It is interesting to note that out of the total 2963 people in the survey, 2406 (more than 80 per cent) have/had attended schools located within their own village. With the increase in distance from the source of education, there is a gradual decline in the number of people attending them (Table-5.24[a]). More than 90 per cent of females go to schools available within the village. Approximately 5 per cent attend or have attended educational institutions within a distance of 10 kilometres and only 2.5 per cent beyond 10 kilometres (Table-5.24[b]). The majority of males also use educational services within the village, but this percentage is significantly lower than that for women. More than 10 per cent of males have utilised educational facilities located beyond a distance of 10 kilometres.

Table-5.24(a): Distance from educational institutions

	Distance zone (kilometres)					
	0	10	20	40	Above 40	Total
	Number of people					
Rohtak						
Male	732	95	86	40	17	970
Female	700	27	11	9	2	749
Total	1432	122	97	49	19	1719
Bhiwani						
Male	461	150	27	10	30	678
Female	513	42	7	2	2	566
Total	974	192	34	12	32	1244
Total						
Male	1193	245	113	50	47	1648
Female	1213	69	18	11	4	1315
Total	2406	314	131	61	51	2963

Source: Author's fieldwork.

Table-5.24(b): Distance from educational institutions

	Distance zone (kilometres)					
	0	10	20	40	Above 40	Total
	% of people					
Rohtak						
Male	75.5	9.8	8.9	4.1	1.8	100
Female	93.5	3.6	1.5	1.2	0.3	100
Total	83.3	7.1	5.6	2.9	1.1	100
Bhiwani						
Male	68.0	22.1	4.0	1.5	4.4	100
Female	90.6	7.4	1.2	0.4	0.4	100
Total	78.3	15.4	2.7	1.0	2.6	100
Total						
Male	72.4	14.9	6.9	3.0	2.9	100
Female	92.2	5.3	1.4	0.8	0.3	100
Total	81.2	10.6	4.4	2.1	1.7	100

Source: Author's fieldwork.

In Rohtak, 83.3 per cent of people utilise educational services within the village, which is 5 per cent more than Bhiwani District. Large differences between Bhiwani and Rohtak Districts can be noticed in the percentages of people attending educational institutions within a distance of 10 kilometres. The percentage for Bhiwani District is significantly higher than that for Rohtak District. In the villages of Bhiwani District, an adequate number of schools may not be available, and people have to rely on other villages or a nearby town/city. Further it is

interesting to note that more than 9 per cent of people in Rohtak District have access to educational institutions beyond 10 kilometres, which is 3.3 per cent more than for Bhiwani District. This analysis shows that in Rohtak District more people (both males and females) have access to distant educational institutions as compared to Bhiwani District.

Distance from educational institutions and controlling variables: All four controlling variables under analysis show a statistically significant association with access to educational institutions located in different distance zones (Table-5.25). Among these, income level has the highest degree of association, followed by village accessibility, sex and caste.

Table-5.25: Distance from educational institutions and controlling variables

Controlling variables	Distance zone (kilometres)					
	0	10	20	40	Above 40	Total
	% of people					
Sex						
Male	72.4	14.9	6.9	3.0	2.9	100
Female	92.2	5.3	1.4	0.8	0.3	100
Total	81.2	10.6	4.4	2.1	1.7	100
Caste						
General	77.6	12.0	5.5	2.8	2.1	100
BCs	84.3	10.7	2.8	0.6	1.7	100
SCs	92.3	5.5	1.6	0.4	0.4	100
Total	81.2	10.6	4.4	2.1	1.7	100
Income (Rs.)						
Below 250	91.9	4.7	2.6	0.8	0.0	100
250 to 500	90.0	6.8	1.0	1.6	0.5	100
500 to 1000	81.6	12.2	3.1	2.3	0.8	100
1000 to 2000	72.6	15.1	5.9	3.0	3.4	100
2000 to 4000	61.7	11.7	18.3	1.7	6.7	100
Above 4000	46.4	7.1	32.1	0.0	14.3	100
Total	81.2	10.6	4.4	2.1	1.7	100
Village Accessibility						
Less	78.6	12.3	3.7	3.1	2.4	100
More	85.4	7.9	5.7	0.4	0.62	100
Total	81.2	10.6	4.4	2.1	1.72	100

Source: Author's fieldwork

From Table-5.25 it is clear that there is an inverse relationship between income level and access to education within the village of residence, while this relationship is positive for the educational institutions located beyond a distance of 10 kilometres. A similar type of

relationship is also observed between caste and distance. This suggests that a large number of people in upper castes with higher income level may be studying in the educational institutions in towns or cities. It can be concluded that the upper castes and higher income groups have better access to educational institutions located at a distance.

Women's access to distant educational institutions is significantly lower than that for men. Ms Usha (studying in a Senior Secondary School at Loharu, four kilometres away from the village) reports that:

> "Recently, girls do pay attention to their study and want to go for senior secondary and college education. In this village, only four/five girls have studied up to senior secondary level. If there are 100 girls in the fifth class hardly 10 girls will continue their studies after the fifth class. The major reason for this is the non-availability of a school in the village, because people do not like to send their daughters to schools located at distant places. My father is educated and maybe because of that I could continue my studies even up to senior secondary level. Only one girl from this village has passed a B.A. till today and only four girls are in senior secondary" (Usha Devi, Dhani Mansukh, 1998).

> "People do not prefer to send their daughters to schools/colleges located out of the village. This is a big village and only 5 girls go to senior secondary school, Dighal (located at a distance of 6 kilometres). Hardly 1-2 per cent of the girls go to school or college located out of the village" (Teachers, Government Girls High School, Brahana, 1998).

It is interesting to note that village accessibility level shows a negative association with distance to school, especially in the first two categories. The most probable reason is that in the less accessible villages there is inadequate provision of schools and people have to travel to the neighbouring villages or nearby towns which may fall within a distance of 10 kilometres. Significant variations in access to schools located in different distance zones are observed across Rohtak District and Bhiwani Districts.

Table-5.26: Distance from educational institution and its association with controlling variables

Variable	Chi-Squared Value	Probability of significance	Degree of freedom
Sex	193.9	0.000	4
Caste	73.9	0.000	8
Income	312.4	0.000	20
Village Accessibility	59.4	0.000	4
District Code	84.0	0.000	4

Source: Author's fieldwork

Mlogit was used to regress the utilisation of educational services located in the different distance zones on the same four controlling variables. In this analysis, the base of comparison is educational institutions within the village and this will be compared with four distance zones (within 10, 20, 40 and more than 40 kilometres). In the first comparison, sex and village accessibility are the most significant variables (Table-5.27).

Table-5.27: Controlling variables and access to educational institutions located at different distances

Variable	Regression Coefficient	Standard Error	Z-Value	P > |Z|
10 kilometres				
Sex	-1.3389	0.1441	-9.2910	0.0000
Caste	-0.3666	0.0953	-3.8450	0.0000
Income	0.0002	0.0001	3.8130	0.0000
Village accessibility	-0.6236	0.1355	-4.6030	0.0000
Constant	0.8708	0.3108	2.8010	0.0050
20 kilometres				
Sex	-2.1360	0.2803	-7.6200	0.0000
Caste	-0.3733	0.1692	-2.2060	0.0270
Income	0.0005	0.0001	9.6700	0.0000
Village accessibility	0.1363	0.1904	0.7160	0.4740
Constant	-0.6913	0.4896	-1.4120	0.1580
40 kilometres				
Sex	-1.6071	0.3381	-4.7530	0.0000
Caste	-1.3302	0.3525	-3.7730	0.0000
Income	0.0000	0.0001	0.2330	0.8160
Village accessibility	-2.1250	0.4704	-4.5170	0.0000
Constant	2.6969	0.8096	3.3310	0.0010
Above 40 kilometres				
Sex	-2.8618	0.5510	-5.1940	0.0000
Caste	-0.4139	0.2756	-1.5020	0.1330
Income	0.0006	0.0001	8.4190	0.0000
Village accessibility	-1.7085	0.4225	-4.0440	0.0000
Constant	1.3831	0.8503	1.6270	0.1040
Base of comparison is 0 distance (within the village of residence)				

Source: Author's fieldwork

It must be noted that girls are generally not allowed to attend a school located at a distant place. Further, this can be observed from the regression analysis, which suggests that the probability of women using educational services within village is significantly higher than those located in other villages, towns or cities. However, for men it is the reverse. In the

second level of comparison, income has the most significant regression coefficient. This impact is positive, which indicates that the higher the income level, the greater the chances of using an educational institution located out of the village of residence but within a distance of 20 kilometres.

In the third comparison between educational institutions within villages and at 20-40 kilometres, the regression coefficient for income is statistically insignificant. An inadequate number of observations may explain this unexpected outcome. In this comparison, sex and caste have statistically significant negative regression coefficients. Among the upper caste people the probability of attending educational institutions available in between 20 and 40 kilometres is higher than that for lower caste people.

With access to educational institutions located beyond a distance of 40 kilometres, income has the most statistically significant regression coefficient, followed by village accessibility, and sex. The regression coefficient for sex is negative and statistically significant at 0.01 per cent level of significance, that shows toward the fact that the probability of women attending educational institutions beyond the distance of 40 kilometres is significantly lower than that for men.

5.5 REASONS FOR THE UTILISATION OF GOVERNMENT AND PRIVATE EDUCATIONAL INSTITUTIONS

Data on the reasons for the utilisation of Government and private schools were collected separately for girls and boys. In the case of girls, there are four major reasons behind the utilisation of educational institutions. The utilisation of Government schools can be attributed to four important reasons: economic, separate facilities for girls, availability of a stipend and the non-availability of other schools. No fees or a nominal fee is the most important economic reason for the utilisation of a Government school. It is interesting to note that out of the total 286 school-going girls, as many as 169 go to Government schools for economic reasons (Table-5.28).

Out of the total 68 households where quality of education is considered more important, in 62 (more than 90 per cent), girls are enrolled in private schools. Another important reason for the utilisation of a private school is their vicinity to the home. Private schools (especially in the villages) are not located far from the village and available at more central locations (in terms

of distance). In all the eight-surveyed villages Government schools were located on the village's periphery. Therefore, many parents may feel uncomfortable in sending children to schools located at a distant place even within the village (such as Government schools), and prefer to send them to private schools (if they can afford the higher fees) located nearer to their home.

The association between these reasons and the use of Government or private schools is significant. The chi-squared value is 240.62, which is significant at the 1 per cent level of significance with 6 degrees of freedom, suggesting that there are clear reasons for utilisation of specific educational institutions.

In the case of boys, four important factors were reported in the survey. Economic and non-availability of other schools in the village are the two major reasons, which force many people to use only Government schools. Out of the total of 362 households (where a male member of household is currently attending an educational institution), 184 households are sending their boys to Government schools for economic reasons. In other words it can be concluded that more than 50 per cent of the households cannot afford private schools. Among the surveyed households, 124 send their boys to private schools and the reason reported is the better quality of education. Thus two main reasons (quality of education and paying capacity) govern the utilisation of Government and private educational institutions.

Table-5.28: Reasons and utilisation of educational institutions for girls

Reason for using educational institution	Number of Households			% of households		
	Govern-ment	Private	Total	Govern-ment	Private	Total
Quality of education	6	62	68	8.8	91.2	100
Economic	169	1	170	99.4	0.6	100
Separate for girls	8	0	8	100.0	0.0	100
Close to home	1	12	13	7.7	92.3	100
No other school available	14	1	15	93.3	6.7	100
Get Stipend	8	0	8	100.0	0.0	100
Others	1	3	4	25.0	75.0	100
Total	207	79	286	72.4	27.6	100

Source: Author's fieldwork

Table-5.29: Reasons and utilisation of educational institutions for boys

Reason for using educational institution	Number of Households			% of households		
	Govern-ment	Private	Total	Govern-ment	Private	Total
Quality of education	6	124	130	4.6	95.4	100
Economic	184	0	184	100.0	0.0	100
Close to home	4	10	14	28.6	71.4	100
No other school available	15	0	15	100.0	0.0	100
Others	8	11	19	42.1	57.9	100
Total	217	145	362	59.9	40.1	100

Source: Author's fieldwork.

The chi-squared value for reasons and utilisation of educational institutions is 306.9. This value is statistically significant at lower than the 0.01 per cent level of significance with 4 degrees of freedom. It can be concluded that the reasons for the utilisation of Government and private education differ significantly.

5.6 EDUCATION LEVEL

Education level attained generally represents the duration of time one spends attending educational institutions, but indirectly it can also represent the duration of access to education. This can be generalised to a limited time period such as for 20 years or so. In this study, school education (about ten years of schooling) is more important, as more than 80 per cent of people do not have access to post-high school education. High school education is only ten years of continuous schooling. One of the important objectives here will be to investigate: what is the duration of people's access to education and does this duration vary across different sexes, castes and income groups?

Data on education level of each and every individual was collected for all 507 households. Education level has been divided into five categories: (1) illiterate, (2) primary, (3) middle, (4) high and (5) post-high schooling. These represent 0, 5, 8, 10 and more than 10 years of access to educational institutions respectively. The following discussion considers, first, education level for all age groups, and then education level separately for both the younger and the older generations. The impacts of caste, income, gender and village accessibility on the education level will also be examined.

Tables on education level for male and female have been generated separately (Table-5.30[b]). In all the villages, more than 20 of per cent of people were illiterate; 14.8 per cent of men and 44.3 per cent of women were illiterate.

In all the villages, except in Chuliana and Brahana, just more than 10 per cent of people have some experience of post-school education. For women the percentage is just less than 7 per cent. In Patodi and Chuliana, which are less accessible villages, just less than 3 of percent women have access to more than 10 years of schooling. It is interesting to note that there is a sharp decline in the percentages from primary to middle school education for both sexes. It is 16 per cent for men and about 20 per cent for women. It can be concluded that the highest dropout rate is just after five years of schooling for both sexes.

The contrast between middle and high school is not very prominent, and it leads us towards the conclusion that if somebody has already accessed eight years of schooling, the probability for him/her continuing to High School will be relatively higher. The second highest decline can be observed from high school to post high schooling, at about 7 per cent for both sexes (Table-5.30[b]).

Table-5.30(a): Education level (number of people)

Village/ District	Education level					
	Illiterate	Primary	Middle	High	Post-High	Total
Kehrawar	128	190	88	101	61	568
Chuliana	147	150	62	59	26	444
Diwana	28	34	21	25	13	121
Brahana	152	191	104	98	41	586
Rohtak	**455**	**565**	**275**	**283**	**141**	**1719**
Bhera	92	92	41	40	29	294
Patodi	91	84	32	25	17	249
Bapora	148	191	85	78	62	564
Dhani Mansukh	41	38	21	24	13	137
Bhiwani	**372**	**405**	**179**	**167**	**121**	**1244**
Total	**827**	**970**	**454**	**450**	**262**	**2963**

Source: Author's fieldwork

Table-5.30(b): Education Levels (% of people)

Village/ District	Education level					
	Illiterate	Primary	Middle	High	Post-High	Total
Male						
Kehrawar	12.6	34.7	17.4	21.1	14.2	100
Chuliana	21.3	36.5	15.7	18.1	8.4	100
Diwana	8.8	29.4	23.5	22.1	16.2	100
Brahana	14.6	35.4	18.8	22.9	8.3	100
Rohtak	**15.3**	**35.1**	**17.8**	**21.0**	**10.8**	**100**
Bhera	12.4	34.2	17.4	21.1	14.9	100
Patodi	19.3	38.5	16.3	15.6	10.4	100
Bapora	12.0	32.5	21.1	18.5	15.9	100
Dhani Mansukh	17.6	29.7	17.6	21.6	13.5	100
Bhiwani	**14.2**	**33.8**	**18.9**	**18.9**	**14.3**	**100**
Total	**14.8**	**34.5**	**18.3**	**20.1**	**12.3**	**100**
Female						
Kehrawar	35.1	31.9	13.1	13.5	6.4	100
Chuliana	48.2	30.3	11.8	7.2	2.6	100
Diwana	41.5	26.4	9.4	18.9	3.8	100
Brahana	41.2	28.8	16.4	8.4	5.2	100
Rohtak	**41.0**	**30.0**	**13.6**	**10.5**	**4.8**	**100**
Bhera	54.1	27.8	9.8	4.5	3.8	100
Patodi	57.0	28.1	8.8	3.5	2.6	100
Bapora	43.4	35.5	7.8	8.2	5.1	100
Dhani Mansukh	44.4	25.4	12.7	12.7	4.8	100
Bhiwani	**48.8**	**31.1**	**9.0**	**6.9**	**4.2**	**100**
Total	**44.3**	**30.5**	**11.6**	**9.0**	**4.6**	**100**
Total (Male+Female)						
Kehrawar	22.5	33.5	15.5	17.8	10.7	100
Chuliana	33.1	33.8	14.0	13.3	5.9	100
Diwana	23.1	28.1	17.4	20.7	10.7	100
Brahana	25.9	32.6	17.7	16.7	7.0	100
Rohtak	**26.5**	**32.9**	**16.0**	**16.5**	**8.2**	**100**
Bhera	31.3	31.3	13.9	13.6	9.9	100
Patodi	36.5	33.7	12.9	10.0	6.8	100
Bapora	26.2	33.9	15.1	13.8	11.0	100
Dhani Mansukh	29.9	27.7	15.3	17.5	9.5	100
Bhiwani	**29.9**	**32.6**	**14.4**	**13.4**	**9.7**	**100**
Total	**27.9**	**32.7**	**15.3**	**15.2**	**8.8**	**100**

Source: Author's fieldwork.

Table-5.31: Education Levels in the younger generation (% of people)

Village/ District	Education level					
	Illiterate	Primary	Middle	High	Post-High	Total
Male						
Kehrawar	0.0	58.3	22.6	13.0	6.1	100
Chuliana	4.2	64.6	15.6	11.5	4.2	100
Diwana	5.6	66.7	5.6	16.7	5.6	100
Brahana	3.5	62.9	17.2	12.1	4.3	100
Rohtak	2.6	62.0	18.0	12.5	4.9	100
Bhera	3.2	51.6	24.2	14.5	6.5	100
Patodi	4.2	64.6	14.6	8.3	8.3	100
Bapora	3.7	53.3	25.2	12.2	5.6	100
Dhani Mansukh	3.5	48.3	24.1	13.8	10.3	100
Bhiwani	3.7	54.5	22.8	12.2	6.9	100
Total	3.1	58.9	20.0	12.4	5.0	100
Female						
Kehrawar	0.0	58.0	15.9	18.2	8.0	100
Chuliana	14.3	58.3	22.6	3.6	1.2	100
Diwana	11.1	55.6	5.6	27.8	0.0	100
Brahana	7.6	57.6	22.8	8.7	3.3	100
Rohtak	7.5	57.8	19.5	11.4	3.9	100
Bhera	22.2	55.6	14.8	7.4	0.0	100
Patodi	29.7	51.4	13.5	2.7	2.7	100
Bapora	14.3	61.2	10.2	9.2	5.1	100
Dhani Mansukh	3.9	42.3	23.1	23.1	7.7	100
Bhiwani	17.7	55.8	13.5	9.3	3.7	100
Total	11.9	56.9	16.9	10.5	3.8	100
Total (Male+Female)						
Kehrawar	0.0	58.1	19.7	15.3	6.9	100
Chuliana	8.9	61.7	18.9	7.8	2.8	100
Diwana	8.3	61.1	5.6	22.2	2.8	100
Brahana	5.3	60.6	19.7	10.6	3.9	100
Rohtak	4.8	60.1	18.7	12.0	4.5	100
Bhera	12.1	53.5	19.8	11.2	3.5	100
Patodi	15.3	58.8	14.1	5.9	5.9	100
Bapora	8.8	57.1	18.1	10.7	5.4	100
Dhani Mansukh	3.6	45.5	23.6	18.2	9.1	100
Bhiwani	10.2	55.1	18.4	10.9	5.4	100
Total	7.1	58.0	18.6	11.5	4.9	100

Source: Author's fieldwork

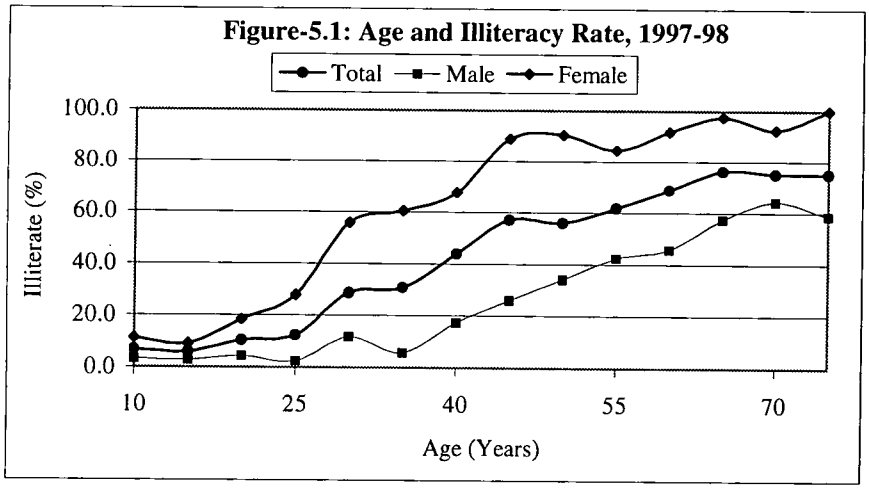
Education Level in the younger generation: In the younger generation less than 4 per cent of men and 12 per cent of women are illiterate; these proportions are relatively low as compared to all age groups. In Bhiwani, more than 17 per cent of women are illiterate; 10 per cent more than the Rohtak District, which shows women's better access to education in Rohtak District as compared to Bhiwani District.

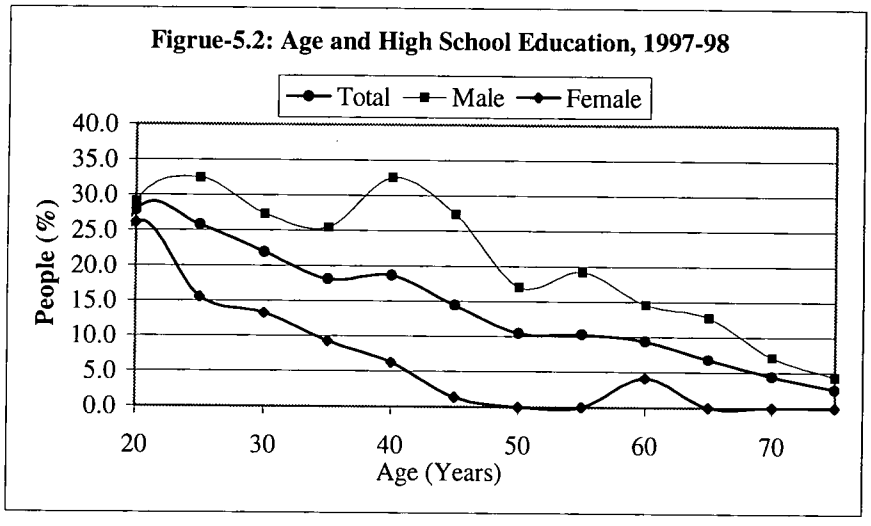
Another interesting point to note is that more than 50 per cent of men and women have access to only primary (five years of schooling) education. The percentages of people attending middle, high and post-high schools are less than 19, 12 and 5 respectively (Table-5.31). The largest proportion of the population has access only to primary education. There are sharp declines in the percentages from primary to middle school education, 38 per cent for men and 40 per cent for women.

Education level in the older generation: In the 'older generation' there are not many differences in the percentages of people attending primary, middle, high and post high school as compared to the younger generation. About 30 per cent of people are illiterate in this generation (Table-5.32), while the percentages of illiterate people in the younger generation are very low. In the older generation, 10.5 per cent of men are illiterate, while the figure for women is more than 50 per cent.

The majority of women in the older generation did not have access to any education. The differences in the percentages of men and women who have access to five years of schooling are small. Another interesting thing to notice is that the percentages of men who have access to high and post-high schooling are 29.3 and 20.7 respectively; these percentages are 18.7 and 14.9 higher than for women.

It can be concluded that the percentage of illiterate women is significantly lower in the younger generation, because women's access to primary education has improved (Figure-5.1). Availability of schools in villages and the increasing importance of girls' education might have resulted in higher literacy rates in the younger generation. Up to the age of 15 years, the differences between male and female literacy rates are lower, but after the age of 25 years, these differences are quite wide.





Very high proportions of men and women have access to primary schools in the younger generation. Less than 20 per cent of the people aged 40 years or more have had high school education. In the case of females, it was less than 5 per cent. After the age of 20 years, there is a sharp decline in the percentages of people (particularly of women) with high school education. It can be concluded that women's education level has increased over the last two decades.

In the study area only a small proportion of people went for post-high schooling. Out of the total, only 8.8 per cent of the people were with post-high school education (it was 12.3 per cent for males and 4.5 per cent for females). More than 20 per cent of the people in age group 25 to 30 years had post-high schooling. There was a sharp decline in the percentages after the age of 30 years. Only 5 to 10 per cent of the people had post-high schooling in the age group

30 to 50 years; and after the age of 50 years less than 5 per cent of the people had post-high schooling (Figure-5.3).

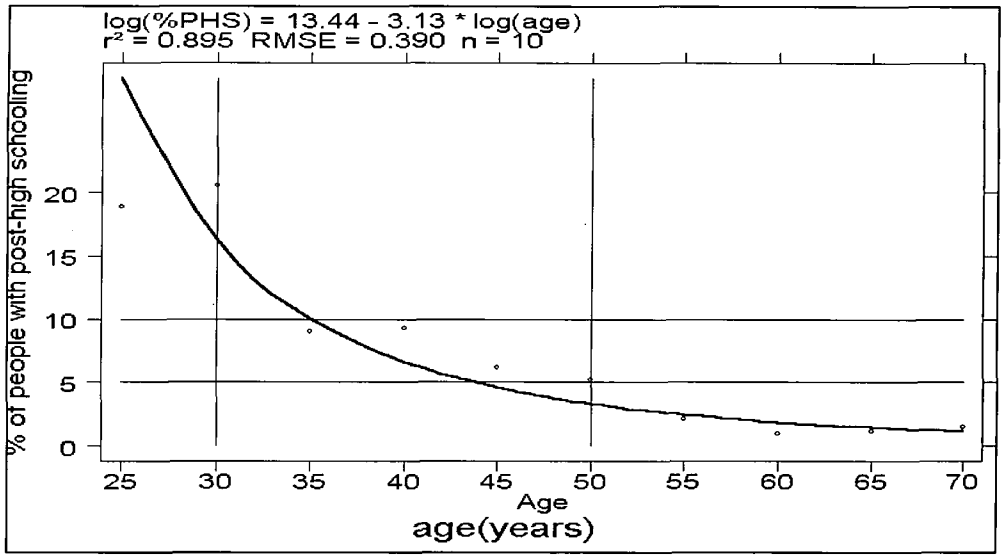
Table-5.32: Education Levels in the older generation (% people)

Village/ District	Education level					
	Illiterate	Primary	Middle	High	Post-High	Total
Male						
Kehrawar	5.5	24.7	12.3	32.2	25.3	100
Chuliana	17.8	20.6	18.7	28.0	15.0	100
Diwana	7.5	15.0	27.5	25.0	25.0	100
Brahana	8.2	22.6	22.0	34.0	13.2	100
Rohtak	9.5	22.1	18.6	31.2	18.6	100
Bhera	12.2	20.3	13.5	28.4	25.7	100
Patodi	15.3	22.0	22.0	25.4	15.3	100
Bapora	10.3	18.6	20.5	24.4	26.3	100
Dhani Mansukh	12.9	12.9	16.1	35.5	22.6	100
Bhiwani	11.9	19.1	18.8	26.6	23.8	100
Total	10.5	20.9	18.7	29.3	20.7	100
Female						
Kehrawar	44.0	21.6	13.6	13.6	7.2	100
Chuliana	62.3	13.0	5.2	14.3	5.2	100
Diwana	48.3	13.8	13.8	17.2	6.9	100
Brahana	44.9	15.9	18.7	11.2	9.4	100
Rohtak	48.8	17.2	13.3	13.3	7.4	100
Bhera	69.5	10.2	8.5	3.4	8.5	100
Patodi	60.7	21.4	8.9	5.4	3.6	100
Bapora	52.9	22.7	7.6	10.1	6.7	100
Dhani Mansukh	64.3	17.9	7.1	7.1	3.6	100
Bhiwani	59.5	19.1	8.0	7.3	6.1	100
Total	53.5	18.0	11.0	10.7	6.8	100
Total (Male+Female)						
Kehrawar	23.3	23.3	12.9	23.6	17.0	100
Chuliana	36.4	17.4	13.0	22.3	10.9	100
Diwana	24.6	14.5	21.7	21.7	17.4	100
Brahana	22.9	19.9	20.7	24.8	11.7	100
Rohtak	26.3	20.0	16.3	23.5	13.8	100
Bhera	37.6	15.8	11.3	17.3	18.1	100
Patodi	37.4	21.7	15.7	15.7	9.6	100
Bapora	28.7	20.4	14.9	18.2	17.8	100
Dhani Mansukh	37.3	15.3	11.9	22.0	13.6	100
Bhiwani	33.3	19.1	13.9	17.9	15.8	100
Total	29.3	19.6	15.3	21.1	14.7	100

Source: Author's fieldwork

Again male-female differences can be noticed in post-high schooling. Just more than 5 per cent of the women in the age group 20 to 25 years had post-high schooling; after the age of 25 years there is sharp decline in the percentages for both sexes (Figure-5.4); none of the women older than 40 years had post-high schooling. It can be concluded that education among women is a recent phenomenon, but the education level of women is increasing slowly.

Figure-5.3: Age and post-high schooling, 1997-98

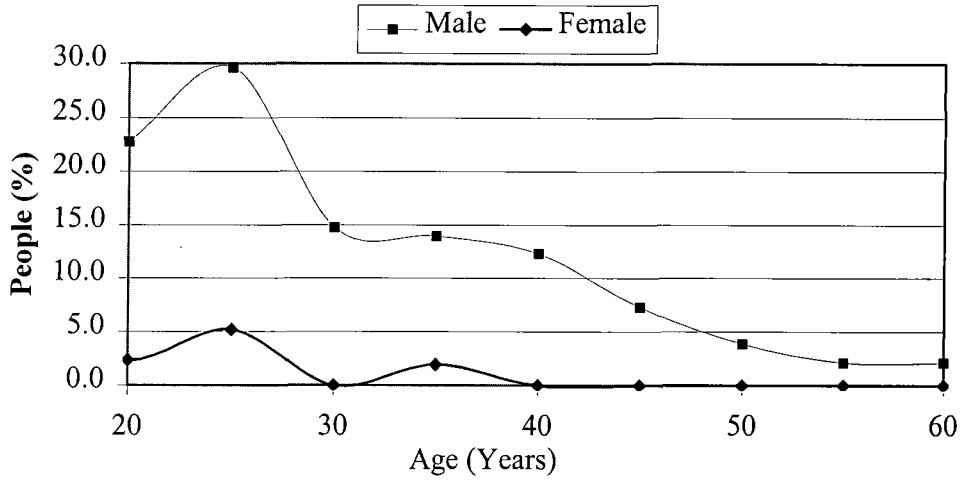


Education levels and controlling variables: Like access to educational institutions, the same four controlling variables play a vital role in determining education levels. In this section, an attempt will be made to examine the impact of caste, income level, sex and village accessibility on educational levels. In the first part a descriptive association will be examined, followed by a multinomial regression analysis to examine the impact of controlling variables on educational levels.

Sex and Education level: It appears that sex has an important association with the levels of education. Out of the total, 44.33 per cent of women were illiterate while the percentage for men was only 15.26 (Table-5.33). In Bhiwani District, more than 48 per cent of women were illiterate, about 8 per cent higher than that for Rohtak District. The percentages of women,

who had access to primary, middle, high and post-high schooling were lower than for men. These differences were more apparent in the category of high and post-high schooling.

Figrue-5.4: Age and Post-High School Education, 1997-98



The chi-squared value for sex and education level is more than 350, which is significant at the 0.01 per cent level with 4 degrees of freedom (Table-5.34), indicating towards a statistically significant association between education level and sex of an individual. In other words, it can be said that levels of education significantly differ across gender. From Table-5.33 it is clear that duration of women's access to education is lower than that of men.

Table-5.33: Sex and education level (% of people)

Sex of Individual	Education level					
	Illiterate	Primary	Middle	High	Post-High	Total
Total						
Male	14.81	34.53	18.26	20.15	12.26	100
Female	44.33	30.49	11.63	8.97	4.56	100
Total	27.91	32.74	15.32	15.19	8.84	100
Rohtak						
Male	15.26	35.05	17.84	21.03	10.82	100
Female	40.99	30.04	13.62	10.55	4.81	100
Total	26.47	32.87	16	16.46	8.2	100
Bhiwani						
Male	14.16	33.78	18.88	18.88	14.31	100
Female	48.76	31.1	9.01	6.89	4.24	100
Total	29.9	32.56	14.39	13.42	9.73	100

Source: Author's fieldwork

Table-5.34: Education level and controlling variables

Variable	Chi-square	Degree of freedom	Probability of Significance
Sex	362.18	4	0.000
Caste	129.48	8	0.000
Income level	290.01	20	0.000
District Name	10.57	4	0.032
Village Accessibility	17.6	4	0.001

Source: Author's fieldwork.

Caste and education level: Table 5.35 shows the association between caste and levels of educational attainment. The highest percentages of illiterates are observed in the scheduled castes, which are the lowest in the caste hierarchy. In Bhiwani District, there are a larger number of illiterates among all the castes. In other than the first two categories of illiterate and primary education, the percentages are higher for the upper castes and lower for the lower castes. About 80 per cent of people in the scheduled castes are either illiterate or have access only to primary education (five years of schooling). However, among the upper castes more than 50 per cent of people have attended educational institutions for more than eight years. The chi-squared value for castes and education levels is 129.48 (Table-5.34). At 8 degrees of freedom this value is statistically significant at the 0.01 per cent level of significance, which proves an association between castes and education level.

Income and education level: Duration of access to education can be assumed to be an important function of income. A longer duration of education means more fees and other supporting expenses (such as transport costs, books, stationery and boarding expenses). It also involves a longer duration of absence from the household and agriculture work, which may cause economic losses to household. Therefore, income play a vital role in determining duration of access to education. The chi-squared value reveals the second highest degree of association between income level and level of educational attainment (Table-5.34). This association is statistically significant at the 0.01 level of significance with 20 degrees of freedom.

Table-5.35: Caste and education level (% of people)

Caste	Education level					
	Illiterate	Primary	Middle	High	Post-High	Total
Total						
Upper Caste	24.9	30.12	16.73	17.81	10.43	100
BCs	26.17	34.99	16.8	14.88	7.16	100
SCs	39.79	40.67	9.33	5.99	4.23	100
Total	27.91	32.74	15.32	15.19	8.84	100
Rohtak						
Upper Caste	23.91	28.51	17.79	19.66	10.13	100
BCs	23.5	38.25	15.85	17.49	4.92	100
SCs	36.29	44.32	10.25	5.54	3.6	100
Total	26.47	32.87	16	16.46	8.2	100
Bhiwani						
Upper Caste	26.25	32.32	15.29	15.29	10.85	100
BCs	28.89	31.67	17.78	12.22	9.44	100
SCs	45.89	34.3	7.73	6.76	5.31	100
Total	29.9	32.56	14.39	13.42	9.73	100

Source: Author's fieldwork.

Table-5.36 shows an inverse relationship between the percentages of illiterates and people with primary education and income levels. Poor economic conditions might have constrained people's access to schooling, while the situation is the reverse for rich people. For middle school, there is not much of a clear trend, while in the last two categories of high and post-high schooling this relationship is positive. Thus at higher levels of income there is enhanced access to high and post-high school education. One of the most interesting things to notice is that more than 42 per cent of people with an income of more than Rs. 4000 had access to post-school education. In other than this category the percentage of people who have access to post-high school education is less than 22. In Bhiwani more than 50 per cent of people in this income level had access to post-school education, which clearly establishes that there is a strong association between education and income levels.

Table-5.36: Income and education level (% of people)

Gross per capita income (Rs)	Education level					
	Illiterate	Primary	Middle	High	Post-High	Total
Below 250	39.43	41.51	10.97	5.22	2.87	100
250 to 500	33.73	35.96	15.75	11.29	3.27	100
500 to 1000	25.95	34.63	16.47	15.67	7.29	100
1000 to 2000	21.23	26.11	16.79	20.80	15.06	100
2000 to 4000	20.56	20.56	11.11	26.11	21.67	100
Above 4000	14.29	10.71	14.29	17.86	42.86	100
Total	27.91	32.74	15.32	15.19	8.84	100
Rohtak						
Below 250	36.78	45.21	9.96	4.98	3.07	100
250 to 500	29.33	37.87	16.53	12.8	3.47	100
500 to 1000	25.91	33.02	17.38	17.54	6.16	100
1000 to 2000	19.42	23.19	18.26	23.48	15.65	100
2000 to 4000	18.18	15.91	11.36	30.68	23.86	100
Above 4000	11.76	11.76	23.53	17.65	35.29	100
Total	26.47	32.87	16.00	16.46	8.2	100
Bhiwani						
Below 250	45.08	33.61	13.11	5.74	2.46	100
250 to 500	39.26	33.56	14.77	9.40	3.02	100
500 to 1000	26.02	37.40	14.91	12.47	9.21	100
1000 to 2000	23.01	28.98	15.34	18.18	14.49	100
2000 to 4000	22.83	25.00	10.87	21.74	19.57	100
Above 4000	18.18	9.09	0.00	18.18	54.55	100
Total	29.9	32.56	14.39	13.42	9.73	100

Source: Author's fieldwork

Village accessibility and education level: Village accessibility level has a strong association with people's education level (Table-5.37). The chi-squared value for village accessibility and education level is 17.6, which is statistically significant at the 1 per cent level. There is an inverse relationship between village accessibility and the percentages of illiterates, while village accessibility shows a positive association with the percentages of people with high and post-high schooling. Besides village accessibility, the education levels of people also vary significantly across the villages of Bhiwani and Rohtak Districts.

Table-5.37: Village accessibility and education level (% of people)

Accessibility level	Education level					
	Illiterate	Primary	Middle	High	Post-High	Total
Less	30.09	32.17	15.35	14.8	7.59	100
More	24.38	33.66	15.28	15.81	10.87	100
Total	27.91	32.74	15.32	15.19	8.84	100

Source: Author's fieldwork.

From the description given above it is clear that sex has the most important association with education levels. Females have a shorter duration of access to education as compared to males, and income shows the second highest degree of association with the duration of access to education. A larger proportion of people with lower levels of income is either illiterate or has access only to primary education. After income, caste and village accessibility show a statistically significant association with education levels.

Regression results: There are five categories of education level. The first category is illiteracy, which will be the base of comparison with primary, middle, high and post-high school education. In the first comparison between illiteracy and primary education only two variables namely- sex and village accessibility are statistically significant. Sex has the highest impact on differences between illiterate and those who have access to primary school education. If the sex is female then the probability of being illiterate is significantly higher than of having access to primary education. But if the sex is male then the probability of access to primary education is higher than that being of an illiterate.

Village accessibility is the second most important variable, showing an impact on differences between illiterates and primary level of education. In the more accessible villages the percentage of people with primary education level is significantly higher than for illiterates. In other words, it can be concluded that there is greater number of illiterates in the less accessible as compared to the more accessible villages. Caste is the third important variable, but its regression coefficient is statistically significant only at the 5 per cent level (Table-5.38).

The next comparison is between no schooling (i.e. illiterate) and access to eight years of schooling. In this comparison, three controlling variables, namely sex, caste and village accessibility, have significant regression coefficients. The regression coefficient for caste is statistically significant at the 1 per cent level, while in the previous comparison its regression

coefficient was not significant even at the 5 per cent level. Village accessibility, which was the second most important variable in the previous comparison, is placed third. The regression coefficient for sex is statistically most significant, showing a positive bias for eight years of schooling for men and a negative bias for women. In other words it can be said that the chances of women attending school for eight years are significantly lower than no schooling, while the situation for men is the reverse. Regression analysis further shows a statistically significant impact of caste and village accessibility in this comparison.

Table-5.38: Education level and controlling variables

Variable name	Coefficient	Standard Error	Z-value	P>|Z|
Primary School				
Sex	-1.2404	0.1009	-12.2940	0.0000
Caste	-0.1196	0.0640	-1.8690	0.0620
Gross per capita income	0.0000	0.0001	-0.5200	0.6030
Village Accessibility	0.2927	0.1021	2.8680	0.0040
Constant	1.9284	0.2609	7.3920	0.0000
Middle School				
Sex	-1.6026	0.1269	-12.6310	0.0000
Caste	-0.4754	0.0872	-5.4520	0.0000
Gross per capita income	0.0001	0.0001	1.3210	0.1870
Village Accessibility	0.2199	0.1265	1.7390	0.0820
Constant	2.1545	0.3146	6.8470	0.0000
High School				
Sex	-1.9981	0.1348	-14.8180	0.0000
Caste	-0.5918	0.0960	-6.1640	0.0000
Gross per capita income	0.0003	0.0001	4.9170	0.0000
Village Accessibility	0.2747	0.1291	2.1270	0.0330
Constant	2.4473	0.3189	7.6740	0.0000
Post-High School				
Sex	-2.2439	0.1735	-12.9310	0.0000
Caste	-0.4147	0.1171	-3.5430	0.0000
Gross per capita income	0.0005	0.0001	7.7190	0.0000
Village Accessibility	0.5457	0.1542	3.5390	0.0000
Constant	1.2721	0.3819	3.3310	0.0010
Base of comparison is illiterate				

Source: Author's fieldwork

In the third comparison between no schooling and ten years of schooling (high), all the four independent variables show statistically significant regression coefficients. After sex and caste it is income which is the third most significant controlling variable. Again sex and caste show

similar trends, as in the second comparison. Income has a positive impact on access to high school education. Thus the probability of completing ten years of school education is higher than being illiterate among the higher income groups, while the relationship is the reverse for the lower income groups.

The results of the comparison between post-high schooling and illiteracy are very similar to the third comparison. The only difference is that income is the second most important variable in this comparison, while caste is in third place. Sex has remained the most significant variable in this comparison as well. From the analysis given above it can be concluded that the probability of a long duration of access to education is lower for women as compared to that for men. Among the upper castes the probability of being illiterate is lower than having access to primary, middle, high and post-high schooling. It is interesting to note that income does not show any significant impact on the differences between being illiterate and having five and eight years of schooling. But it does have a statistically significant impact on the differences between illiteracy and high and post-high schooling.

5.7 REASONS FOR DROP-OUT FROM EDUCATION

As well as asking respondents about the educational level of members of their household, they were also asked the question: what were the reasons for them dropping out of education? This question is valid only for those who have attended at least one educational institution. Twelve reasons were reported for dropping out (Table-5.39). The first reason is geographical inaccessibility, which plays an important role in restricting women's access to education. More than 16 per cent of women could not continue their education because of geographical inaccessibility[10] to school, while the figure for men is only 1.3 per cent:

> "People hesitate to send their daughters out of village because of social insecurity. Therefore, a girls' school must be available in the village. There is one middle school in the village, but not separate for girls. People do not like to send their daughters to co-educational schools even if available within the village" (Sarjit, Patodi, 1997).

> "I went to a Government high school in Chuliana (in a nearby village at a distance of 2 kilometres). I used to walk everyday along with other friends. I wanted to continue my studies, but I could not, as senior secondary school is located at a distant place (about 5 kilometres from my village) and no transport facility is available in the village so that I

[10] In the case of women, geographical inaccessibility also represents the non-availability of a school within the village, and their poor mobility. As reported earlier, many parents do not like to send their daughter to schools located out of the village. Therefore, this is one of the important reasons to drop out of education.

could commute. Moreover, my parents would not like me to attend a school or college located at a distance" (Reena, Diwana, 1997).

Work in the household (such as cooking, cleaning, and fetching drinking water and fodder for cattle) is another important reason that compels girls to drop out of education (Plate-5.1 and 5.2). Traditionally, women's roles have been restricted to household work. In the study area, the majority of households have a joint family[11]. Some of the girls are not able to go to school at all due to work pressure in the household. When I asked one lady why did she not go to school she replied that

> "My mother was ill and I was the second eldest in the family. My other brother and sisters were quite young and I had to do all outside household work. We are three sisters. Only the youngest sister is educated. My elder sister used to take care of household work and I did all the outside household work such as bringing fodder for the cattle, water etc." (Shani, Dhani Mansukh, 1998 [Plate-5.1 and 5.2])

Almost all the girls in villages have to do lots of household work along with their studies. The comments from schoolteachers may help in understanding work pressure on female students:

> "Mothers want their daughters to contribute in household work. Most of the men spend their whole time on 'playing cards' (Plate-3.2) and most of the work burden is on the wife and if she can not manage all this work herself, then some work is shared by her daughter(s). Girls studying in the fifth class generally do almost all the work in the household extending from cleaning to cooking. Girls in second class even contribute in household work. That is why girls are not in a position to continue for higher studies. Even they do not get enough time to study" (Teachers, Government Girls School, Brahana, 1998).

> "This is a harvesting season and the cost of labour will be Rs. 90 per day and it is difficult to hire labour for harvesting. If her parents get some help from her it is not a bad thing" (Teachers, Government Girls School, Kehrawar, 1998).

If there are too few women to work in the household then young girls who are still going to school will start contributing to household work and ultimately drop out of education because of the pressing need for their domestic labour. About 17 per cent of women dropped out from education for this reason. Another important reason for women to drop out from education is the early age of marriage:

[11] Haryana has predominantly agriculturally-based economy. A large number of agricultural households in rural areas are joint families, where parents, children and their spouses live together in the same household.

Plate-5.1: A woman and a girl fetching drinking water, Chuliana

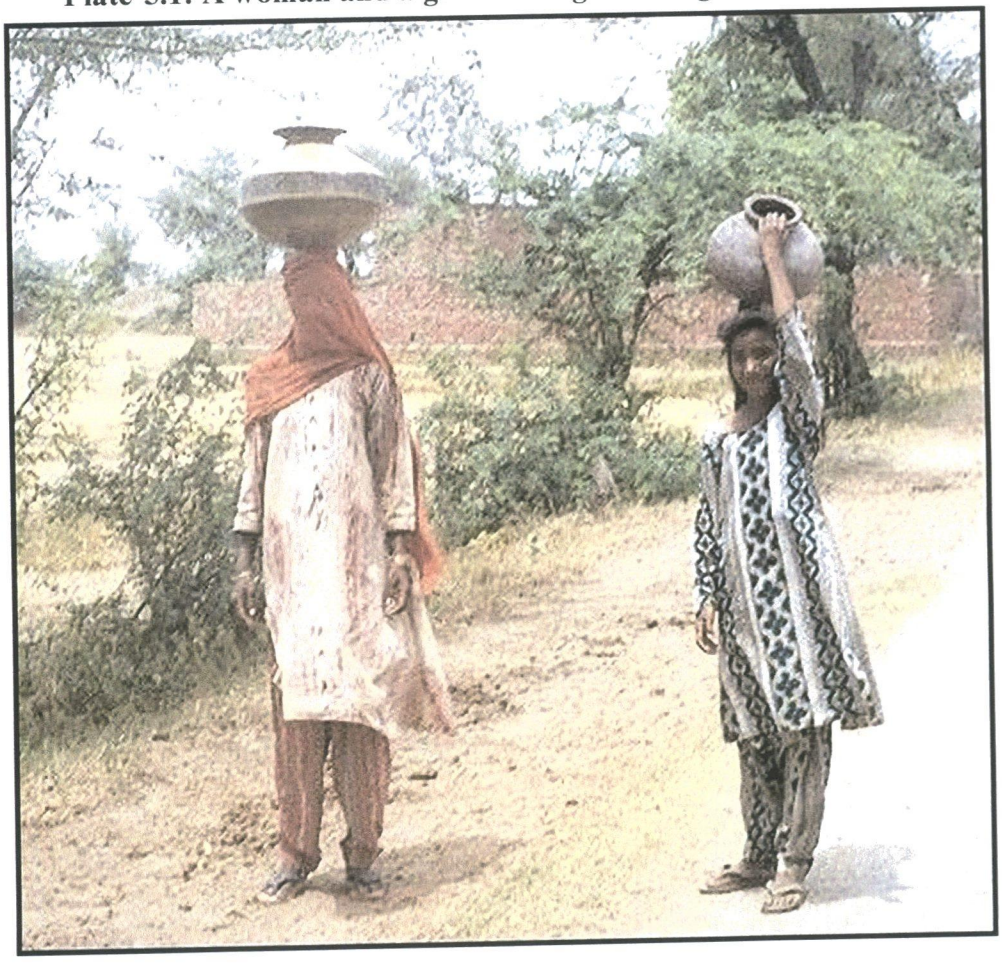
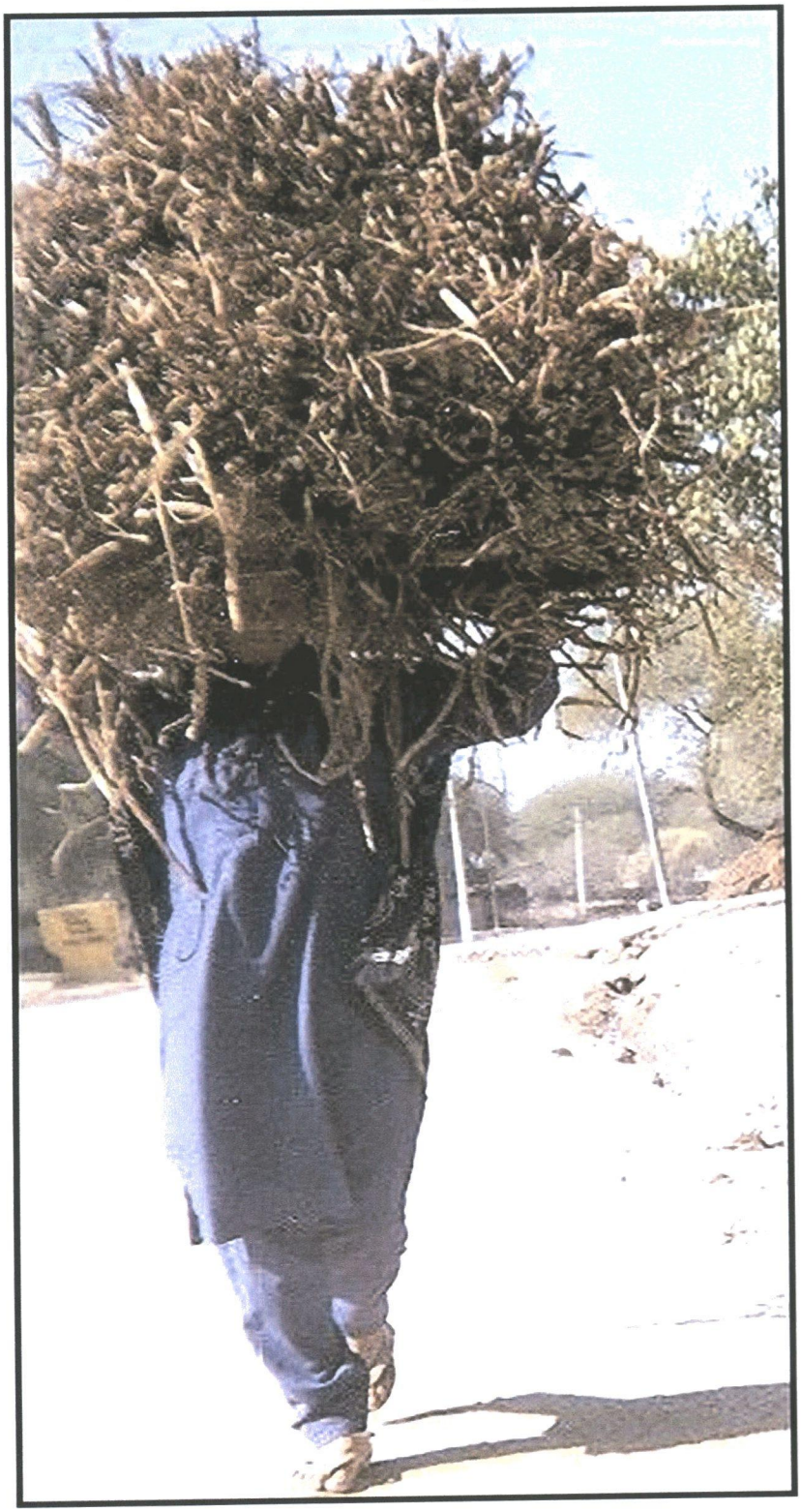


Plate-5.2: A woman bringing fodder, Bapora



> "Marriage and failure in the boards' exam in the eighth and tenth classes are the two important reasons of girls' drop out of education. If they fail twice the probability of dropout is more than 95 per cent and their parents would prefer to arrange their marriages" (Teachers, Government Girls School, Kehrawar, 1998).
>
> "Generally, people educate their daughters up to matriculation. After matriculation they prefer to arrange the marriage of their daughters" (Ramdhari Singh, Bapora, 1997).

Even some educated and employed parents arranged marriage for their daughters at an early age. One of the schoolteachers reported that:

> "Sarita was married at the age 17 years even though her mother is educated and is a schoolteacher. When one of her mistresses asked her why she had not completed her senior secondary education and got married...she replied that her parents arranged her marriage along with the marriage of her elder sister. Not only this, her marriage was arranged during the exam time. Her parents could have delayed her marriage until the final exams were over so that she could have appeared in the exam, but they even did not bother to do that" (Teachers, Government Girls School, Kehrawar, 1998).

More than 40 per cent of women drop out of education because of marriage. It was reported that the bride has to work in the bridegroom's house and fields and it is therefore difficult for her to continue with her studies after marriage.

Work in agriculture also affects access to education. For this reason more than 15 per cent of men had to drop out from education; for women the percentage is only 1.3. Because of poor economic conditions about one seventh of the total men could not continue their studies. Mr. Tara Chand could not continue his studies due to poor economic conditions of the household. He told me that

> "I was married at the age of 16 years and I had to take care of my family on my own and my economic condition was very poor. That is why I could not complete my studies" (Shri Tarachand, Bapora, 1998).

Another important reason that stops people completing their studies is 'no further interest in study or failure in school exams'. It was reported in the study area that many young boys did not continue their education either because they have failed two or more times or because they have no more interest in study.

When investigated further, some respondents reported that even if they continued their studies it would be unlikely for them to get a job. Therefore, it really did not interest them to continue

their studies, as it would be a sheer wastage of money and time. More than 25 per cent of males did not continue their education for two reasons: either they gained some employment or they had to start searching for a job. Some students also stopped going to school due to a dispute with their teacher. Ms Ramesh reports that:

> "My husband stopped going to school as his school master kept on asking him to bring honey from his beehives" (Ms Ramesh, Kehrawar, 1998).

Table-5.39: Reasons for dropping out from education

Reason for drop out	Number of people			% of people		
	Male	Female	Total	Male	Female	Total
Geographical inaccessibility	12	62	74	1.3	16.5	5.8
Work in the household	13	64	77	1.4	17.0	6.0
Work in the field	139	5	144	15.3	1.3	11.2
Poor economic conditions	175	18	193	19.3	4.8	15.1
Marriage	4	156	160	0.4	41.5	12.5
No interest in study/failed	258	43	301	28.5	11.4	23.5
Employment purposes	235	5	240	25.9	1.3	18.7
Father/Mother's Death	9	1	10	1.0	0.3	0.8
Dispute with teacher	15	4	19	1.7	1.1	1.5
No Tradition to educate	0	7	7	0.0	1.9	0.6
Education Completed	9	0	9	1.0	0.0	0.7
Others	37	11	48	4.1	2.9	3.7
Total	906	376	1282	100	100	100

Source: Author's fieldwork.

Some differences in the reasons for dropping out can be observed between Rohtak District and Bhiwani Districts (Table-5.40). In Rohtak District about 45 per cent of women dropped out because of marriage, while this is only 36 per cent in Bhiwani District. In Bhiwani, more than 22 per cent of women have dropped out from education because of work in the household that is 9 per cent more than in Rohtak District. Further, it is interesting to note that in Bhiwani District about 5 per cent of women could not continue their studies as respondents said that there is no local tradition to educate women after the level of middle or high school. In Rohtak District, none of the respondents dropped out from education because of this reason. This shows that traditional values about women's education vary across these two districts, and are strong in Bhiwani as compared to Rohtak District.

Table-5.40: Reasons for dropping out from education for Rohtak District and Bhiwani Districts

Reason for drop out	% of people					
	Rohtak			Bhiwani		
	Male	Female	Total	Male	Female	Total
Geographical inaccessibility	0.9	15.7	5.3	1.9	17.7	6.5
Work in the household	2.0	13.5	5.4	0.6	22.5	6.9
Work in the field	14.4	0.9	10.4	16.8	2.0	12.6
Poor economic conditions	19.9	5.2	15.5	18.5	4.1	14.3
Marriage	0.2	45.0	13.5	0.8	36.1	11.0
No interest in study/failed	30.6	13.1	25.4	25.3	8.8	20.6
Employment purposes	24.3	1.8	17.6	28.4	0.7	20.4
Father/Mother's death	0.9	0.0	0.7	1.1	0.7	1.0
Dispute with teacher	1.7	0.9	1.4	1.7	1.4	1.6
No tradition to educate	0.0	0.0	0.0	0.0	4.8	1.4
Education completed	0.2	0.0	0.1	2.2	0.0	1.6
Others	5.0	3.9	4.7	2.8	1.4	2.4
Total	100	100	100	100	100	100

Source: Author's fieldwork

The reasons for dropping out from education have a statistically significant association with all five controlling variables (Table-5.41). The reason varies significantly for males and females, as the chi-squared value for sex and reasons for drop out is 798.59, which is the highest among all the other variables and statistically significant at the 0.01 per cent level of significance with 11 degrees of freedom. In the case of women, about three quarters of the total drop out is because of geographical inaccessibility, work in the household and marriage, while more than 85 per cent of men's dropout is explained by four major reasons: work in the field, poor economic conditions, employment and no interest in study. This clearly presents a contrasting picture of the reasons for drop out from education between men and women.

Table-5.41: Association between reasons of drop-out and controlling variables

Variable	Chi-Squared Value	Probability of significance	Degrees of freedom
District Code	33.68	0.0000	11
Sex	798.59	0.0000	11
Caste	147.09	0.0000	22
Income	245.39	0.0000	55
Village Accessibility	27.06	0.0050	11

Source: Author's fieldwork

Income has the second highest degree of association with the reasons for drop out, which means that the reasons for dropping out from education vary significantly over different

income groups. Variations in the reasons for drop out are also statistically significant over different castes and village with different levels of accessibility.

5.8 SUMMARY OF RESULTS AND DISCUSSION

5.8.1 Summary of results: In the majority of cases, people's expectations of girls' education are not directly associated with economic benefits, but rather with better matrimonial prospects and household management. The major expectation for educating boys is observed as employment, but many of the educated youth were reported unemployed in the study area. Because of this some people in the field did not show much interest in educating their children or continuing their children's study.

Male-female differences in access and duration of access to education were widely observed in the study area. The percentage of illiterate women is significantly higher than that for men, indicating women's poor access to education as compared to men. The development level of a district also has a significant impact on access to education. Both men and women enjoy better access to education in Rohtak District (which is relatively developed) as compared to Bhiwani (relatively less developed). Moreover, the gender differences in access to educational institutions in Rohtak District are less than for Bhiwani.

In the study area, a larger percentage of people (about 80 per cent) are still dependent on Government schools, but access to private schools varies across all villages and both districts under study. The percentage of people using private educational institutions is higher in more accessible villages such as Kehrawar and Bapora. In these villages, more than 20 per cent of males have access to private educational institutions. As reported earlier, the richer people have better access to private educational institutions, while the poorer people have to rely more on Government institutions, so paying capacity is one of the important determinants of access to private schools. Caste, which is highly associated with income, also has a statistically significant impact on access to different types of educational institutions; the higher the caste the greater is the probability of attending a private school within the village and/or out of the village. In the lower castes, children generally attend Government schools, because these schools are less expensive and they also provide a stipend to SC children. There is an inverse relationship between income and people's access to private schools. The percentages of people attending/attended private schools gradually increase with the increase

in income level. Another interesting thing to notice here is that sex plays a vital role in determining access to private school. In the study area, women's access to private source of education is significantly lower than that for men.

All the four independent variables, namely income, caste, village accessibility and sex, have a statistically significant impact on accessibility to educational institutions. Out of these four controlling variables, sex has the highest impact on access to educational institutions; girls/women's access to education is significantly lower than that of boys/men. Income, however, has the highest statistically significant impact on access to educational institutions located at different places (within village and out of village, namely town and or city etc), leading towards the conclusion that attending an educational institution in town or city is costlier and only children from higher income households can afford to access these institutions in the study area.

In the study area, an inverse relationship was observed between the distance from educational institutions and the percentages of people attending them; but inter-district disparities are also ostensible. In Rohtak, more people (both males and females) have better access to distant educational institutions as compared to Bhiwani District. Also the upper castes and higher income groups have better access to educational institutions available at a distance. Sex is another important determinant of access to educational institutions located in different distance zones. In the study area it was observed that women's access to distant educational institutions is significantly lower than that for men, because girls are generally not allowed to visit/travel alone to distant places. Therefore, distance greatly hinders women's access to educational institutions.

A major proportion of girl students rely on the Government Schools; and the percentage of girls attending Government schools is significantly higher than for men. Four important reasons, namely economic, separate facilities for girls, availability of a stipend and the non-availability of other schools explains their higher enrolment rate in Government schools. However, for boys, two main reasons (quality of education and paying capacity) govern the utilisation of Government and private educational institutions.

The lower percentage of illiterate women in the younger generation (against the older generation) explains that women's access to education has been gradually improving for the

last two decades; availability of schools in villages and increasing importance of girls' education may explain higher literacy rates and improving education levels in the younger generation. But education level among women also varies across Rohtak and Bhiwani Districts; and in Rohtak, women in the younger and older generations enjoy relatively better access to education as compared to Bhiwani District. A large number of women drop out from education before senior secondary school; the geographical inaccessibility (non-availability of school in the villages), work in the household and marriage are the most important reasons for women's drop out from education. In the study area, most of the men's drop out is explained by four reasons, namely work in the field, poor economic conditions, employment and no interest in study. Our analysis further shows that reasons for dropping out from education vary significantly over different income groups; the percentages of drop out gradually decline from the lower to the higher income groups.

5.8.2 Discussion: Education is an agent of change, as it prepares a society for a fundamental change in social and economic institutions (Vijayan and Shannon, 1995) and is considered to be an essential component of human development[12]. Investment in education also fulfils a number of other vital objectives, namely it satisfies a basic need for knowledge, provides a means to meet other basic needs, and helps sustain and accelerate overall development. It provides an essential skilled workforce for both the industrialised and informal sectors of the economy and develops the productive capacities of the labour force; it determines not only the income of the present generation but also the future distribution of income and employment; and it has a great impact on social welfare through its indirect effect on health, fertility and life expectancy (Psacharopoulos and Woodhall, 1986).

The positive effects of investment in education are well documented in the development literature (Colclough, 1982; D'Aeth, 1975; Drèze and Sen, 1995; Jones, 1992; Noor, 1981; Psacharopoulos and Woodhall, 1986; Sen, 1992, 1996; World Bank, 1980c, 1990, 1994 and 1999). Moreover, education has widespread inter-sectoral linkages, which is clear from one of the World Bank's reports:

> Improvement in education helps alleviate poverty both directly and indirectly by increasing income and improving health and nutrition, and reducing family size. Healthy children learn more effectively than sick children, well-nourished children learn

[12] Human development encompasses education and training, better health and nutrition and the reduction of fertility, each of which makes its own important contribution to human development (World Bank, 1980b).

more effectively than hungry children and educated parents are more likely to have healthy and well-nourished children (World Bank, 1980).

The socio-economic rates of return from education are substantial especially in Developing Countries with a low stock of capital (Psachoaropoulos, 1981, 1987; Psachoaropoulos and Woodhall, 1986). For more than four decades Governments and international organisations have been investing in education, but it has not fulfilled the desired objectives, particularly in the Developing Countries. Today, a large proportion of children (girls and poor in particular) is excluded from the educational system (Vijayan and Shannon, 1995). Some villagers report that:

> "There is one middle school in the village, but it is not separate for girls. People prefer to send their daughters to a separate school. Secondly, people hesitate to send their daughters out of village because of social insecurity". When villagers were asked whether they had taken any steps for the arrangement of girls' school in the villages, they reported that "we have given this proposal to the Chief Minister, but he told us that building a separate school for girls in this village will not be possible". When I further told the villagers that it means the girls in this village cannot be educated after the eighth class, they admitted it and silently said that 'it seems to be' (Group Discussion, village Patodi, 1997).

Under the prevailing social circumstances, the non-availability of a school, and cheap and reliable transport greatly hinder women's access to education. Like wise the deprived sections of the society have relatively poor access to education. The failure of education in the Developing Countries is attributed to an oversimplified approach in planning formulation and implementation. Education was regarded as a synonym of formal schooling, and expected to contribute to economic growth and social conditions of life, but education is not a separate affair from which good things will flow naturally (D'Aeth, 1975). A research on investment in Indian education concludes that India's success in building a solid infrastructure of universities and technical institutes has not been without its problems. This success has unfortunately created a larger pool of educated unemployed threatening political stability if unemployment persists for long (Heyneman, 1980). The need of the hour is to investigate the following questions:

- How to increase school coverage so that deprived sections of the society have access to school education?
- What type of education to provide, which fulfils people's expectations?
- How to enhance school quality (particularly in rural areas)?

- How to finance educational expansion especially when Government is under financial constraints? And
- How to improve distributional equity so that inter-personal and inter-regional disparities are reduced?

Answers to these questions are interrelated, but an attempt will be made to deal with these one by one. As we have already noticed that the poor, SC and BC (deprived sections) and women have relatively poor access and less duration of access to education. This has resulted in inter-personal and inter-regional inequalities. Sen (1970) argues that there have been deep-seated class biases that have determined Indian educational priorities and that the inequalities in education are, in fact, a reflection of the inequalities of economic and social powers between different groups in India. Therefore, some sections of society and some regions enjoy better access to education, while the others have been deprived of education. Non-availability of school in the village is the most important reason that limits women's and the poor's access to education:

> "Many of the parents do not like to send their daughters to a school not located in their village. Social insecurity is the most important reason that hinders girls' access to schools located out of the village" (School teachers, Government Girls School, Kehrawar, 1998)

Therefore, it is necessary that if a school is not available within the village, that cheap or free transport is available to students. Poverty is the second most important reason, which restricts access to education, particularly of deprived sections of the society. Therefore, it is necessary to bear in mind the financial constraints of the poor while making a provision of education for them. Free education, transport and stipend are/could be part of the solution, but the question 'will it suffice to compensate the losses parents will suffer from the loss of their children's employment or work in the household/field' needs to be investigated further.

The next question is what type of education to provide, which fulfils people's expectations? Arthur Lewis (1962) a long time ago stated that 'education was not invented in order to enable men to produce more goods and services. The purpose of education is to enable men to understand better the world in which they live, so that they may more fully experience their potential capacities'. But there are different schools of thought. Some of them relate education to economic growth and in particular employment (D'Aeth, 1975; Noor, 1981; Sen, 1996;

World Bank, 1980c). It is widely observed in the field that people closely relate education with employment (especially for male) and every educated youth expects employment, because employment is necessary for their livelihood. Noor (1981) identifies production skills as one of the essential components of basic education for self-employment, especially in the Developing Countries where the prospects of finding a job in the modern sector are becoming difficult. But the teaching of production skills cannot be started right at the beginning of primary schooling. The first task is to develop communication and arithmetic skills, which are the essence of primary school education.

Primary education also helps to alleviate poverty and advances economic and social development (Jones, 1992). The main objective of primary education must be to develop communication skills and deep understanding of the world in which people live. This can be followed by a rigorous vocational training or other skills or further specialised education, which are sufficient for self-employment or for employment in other modern sectors or for further tertiary education. But an emphasis on 'primary education' is essential for advances in social and economic development and competitiveness in the global market[13]. Social rates of returns to investment in primary education are substantial (Psachoaropoulos, 1981, 1987). But Tilak (1989) argues that although primary education was earlier found to have had a significant effect on income distribution, now we find that it is the secondary level of education that has a more significant effect, and that primary education may not be adequate to produce any recognisable effect. Ram and Schulthz (1979) further argue that the returns to higher education in India remain high enough to justify the investment. The rewards of education are positive and the educated do eventually find suitable economic roles. But in the study area, a large proportion of youths was found to be unemployed. This may be true for those who have access to a good quality education, which is accessible to only a meagre proportion of the population in rural areas. Therefore, another important question to investigate here is 'how do we enhance school quality (particularly in rural areas)?

[13] There is little evidence that the seriousness of India's educational backwardness has been officially recognised. Basic education is not only important for the well-being and freedom of people and for social change, but also for the success of India's economic reform. The prospects of participatory growth of India and India's ability to make good use of the opportunities of integration with the world market are significantly compromised by the backwardness of basic education in the this country (Sen, 1996, 27). The role of higher education cannot be neglected if India is to maintain her competitiveness in the international trade of manufacturing goods and commodities (Ram and Schulthz, 1979).

In the field it was evident that the Government schools (in rural areas) cater to the needs of a major section of society. But the standards of education in these schools are not comparable with the high standard of private schools located in towns and cities (Plate-5.3). Some private schools are also available in rural areas (Plate-5.4), but they do not have qualified faculty. Negligence in Government schools encourages the people (who can afford) to send their children to private schools. One of the teachers admitted to me that

> "We are really not happy to send our children to a private school. If there were improvements in the Government schools definitely we would like to send our children there, because we are not happy to pay very high tuition fees to private schools" (Teachers, Government High School, Kehrawar, 1998).

> "There are two mistresses in the whole school and one of them never turns up... our school has been closed over the last six months, one of the mistress's husband visits and distributes cereals to the children and goes away, the left over cereals he takes to his home. This is sheer blindness of the Government, as the Government does not bother about the negligence of teachers in the school and we villagers always suffer from that" (Shopal Singh, 1998, Dhani Mansukh).

The DEO, Bhiwani told me that

> "The Government has introduced a new syllabus based on the Central Board of School Education (CBSE) pattern.... Honestly speaking teachers in the Government schools are not trained enough to handle teaching of the newly implemented syllabus" (DEO, Bhiwani, 1998).

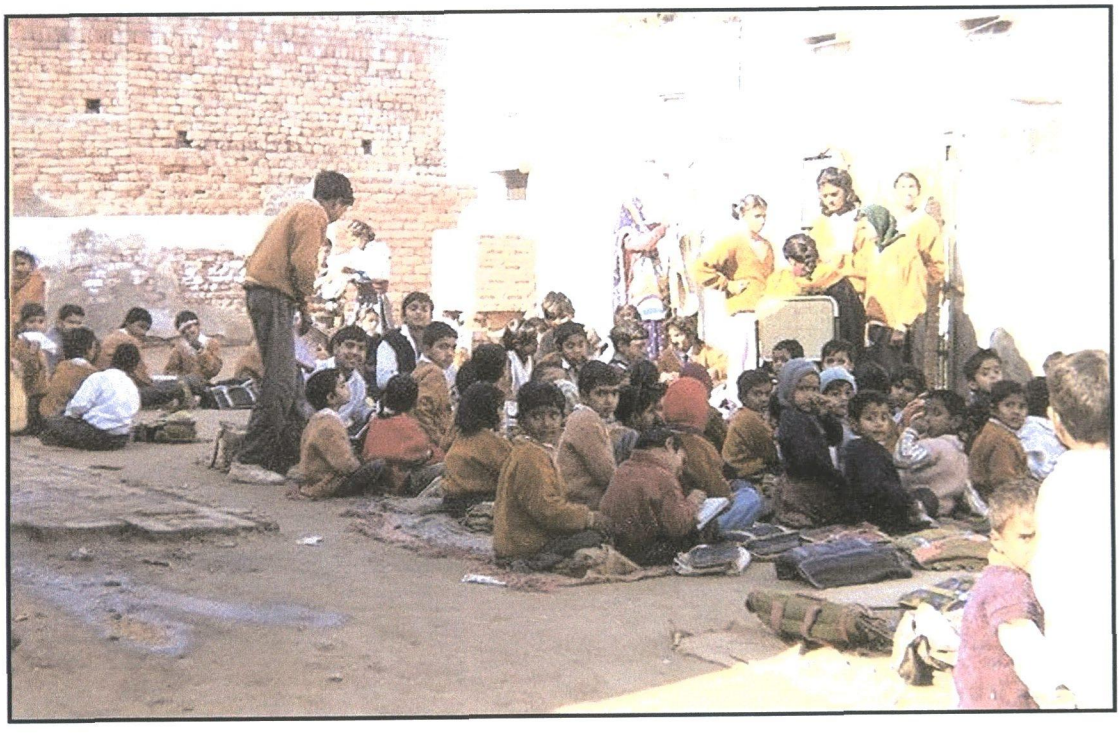
Another question is whether private schools can be held responsible for providing quality education in rural areas. In a recent study of Zamia, Kaluba (1995) reports that:

> *Recent private school initiatives are not in fact achieving the desired objectives. There is no community participation in the setting up and running of these schools, because they are first and foremost individual or group business. Furthermore, they have failed to create enough additional schools. Most of them cannot provide satisfactory educational services. Moreover, the private school is largely an urban solution because that is where the private schools are but they benefit only a few people.*

These findings are very similar to my field observations (except for the increasing number of private schools in geographically accessible areas). The upper class maintains its comparative advantage by securing and building well-staffed private schools (Vijayan and Shannon, 1995). These schools are expensive and the poor can rarely afford them. Primarily, they have to rely on Government schools, where the standards of education have dropped dramatically (widely

Plate-5.3: Government boys' high school, Chuliana

Plate-5.4: Private school, Bapora



observed in the field, 1997-98; Drèze and Gazdar, 1996). A Retired Junior Commissioned Officer (89 year old freedom fighter) reported that

> "Children who were educated in Government school with us (in this village) have reached very high rank posts such as DC, brigadier, session judge, and there may be 100 of JCOs like me from this village who have worked in the Indian army and at other places. At that time, teachers used to treat us like their own son and daughter. Recently the standard of education has declined drastically. Let me cite you one example, there is one master in the Government high school who commutes daily from Narnaul, about 90 km away from here. He arrives at least one hour late and leaves one hour earlier than the stipulated time. As compared to teachers of our time, recently teachers are highly paid; even though they do not pay as much attention on teaching as they are paid".

Therefore, students with Government schooling find it extremely difficult to compete with those with convent schooling and hence are placed at a disadvantage in the job market. Many young students have stopped taking an interest in their studies. It was observed in the field that a large proportion of students stopped studying either because they were not interested or they failed because of lack of interest. The lack of interest is mainly because of poor employment prospects after schooling. Therefore, it is essential to improve quality and type of education. Noor (1981) argues that

> *The quality of education can be improved through curriculum planning, wide availability of textbooks and learning material, the training and upgrading of teachers, alteration in teaching methods, and through appropriate teacher motivation and school management. Some routine administration tasks such as the payment of teachers' salaries on time, a regular supply of instructional material, and maintenance of physical facilities also have a strong influence on the quality of instruction.*

Improving the quality of education is not the only task. But the whole education system (especially primary education) has to be changed. Jones (1992) maintains that the challenge from now on is to discover a new view of education that is sufficiently comprehensive and powerful to create conditions conducive to individual, community, and national freedom.

In fact, there must not be a hierarchy of schools[14] (in terms of quality of education) at least in basic education; all children irrespective of sex, income and social class must have access to good quality basic education. Some teachers further substantiate this point:

> "There must be nationalisation of education in the country. There must be only the Government schools (for basic education) and all the children must be educated in the

[14] This means complete elimination of private schools.

similar type of schools, and within the schools there must not be any differences in the quality and standards of education...and uniform type of facilities must be provided in all the schools" (Teachers, Government High School, Brahana, 1998).

One of the teachers admits that

> "We must develop a strong base of a child up to fifth class (developing communication skill, arithmetic ability, understanding of living environment and civic sense) because if the base is not developed properly he/she cannot do well in further classes. Therefore, it is necessary to pay special attention to children in primary education. Besides, the household environment must also be improved and parents must pay special attention to the education of their children" (Teachers, Government High School, Brahana, 1998).

Change in household environment could be another hurdle. But this can be overcome by introducing 'free and compulsory boarding education to all' (especially for the poor, in this situation parents do not need to spend on their children and they may not resist much toward the education of their children). One of the teachers argues that

> "India has a long history of boarding education. In ancient times, there were residential schools know as '*gurukuls*[15]', and the 'guru' (teacher) had a great attachment and concern with/for their pupils. These days, teachers do not have much attachment with students and they are less bothered about the study and careers of their pupils" (Teachers, Government High School, Brahana).

If children of upper and lower castes, rich and poor are able to study together (without any discrimination and deprivation), it will not only help overcoming social secessionism (which is the most crucial recent problem in India and further accentuating day by day), but it will be a real capability building process. Moreover, teachers and pupil will have a greater intimacy and interaction, then teachers will feel more concerned about their pupils. This is not a simple task, as any radical change always has strong opposition. It will be appropriate to quote the following:

> *The World Bank started emphasising the need for universal primary education by 1980s, but the Indian Secretary of Education* (Anil Bordia) *was opposed to the Bank's activity in Indian Primary Education* (Jones, 1992).

Bureaucratic, elite and political interests may clash with such a radical reform in basic education as the privileged classes would resist full public access to quality education because

[15] *Gurukul* is composed of two words *'guru'* (teacher) and *'kul'* (family). Which means a place where a teacher lives with his pupils and family. In ancient times, *Gurukuls* used to be located at isolated places where the interventions of common life were least and provided healthy conditions for teaching and learning.

they would lose their own advantages of having the best access. Therefore, it requires revolutionary steps and a strong political will, which cannot be attained successfully without active Government intervention, substantial funding, public co-operation and demand.

The first important task is to build up a strong public demand for 'high standard basic education' and then a strong public pressure on politicians so that they feel accountable to the public. In this scenario, it would not be difficult to mobilise funds, as the chief obstacle to spreading basic education to the masses is not economic, but rather the socio-political structure that tend to perpetuate the interests of the privileged (Noor, 1981, Sen, 1970, 1996). Noor further argues that universal primary education is feasible economically. This requires that existing educational activities be made more cost-effective and that a reallocation of existing educational resources should be made through raising the share of public expenditure and increasing public expenditure on education. People who can afford should be charged to raise some more funds and the same funds can be used for the maintenance of the high standards of education. Moreover, there is also a need to change the existing education curriculum according to the needs of the people and the nation so that this fulfils people's desire and hence happiness, which essentially guide a person's well-being[16]. Therefore, this investment in education is essential for a strong nation building process. If there is a strong political will and public pressure and demand, this can be achieved. This could be the most appropriate remedy to the redistribution of wealth, income and opportunities between rich and poor, advantaged and disadvantaged; and this will develop the fullest potential and talents of the people.

[16] It is doubted that a person can do well whose desires to achieve a high level of well-being are violated systematically (Sen, 1985, 17).

Chapter - 6

AVAILABILITY AND SPATIAL EFFICIENCY LEVEL OF GENERAL HEALTH SERVICES

6.1 INTRODUCTION

Traditionally, a healthy population and workforce has been assumed to assist economic development, while an unhealthy population has been associated with poverty and underdevelopment (Phillips, 1990). The importance of the provision of health facilities has been realised since the middle of this century in general, and in the Developing Countries in particular, because health[1] was considered to be a crucial component of well being and economic development. Life expectancy in the Developing Countries in 1950 was only 40 years, but increased to 62 by 1990; meanwhile the child mortality rate before the age of five years has fallen from 28 to 10 per 100 children (World Bank, 1993). These achievements could not have been possible without enormous investment in the provision of health services (especially preventive health services). Along with these achievements, the World Bank (1980 and 1993) characterises the Third World health with many weaknesses:

- Health facilities are generally inaccessible to the majority of population and women and children especially may experience difficulty in reaching a source of care;
- Urban and rural differences and inequalities frequently persist in health and health care;
- The availability of services and treatment (such as drugs or X-rays) are often erratic, not only in rural areas but also in some parts of towns;
- Official health facilities sometimes fail to provide the necessary medicines, whereas they may be available through the private black market;
- Economic barriers as well as physical barriers exclude many people from formal health services; transport costs and time lost may prove too high for the poor to enable them to use services;

[1] The WHO (1998) defines health as 'a state of complete physical, mental and social well being and not merely the absence of disease or infirmity'. The constitution of the WHO proclaims that the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political, economic and social conditions; the health of all is fundamental to the attainment of peace and security. The World Health Assembly declared in 1970 and 1977 that 'health is a human right'. This was further reiterated at the International Conference on Primary Health Care in Alma-Ata in 1978.

- Imbalances therefore characterise health services: imbalances between individuals and communities (rich versus poor, favoured versus unfavoured), between regions, between urban and rural areas, and between countries;
- The provision of curative medicines and the training of health workers and physicians are not attuned to the need of health services is rural areas; and
- The Lack of intersectoral co-ordination.

India is also facing some of these problems. In India, the health of the people and the state of health services became a concern of national movements much before 1950. In 1930, The Indian National Congress (INC) set up the National Planning Commission (NPC) under the chairmanship of Pt. Jawaharlal Nehru; a sub-committee on health was formed to assess the health situation and services in the country, under the chairmanship of Col. S.S. Sokhey. The NPC recommended on August 31, 1940 that the state must take the responsibility of maintaining the health of the people: this was later enshrined in the Constitution of India (Government of India, 1997; Singh, 1975). In 1946, Sir Joseph Bhore (head of the Health and Development Committee) recommended the establishment of well-structured and comprehensive health services with a sound basic health care infrastructure, laying down an equal need for safe drinking water supplies, housing and sanitation. This report provided the foundation for subsequent health planning and development in Independent India (Government of India, 1997). From the First FYP onward, the Central and State Governments have made efforts to provide primary, secondary and tertiary health centres and to link them through an appropriate referral system in order to combat the major health problems. The death rate per thousand has declined from 25.1 in 1951 to 9.8 in 1995 and life expectancy has increased from 32 years in 1947 to 61.1 years in 1995-96 (SRS, 1998). Despite the significant improvement in death rates and life expectancy, morbidity is still very high in many parts of the country. The Government of India has therefore declared in the *Ninth FYP* document that 'efforts will be made to tackle communicable and non-communicable diseases so that there is a sustained improvement in the health status of the population' (Government of India, 1997).

India has a vast network of Government health services manned by a large number of medical and paramedical persons, but this network is working sub-optimally because of the lack of essential infrastructure, suitable equipment and appropriate manpower especially in some critical positions and due to poor referral services (Government of India, 1997).

Provision of health services in India: India has a rich heritage of the centuries-old tradition of medical and health science known as '*Ayurveda*[2]'. This philosophy is based on a holistic approach to human health. Over the centuries, with the infusion of foreign influences and mingling of cultures, various systems of medicine have evolved and have continued to be practised widely. Among these, the allopathic system of medicine has had the greatest impact on the entire approach to health care services in the country at present, primarily because of the colonial impact[3]. The British Health Policies failed to come to terms with local society; and their health measures per se had little marked impact on the mortality and morbidity of the masses. But this did establish a framework (of personnel, idea and institutions) which was subsequently followed for public provision of health services in post-independence India (Akhtar, 1991, 103).

The provision of health, sanitation, hospitals and dispensaries are the responsibility of the individual States (Granville, 1966). The Constitution of India aims for the elimination of poverty, ignorance and ill health and directs the States to raise the level of nutrition and the standard of living of the people, to secure the health and strength of workers, men and women, and to ensure that children are given opportunities to develop in a healthy manner. In order to fulfil these objectives, the Government started establishing a Primary Health Centre[4] (PHC) in each Community Development Block (CDB) with a population of 60,000 to 80,000 people as an integral part of the Community Development Programme (CDP) launched on 2nd October, 1952 (DGHS, 1998).

---

[2] *Ayurveda* (a Sanskrit word meaning the 'science' or 'wisdom of life') is an ancient philosophy based on a deep understanding of eternal truths about the human body, mind and spirit. This is a complete system of healing, encompassing philosophy, psychology and spirituality as well as a deep understanding of disease processes. 'Mind, spirit and body hold life in balance with the three *doshas* like a pot on three supports (*Charaka,* 1000 BC) (see Godagama, 1996).

[3] The present health services in India are conditioned by the legacy of health services established under the British rule. The colonial impact on health in India has contradictory effects. On the one hand changes in famine policy and food distribution helped to reduce mortality; increasing numbers of men and (women later on) were trained in medicine to the international standards of the time; issues of disease prevention and public health were addressed as never before. On the other hand, many of these measures were restricted in their impact to a relatively small section of the population: first, the European Civil and Military Servants and their families, and later those with access to urban facilities (Akhtar, 1991).

[4] Each PHC was located at the CDB headquarters and consisted 6 beds and six sub centres. One medical officer, 1 sanitary inspector, 4 midwives (ANM) and 2 ancillary personnel were employed at each PHC (DGHS, 1998).

A landmark in the development of health policy was the International Conference on Primary Health Care held at Alma-Ata in 1978. This conference declared that the health status of hundreds of millions of people in the world was unacceptable and called for a new approach to health and health care services, to:

(i) reduce the gap between the 'haves' and 'have-nots',

(ii) achieve a more equitable distribution of health resources and attain a level of health for all citizens of the world that would permit them to lead to a socially and economically productive life, and

(iii) seek health for all by the end of 20th century.

India is a signatory to the Alma-Ata declaration of 1978 and is committed to attaining the goal of 'health for all' by the year 2000 AD through the primary health care approach. Based upon this, a long term National Health Policy was adopted by the Parliament in 1983 and health for all principles and strategies were incorporated in the Sixth and Seventh FYPs. The delivery of PHC[5] is the foundation of rural health care and forms an integral part of the national health care system. Less than one year is left to attain the objective of 'health for all'. But many people are still under-served by the PHCs even in some of the most developed areas of the country, which raises doubts over whether the objective of 'health for all' will be fulfilled or not by the end of the year 2000, it seems to be a distant dream (Asthana, 1994).

In the present study, the availability of health services is examined in two districts of Haryana State, where the death rate is 8.1 (per 1000 people) against 9 for the country, male and female life expectancy rates are 65.2 and 64.2 against 60.6 and 61.7 years for the country (SRS, 1998). These statistics show that Haryana is one of the most developed states of India in terms of health conditions of the people. But within this state the provision of health services is not adequate in many of the less developed areas in general, and in rural areas in particular. An attempt will be made in this chapter to examine the distribution of public and private health services in this state (with the major emphasis on rural areas).

[5] PHC provides the first level of contact between the population and the health services, which forms the common pathway for the implementation of all health and family welfare programmes in the country. It provides integrated promotive, preventive, curative and rehabilitative services to people close to their hearth and home. It includes three tier services: primary, secondary and tertiary with an adequate referral system (Government of India, 1997).

This chapter is divided into five sections. In the first section, health statistics for Haryana State will be discussed, followed by an examination of the availability and efficiency level of Government (public) health services. In the third section, the provision of private health services and their spatial efficiency level will be examined. The findings of the first three sections will be summarised in the fourth section and other issues related to location and upgrading of new health services will be discussed in this section.

6.2 HEALTH STATISTICS IN HARYANA

Since the inception of Haryana State, the Government has paid special attention to the development of infrastructure services, which have had a significant impact on social and economic conditions of the people. At present, Haryana is considered to be one of the most prosperous states of the country in terms of per capita income. There has been a significant increase in the number of health institutions over a period of three decades (Table-6.1). Per capita expenditure on health has increased from Rs. 1.2 in 1966-67 to Rs. 84.48 in 1995-96[6]. Expenditure on medical, family welfare, public health, sanitation and water supply has increased from Rs. 385 millions in 1980-81 to Rs. 3367 millions in 1995-96 (Table-4.1[a]). At 1980-81 prices, it increased to Rs. 1059 millions, more than a 10 per cent annual growth; and about 10 per cent of the total development and revenue expenditure were spent on health services in 1995-96 (Government of Haryana, 1997b). Annual growth in health expenditure was more than 15 per cent per annum from 1980-81 to 1985-86, falling to less than 5 per cent during the 1985-86 to 1990-91 and less than 10 per cent from 1990-91 to 1995-96 (Table-4.2).

Smt. Kartar Devi, Ex State Health Minister, Haryana State in the late 1980s stated that

> *the heath and family welfare services are made available at the door steps of the people and people should draw maximum advantages of the available services to lead a healthy life and to undertake the task of national reconstruction*[7].

[6] Per capita expenditure on health is calculated at current prices and does not include inflation.

[7] This statement was published in a leaflet (undated), Haryana Marches Ahead: Health Under New 20-Poin Economic Programme, by the Directorate of Health Service, Haryana, Chandigarh.

According to this statement, health services are available to all the people in the State. But up to date a major proportion of the people does not have practicable access to Government health services, particularly in rural areas, despite the fact that there has been a substantial increase in the number of PHCs and Sub-Centres over the last three decades; the number of trained doctors has increased from 881 in 1980-81 to 1519, more than a 72 per cent increase over a period of 15 years.

Table-6.1: Health Statistics, 1966-67 and 1995-96

	1966-67	1995-96	Growth (%)
Hospitals	56	79	41.07
Primary Health Centres	88	398	352.27
Sub-Centres	510	2299	350.78
Per Capita Expenditure on Health (Rs.) at current prices	1.92	84.48	4300.00

Source: Directorate General Health Services, Haryana, 1966-67 and 1995-96

Along with Government, the number of private health services has also increased. Private health services include nursing homes and clinics run by qualified doctors in urban areas and Registered Medical Practitioners (RMP) in rural areas. An increase in the number of health services (alone) can not ensure improvement in the availability of health services in less developed areas in general and in rural areas in particular. The Government of India (1997) states that there are marked disparities in the provision of health services at state and district levels; and attempts have been made to correct these imbalances[8], because districts with poor health indices do not have adequate provision of health services. In the next section, we will examine the provision of Government health services: sub-centres, primary health centres (PHC) and community health centres (CHC).

6.3 PROVISION OF HEALTH SERVICES IN ROHTAK AND BHIWANI

A wide range of health services is available in these two districts, extending from an RMP doctor to a civil hospital and a sophisticated medical college. But the pattern of availability varies across these two districts, and between rural and urban areas. In the present analysis, only four services will be examined at length, viz. sub-centre, PHC, CHC and RMP doctors.

[8] The conference of Chief Ministers in July 1996, recommended that additional central assistance (ADA) may be provided for correcting the existing gap in the provision of seven basic minimum services (BMS). Of these, access to primary health care, safe drinking water and primary education were given higher priority with the mandate that universal access to these services is to be achieved by 2000 AD (Government of India, 1997).

The first three services are under Government control and form an integral part of rural health care provision. Under the basic minimum needs (BMN) programme the Government has set a population criterion for the provision of the first three health services in rural areas: a sub-centre for every 5000 people, a PHC for every 6 sub-centres (30,000 people) and a CHC for every 4 PHC (120, 000 people). All these services are inter-linked to each other and form a hierarchy, and the PHC provides the first direct link with the people through its sub-centres (which it operates directly)[9].

6.3.1 PHC and sub-centre: The prime aim of a PHC is to provide public health[10] services to rural people. Generally, a PHC is staffed with one medical officer, one female medical officer, one dental surgeon, one pharmacist, one laboratory technician, one male and one female supervisor, and four each of male and female multi-purpose workers (MPW) (Civil Surgeon, Rohtak District, 1998). There are four sub-centres under each PHC. According to the national norm, one male and one female multi-purpose worker should be available at each sub-centre to cater for the needs of every 3000 to 5000 people (Government of India, 1997). MPWs are primarily engaged in Tuberculosis and malaria control, family planning, antenatal and immunisation programmes, and they do not provide general clinical services. In other words, MPWs are engaged in preventive health care.

The following analysis is based on rural areas, as almost all sub-centres and PHC are primarily located in rural areas, while in urban areas secondary and tertiary services cater for the needs of the population. In 1981, there were only 233 sub-centres, but this increased to 527 in 1996 (Table-6.2). In 1981, there were 8495 people for every sub-centre against the national norm of 5000. Surprisingly, the extent of inter-district disparities was enormous in 1981, although they narrowed by 1996 and the average population served by each sub-centre also declined. The Government has set population size as the main criterion for the location of health services in rural areas. But this norm has not always been followed. That is why the availability of sub-centres is examined here in relation to population size (Table-6.3).

---

[9] It is assumed here, that if a high order service is available in a village, lower level services are also available. For example, the availability of a CHC also means the availability of services provided by a PHC and a sub-centre.

[10] Public health programmes strike against the health problems of the entire population and their objective is to prevent disease or injury and provide information on self-cure and on the importance of seeking care. Clinical service is another essential component of public health, which cures or eases the pain of those already sick (World Bank, 1993).

Table-6.2: Sub-centres in rural areas, Rohtak and Bhiwani District

Year	Sub-Centres			Population			Population/Sub-centres		
	Rohtak	Bhiwani	Total	Rohtak	Bhiwani	Total	Rohtak	Bhiwani	Total
1981	175	58	233	1217734	761554	1979288	6958	13130	8495
1991	280	189	469	1423133	938004	2361137	5083	4963	5034
1996	312	215	527	1714599	1178699	2893298	5496	5482	5490

Source: DCHB, Rohtak and Bhiwani and unpublished records, Civil Surgeon's office, Rohtak and Bhiwani Districts.

In 1981, a sub centre was available in 70 villages (about 11 per cent) with a population of less than 2500, and no Government health service was available in 15 villages with a population of more than 5000, although the norm for the location of a sub-centre is 3000-5000 people. Villagers in Bapora reported that:

> "This is a very big village, but there is not even a single Government health service" (Hari Singh, Bapora, 1998).

When I enquired about this, the Chief Medical Officer (CMO) reported that

> "Two health workers have been employed in Bapora village. But it is quite probable that they may not have a stable base in the village and may not be visiting this village regularly" (CMO, Bhiwani, 1998).

Table-6.3: Availability of sub-centre by village population, 1981

Population	Number of villages						Percentage of villages					
	Rohtak		Bhiwani		Total		Rohtak		Bhiwani		Total	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Below 2500	233	42	322	28	555	70	84.7	15.3	92.0	8.0	88.8	11.2
5000	58	86	42	14	100	100	40.3	59.7	75.0	25.0	50.0	50.0
7500	8	31	3	11	11	42	20.5	79.5	21.4	78.6	20.8	79.2
Above 7500	2	9	2	5	4	14	18.2	81.8	28.6	71.4	22.2	77.8
Total	301	168	369	58	670	226	64.2	35.8	86.4	13.6	74.8	25.2

Source: DCHB, Rohtak and Bhiwani, 1981

The availability of sub-centres has improved from 1981 to 1996. In 1981, more than 74 per cent of the villages did not have any health sub-centres, against 44.3 per cent in 1996. But this increase in the availability may not serve any purpose unless these services cater to the needs of patients effectively and efficiently. The CMO, Bhiwani reported that

> "Muti-purpose health workers employed in sub-centres are generally engaged in preventive health measures and they are helping villagers to adopt family planning programmes, vaccination of children and distribution of malaria medicines etc., but villagers do not count them as health services, because people need more curative and

clinical health services and they do not realise the significance of preventive health measures. Adequate medicine supply (needed for curative services) may not be available at the sub-centres to diagnose frequently occurring diseases in the village" (CMO, Bhiwani, 1998).

Therefore, sub-centres do not meet people's demand in the villages, but these sub-centres have been effective for providing preventive health services. The distribution of sub-centres varies significantly across Rohtak and Bhiwani Districts; in 1996 more than 50 per cent of the villages of Bhiwani District did not have a health sub-centre (Table-6.4, 6.5), while the equivalent figure for Rohtak was 36 per cent.

Table-6.4: Availability of sub-centre by village population, 1991

Population	Number of villages						Percentage of villages					
	Rohtak		Bhiwani		Total		Rohtak		Bhiwani		Total	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Below 2500	166	65	231	80	397	145	71.9	28.1	74.3	25.7	73.2	26.8
5000	33	126	18	66	51	192	20.8	79.2	21.4	78.6	21.0	79.0
7500	3	54	1	19	4	73	5.3	94.7	5.0	95.0	5.2	94.8
Above 7500	3	19	0	12	3	31	13.6	86.4	0.0	100.0	8.8	91.2
Total	205	264	250	177	455	441	43.7	56.3	58.5	41.5	50.8	49.2

Source: DCHB, Rohtak and Bhiwani, 1991

Table-6.5: Availability of sub-centre by village population, 1996

Population	Number of villages						Percentage of villages					
	Rohtak		Bhiwani		Total		Rohtak		Bhiwani		Total	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Below 2500	138	51	181	75	319	126	73.0	27.0	70.7	29.3	71.7	28.3
5000	33	135	42	77	75	212	19.6	80.4	35.3	64.7	26.1	73.9
7500	1	77	1	28	2	105	1.3	98.7	3.4	96.6	1.9	98.1
Above 7500	1	33	0	23	1	56	2.9	97.1	0.0	100.0	1.8	98.2
Total	173	296	224	203	397	499	36.9	63.1	52.5	47.5	44.3	55.7

Source: DCHB, Rohtak and Bhiwani, 1991

A P-median approach was used to examine the distance from the location of sub-centres to demand points. In 1981, the average distance[11] to access a sub-centre was 2.76 kilometres, declining to 1.08 kilometres in 1996 (Table-6.6). In all of the study years, the average distance is more for Bhiwani as compared to Rohtak District. Distance from the sub-centres also varies across villages. In 1981, there was no sub-centre within a distance of 10

[11] The average distance is calculated by dividing the total weighted distance by the total number of demand points weighted by demand. In case a health service is located in a village, it is assumed that distance patients have to travel is 'zero' (which is not real), but this is in-built in the system and cannot be manipulated while working out average distance. In reality, patients may have to walk on an average less than quarter a kilometre or less in an average size village (See ARC/INFO online help, Version 7.2.1, *ESRI*, 1999).

kilometres for as many as 10 villages, and another 125 villages did not have any sub-centre within a distance of five kilometres, and in another 491 villages people had to travel at least 2.5 kilometres to access a sub-centre. Had the locations of sub-centres been planned using some P-median criterion (such as a location-allocation model) sub-centres could have been made available within a distance of only 5 kilometres for all villages except for 22 (Table-6.7). In 1996, a sub-centre was not available within a distance of 2.5 kilometres for only 167 villages, while the figure for 1981 was 491. There is no doubt about the improvement in the availability of sub-centres in the study area. Moreover, the declining average distance from 1981 to 1996 shows a significant improvement in the geographical accessibility to health sub-centres, primarily because of an increase in the number of sub-centres, but how efficiently these sub-centres are located and are catering to the needs of the people is yet to be examined. In 1981, the actual average distance was 27 per cent more than the modelled distance, and this figure declined to 20 per cent by the year 1996, showing some improvement in the geographical efficiency of sub-centres.

Table-6.6: Actual and modelled distance from sub-centres (kilometres)

Year	Rohtak		Bhiwani		Total	
	Actual	Modelled	Actual	Modelled	Actual	Modelled
1981	1.78	1.57	3.94	3.21	2.76	2.167
1991	1.06	0.88	1.67	1.37	1.356	1.097
1996	0.76	0.64	1.25	1.09	1.079	0.895

Source: Author's calculation

Table-6.7: Distance from a health sub-centre (number of villages)

Year	Distance in kilometres					
	Actual			Modelled		
	>2.5	>5	>10	>2.5	>5	>10
1981	491	135	10	444	22	0
1991	225	23	1	138	4	0
1996	167	10	1	87	3	0

Source: Author's calculation

Generally, sub-centres do not provide clinical, rather preventive services, but health workers at a sub-centre can refer a patient to a PHC, where both clinical and preventive services are available. Therefore, a PHC could be considered to be the first direct link between the people and health services (which can cater for the needs of health services villagers need). Dr. Sunil reported that:

"Government provided health services in rural areas are more oriented towards immunisation, vaccination, family planning and malaria and not towards the general health services, we also provide limited clinical health services (Dr. Sunil Verma, MBBS, Doctor, PHC Kehrawar, 1998).

There were only 20 PHCs in 1981 and their number had increased to 89 in 1996, more than a four times increase over a period of 15 years. In 1981, each PHC used to serve a population of more than 90,000 (Table-6.8), and in 1996 declined to just more than 32,000 people (a little more than the national norm). In 1981, PHCs or higher order services were available at 30 locations (rural and urban) and their number increased to 103 in 1996. Each PHC served 30 other villages in 1981 against only 9 villages in 1996. Nevertheless in 1981, 807 villages (more than 88 per cent) were without any PHC; and the non-availability of a PHC greatly hinders the access to services (especially clinical), as was widely observed during the field survey in the study area.

Table-6.8: Primary health centres in rural areas, Rohtak and Bhiwani District

Year	PHCs			Population			Population/PHCs		
	Rohtak	Bhiwani	Total	Rohtak	Bhiwani	Total	Rohtak	Bhiwani	Total
1981	14	6	20	1217734	761554	1979288	86981	126926	98964
1991	46	33	79	1422424	937946	2360370	30922	28423	29878
1996	53	36	89	1714599	1178699	2893298	32351	32742	32509

Source: DCHB, Rohtak and Bhiwani and unpublished records, Civil Surgeon's office, Rohtak and Bhiwani Districts

The following tables are based on rural and urban areas. However, not all urban areas may have a PHC, as other higher order services are available there. Tables-6.9, 6.10 and 6.11 show the distribution of PHCs against population size for the years 1981, 1991 and 1996 respectively. There is a positive relationship between population size and the availability of a PHC. More than 50 per cent of PHCs are located in villages with a population size of more than 7500, but there are some exceptions as well. For example in 1996, 11 PHCs were located in villages with a population of less than 2500.

Table-6.9: Availability of PHCs and village population, 1981

Population	Number of villages						Percentage of villages					
	Rohtak		Bhiwani		Total		Rohtak		Bhiwani		Total	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Below 2500	274	1	348	2	622	3	99.6	0.4	99.4	0.6	99.5	0.5
5000	140	4	55	1	195	5	97.2	2.8	98.2	1.8	97.5	2.5
7500	36	4	13	3	49	7	90.0	10.0	81.3	18.8	87.5	12.5
Above 7500	7	11	7	4	14	15	38.9	61.1	63.6	36.4	48.3	51.7
Total	457	20	423	10	880	30	95.8	4.2	97.7	2.3	96.7	3.3

Source: DCHB, Rohtak and Bhiwani, 1981

Table-6.10: Availability of PHCs and village population, 1991

Population	Number of villages						Percentage of villages					
	Rohtak		Bhiwani		Total		Rohtak		Bhiwani		Total	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Below 2500	228	3	304	7	532	10	98.7	1.3	97.7	2.3	98.2	1.8
5000	142	17	75	9	217	26	89.3	10.7	89.3	10.7	89.3	10.7
7500	42	15	9	11	51	26	73.7	26.3	45.0	55.0	66.2	33.8
Above 7500	11	19	6	12	17	31	36.7	63.3	33.3	66.7	35.4	64.6
Total	423	54	394	39	817	93	88.7	11.3	91.0	9.0	89.8	10.2

Source: DCHB, Rohtak and Bhiwani, 1991

Table-6.11: Availability of PHCs and village population, 1996

Population	Number of villages						Percentage of villages					
	Rohtak		Bhiwani		Total		Rohtak		Bhiwani		Total	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Below 2500	186	3	248	8	434	11	98.4	1.6	96.9	3.1	97.5	2.5
5000	150	19	110	9	260	28	88.8	11.2	92.4	7.6	90.3	9.7
7500	62	16	21	8	83	24	79.5	20.5	72.4	27.6	77.6	22.4
Above 7500	18	23	12	17	30	40	43.9	56.1	41.4	58.6	42.9	57.1
Total	416	61	391	42	807	103	87.2	12.8	90.3	9.7	88.7	11.3

Source: DCHB, Rohtak and Bhiwani, 1991

The actual locations of PHCs have been examined in relation to the modelled locations derived from the location-allocation models in order to assess the geographical accessibility and efficiency level of PHC locations (Table-6.12). The average distance between a PHC and demand points (villages/towns without a PHC) was 7.8 kilometres in 1981, declining to 4.4 kilometres in 1996. In Bhiwani, people have to travel on average one kilometre further to access a PHC as compared to Rohtak District. This shows poor geographical access to PHCs in Bhiwani as compared to Rohtak District.

Figures 6.1, 6.2 and 6.3 show the actual locations of PHCs and demand points allocated to them for the years 1981, 1991 and 1996 respectively. There are considerable variations in the

geographical distribution of PHCs in the study area. In 1981, the length of lines between the locations of PHCs and villages (demand points, without a PHC) were less in Rohtak District, especially along National Highway number 10. In the northern parts of the study area the average distance was significantly lower than in the southern and southern-west parts. There was a decline in the actual average distance from 1981 to 1991 and 1991 to 1996 (Figures-6.2 and 6.3). Along with the improvement in the actual average distance a north-south contrast was visible.

Figures-6.4, 6.5 and 6.6 show the modelled locations of PHCs and demand points assigned to each PHC in 1981, 1991 and 1996 respectively. Due to an increase in the number of PHCs there was a significant decline in the modelled average distance from 1981 to 1996. When modelled distances are compared to the actual distances from PHCs it was noticed that the geographical efficiency of PHCs has declined from 1981 to 1996, although the number of PHCs has increased many-fold and the actual average distance has declined during this period. In 1981, the actual distance was 12 per cent more than the modelled distance, but in 1996 it was 20 per cent more. This implies the lack of a criterion (especially in terms of distance and demand for services) to be used for the location of new PHCs (Table-6.12). People in Rohtak District have to travel lesser distances to access a PHC, but the geographical efficiency level in this district is lower than in Bhiwani. In Rohtak, the difference between the actual and modelled average distance is 0.70 kilometres, while it is 0.32 kilometres for Bhiwani. In 1996, the actual average distance was 25 per cent more than the modelled average distance in Rohtak as against 17 per cent in Bhiwani District.

Table-6.12: Actual and modelled distance from PHCs (kilometres)

Year	Rohtak		Bhiwani		Total	
	Actual	Modelled	Actual	Modelled	Actual	Modelled
1981	7.12	6.00	8.86	8.54	7.79	6.95
1991	4.16	3.54	5.06	4.40	4.55	3.91
1996	4.14	3.32	4.81	4.10	4.36	3.64

Source: Author's calculation

In as many as 228 villages, people had to travel a distance of more than 10 kilometres to access a PHC in 1981. A significant improvement in the number PHCs has brought down this figure to only 16 and 15 villages in 1991 and 1996 respectively. Had the locations of PHCs been planned using a location-allocation model, a PHC could have been made available to

every village in the study area within a distance of 10 kilometres. In 1996, people in 351 villages had to travel more than 5 kilometres to access a PHC, while only 222 villages exceed this distance in the modelled locations (Table-6.13).

Table-6.13: Distance from PHCs (number of villages)

Year	Distance in kilometres					
	Actual			Modelled		
	>2.5	>5	>10	>2.5	>5	>10
1981	852	688	228	846	684	148
1991	736	385	18	721	269	3
1996	715	351	15	693	222	0

Source: Author's calculation

Modelled locations were worked out using a minimum weighted distance approach[12]. It was observed that in 1981, out of the total 30 actual locations of PHCs, only 9 (30 per cent) were those suggested by the model, that may explain poor geographical efficiency of the PHCs in the study area. In 1996, about 40 per cent of PHCs were available at the locations suggested by the model (Table-6.14). In 1981, the deviation of actual from the modelled locations was more in Rohtak as compared to Bhiwani District. However, in 1991 and 1996, this was reversed; more than 43 per cent of PHCs in Rohtak were available at the locations suggested by the model, but the figure for Bhiwani was only 35 per cent (Figures-6.7, 6.8 and 6.9).

Table-6.14: Actual and modelled locations of PHCs

Year	Rohtak			Bhiwani			Total		
	Number of PHCs		Actual= Modelled (%)	Number of PHCs		Actual= Modelled (%)	Number of PHCs		Actual= Modelled (%)
	Total	Actual= Modelled		Total	Actual= Modelled		Total	Actual= Modelled	
1981	18	5	27.8	12	4	33.3	30	9	30.0
1991	56	23	41.1	37	14	37.8	93	37	39.8
1996	60	26	43.3	43	15	34.9	103	41	39.8

Source: Author's calculation

6.3.2 COMMUNITY HEALTH CENTRE (CHC)

Unlike the sub-centre and PHC, a CHC is a second level health service and as such is not a first link between people and health services, but is rather the first referral unit. The main objective of a CHC is to diagnose 'high risk patients', and to control and manage the PHCs. It

[12] This determines the location of given number of facilities, P, so that total weighted distance travelled is minimised (Hakimi, 1965; Tiwari, 1992; Tewari and Jena, 1987).

has been reported that CHCs are well utilised and are located in towns or large villages, which are well connected with transport networks (Government of India, 1997). A CHC is headed by a Senior Medical Officer (SMO). Other staff members at CHC are: 2 medical officers (one each male and female), one dental surgeon, 1 staff nurse, 3-4 female supervisors and 3-4 male supervisors, two lab technicians, one clerk/accountant and 2 pharmacists and one thermic assistant (informal interview with Civil Surgeon, Civil Hospital, Rohtak). Each CHC serves approximately a population of about 100,000 to 120,000. A CHC covers four PHCs; a CHC not only controls and regulates PHCs, but also provide clinical services to the local people.

There were only 19 CHCs in 1981 and their number increased to 39 in 1996 (Table-6.15). Each CHC served more than 125,000 people in 1981, improving to less than 100,000 in 1996 (well below the national norm). It is interesting to note that the number of people served by each PHC was significantly lower in Bhiwani as compared to Rohtak District. A medical college is not available in Bhiwani, but Rohtak District enjoys the facility of a sophisticated medical college. This college also caters to the need of patients from neighbouring districts and states as well, but geographically the residents of Rohtak District have relatively better access to this facility. This could be an important reason for the lower position of CHCs in Rohtak District.

Table-6.15: Number of CHCs[13] and population size in rural and urban Areas

	Number of CHCs			Population			Population/CHCs		
	Rohtak	Bhiwani	Total	Rohtak	Bhiwani	Total	Rohtak	Bhiwani	Total
1981	13	6	19	1516265	927073	2443338	116636	154512	128597
1991	17	14	31	1807897	1142670	2950567	106347	81619	95180
1996	19	20	39	2227681	1432510	3660191	117246	71626	93851

Source: DCHB, Rohtak and Bhiwani and unpublished records, Civil Surgeon's office, Rohtak and Bhiwani Districts

A large number of CHCs are located in urban areas (Table-6.16). In the towns or cities, there are other higher order public and private health services along with the availability of CHCs. Therefore, the number of CHCs shown in Table 6.15 is more than the actual number of locations where CHCs are available. In 1996, CHCs were available at 26 locations; out of which 14 were in urban areas. In 1981, none of the CHCs were available in rural areas in

[13] CHCs also include other higher order tertiary health services such as a civil hospital.

Bhiwani District. In 1996, not only has the number of CHCs increased in Bhiwani District, but also 8 CHCs were located in rural areas.

Table-6.16: Availability of CHCs in rural and urban areas

	Rohtak		Bhiwani		Total	
	Rural	Urban	Rural	Urban	Rural	Urban
1981	3	5	0	4	3	9
1991	2	8	2	6	4	14
1996	4	8	8	6	12	14

Source: DCHB, Rohtak and Bhiwani and unpublished records, Civil Surgeon's office, Rohtak and Bhiwani Districts

Figures-6.10, 6.11, and 6.12 show the locations of CHCs in 1981, 1991 and 1996 respectively in Rohtak and Bhiwani Districts. The length of lines between the locations of CHCs and demand points (villages without a CHC[14]) has declined from 1981 to 1996. In 1981, on average people had to travel about 14.46 kilometres to reach a CHC, 30 per cent more than the modelled average distance. However in 1996, the average distance was 8.6 kilometres, 18 per cent more than that modelled. Declining average distance from 1981 to 1996 shows improving geographical accessibility to CHCs (Table-6.17). In 1981, the average distance for a CHC was more in Bhiwani as compared to Rohtak District, but 1996 reversed the situation. In Bhiwani District, not only had the number of CHCs improved from 1981 to 1996, but their geographical accessibility also improved.

In 1981, the actual average distance to access a CHC was 30 per cent more than the modelled distance, declining to 18 per cent in 1991, which indicates an improvement in the geographical efficiency of CHCs. This improvement can be attributed to an increase in the number of CHCs from 1981 to 1991. But there was no evidence in the improvement in their geographical efficiency for the same period, as actual average distance was 18 per cent more than the modelled distance in 1981 against 19 per cent in 1991. It is interesting to note that in Rohtak the actual average distance is 27 per cent more than the modelled distance, while the figure for Bhiwani is only 19 per cent (in 1996). This clearly points toward the better geographical efficiency level of CHCs in Bhiwani as compared to Rohtak (even though the number of CHCs may be greater in Rohtak than in Bhiwani); so there has been less

[14] Service centres also do have demand, but due to the limitations of the software and data constraints we had to assume that the people of a village where a health service is located, i.e. a service centre, travel 'zero' distance.

consideration of the distance and demand criteria for the location/upgrading of CHCs in Rohtak as compared to Bhiwani.

Table-6.17: Actual and modelled distance from CHCs (kilometres)

Year	Rohtak		Bhiwani		Total	
	Actual	Modelled	Actual	Modelled	Actual	Modelled
1981	12.22	9.23	17.84	13.01	14.46	11.12
1991	10.81	8.69	11.89	9.86	10.66	9.00
1996	10.18	8.04	8.38	7.05	8.68	7.31

Source: Author's calculation

Figures-6.13, 6.14 and 6.15 show the locations of CHCs suggested by the model for the years 1981, 1991 and 1996 respectively. If CHC locations were planned using the location-allocation model, the average distance people had to travel to access a CHC could have been 7.3 kilometres, against 8.7 kilometres of actual distance. Geographical accessibility is not homogeneous for all villages. In 1981, a CHC was not available within a distance of 10 kilometres for as many as 585 villages (more than 60 per cent of villages); for 354 of the villages a CHC was not available within a distance of 15 kilometres. Surprisingly, in 208 villages people had to travel more than 20 kilometres to access a CHC. Had the actual number of CHCs been planned using location-allocation models, people in only 30 villages would have had to travel more than 20 kilometres to access these services. The number of CHC locations has increased from 1981 to 1996. Therefore, the average distance for CHCs has also declined. In 1996, a CHC was beyond a distance of 10 kilometres for 278 villages against 585 villages in 1981. In the modelled locations for 1996, a CHC was available within a distance of 15 kilometres for all the villages except three (Table 6.18); people in 166 villages have to travel more than 10 kilometres to access a CHC. A comparison between actual and modelled locations is shown in Table-6.19. In 1981, out of 12, only 4 CHCs were available at the locations suggested by the model and in 1996, however, only 6 out of 26 CHCs were situated at the modelled locations (less than 25 per cent).

Table-6.18 Distance from a CHCs (number of villages)

Year	Distance in kilometres					
	Actual			Modelled		
	>10	>15	>20	>10	>15	>20
1981	585	354	208	529	196	30
1991	449	184	52	362	74	8
1996	278	92	23	166	3	0

Source: Author's calculation

Table-6.19: Actual and modelled locations of CHCs

Year	Rohtak			Bhiwani			Total		
	Number of PHCs		Actual= Modelled (%)	Number of PHCs		Actual= Modelled (%)	Number of PHCs		Actual= Modelled (%)
	Total	Actual= Modelled		Total	Actual= Modelled		Total	Actual= Modelled	
1981	8	1	12.5	4	3	75.0	12	4	33.3
1991	10	3	30.0	8	3	37.5	18	6	33.3
1996	12	3	25.0	14	3	21.4	26	6	23.1

Source: Author's calculation

6.4 PRIVATE HEALTH SERVICES

Until recently, not much attention has been paid to the provision of private health services. Unlike Government health services, private health services do not have an integrated hierarchy, and most can be grouped into two categories: clinics and nursing homes. The latter are primarily located in urban areas and are run by qualified doctors; some of the nursing homes are manned by specialist doctors. The location and functioning of these nursing homes is quite independent and determined by the service owners: generally a doctor or a team of doctors. Generally, private doctors prefer to locate their clinic in urban areas, while in rural areas, registered medical practitioners (RMP) are available. The majority of RMPs are not fully qualified to diagnose major illnesses. They have small clinics and do not have all the necessary equipment and medicines. In this regard, some Government schoolteachers reported that:

> "There are six private doctors (RMPs) in this village and some of them are not registered medical practitioners, and they are not qualified even to practice" (Teachers, Government High School, Brahana, 1997).

Data on the availability of RMPs were collected from District Census Handbooks (DCHBs) for the Census years 1981 and 1991. Data on RMPs in towns/cities were not available, but almost all towns or cities have a large number of qualified RMPs. Therefore for modelling purposes at least one RMP was assigned to each of the towns. There were 485 RMPs in 1981 (including urban areas), and surprisingly their number has declined to 416 in 1991 (instead of increasing). In both the districts, the number of RMPs has declined, but in Bhiwani District the decline is more than 50 per cent. Overall, the number of people for every RMP was 4081 in 1981, increasing to 5674 in 1991. It is probable that people might have started relying more on health services (Government and private) in urban areas. This might have resulted in

a decline in demand for RMPs in rural areas. Therefore, it might have not been profitable for private doctors to practise in rural areas; and some of them might have closed their clinics, especially in the villages of Bhiwani District. A declining number of RMPs in rural areas further raises the doubts about the provision of private health services in rural areas.

Another important issue to note here is that Government expenditure on health services is declining; alongside this the quality of Government health services is also deteriorating, because many medicines, essential drugs and other required facilities are not available to patients. In these circumstances, a large number of patients have to rely on private services. But the private health services are available only at the most accessible and profitable locations. Therefore, people in less developed and accessible locations may suffer. Therefore, the issue of private health services in rural areas has to be addressed in detail.

Table-6.20: RMPs and population size in rural areas

Year	No. RMPs			Population			Population/RMPs		
	Rohtak	Bhiwani	Total	Rohtak	Bhiwani	Total	Rohtak	Bhiwani	Total
1981	354	131	485	1217734	761554	1979288	3440	5813	4081
1991	351	65	416	1422424	937946	2360370	4052	14430	5674

Source: DHCB, Rohtak and Bhiwani Districts, 1981 and 1991

In 1981, out of the total 910 inhabited villages, more than 697 (76.6 per cent) did not have any RMP; only one RMP in 95 villages, and in 118 villages more than one RMP were available (Table-6.21). Inter-district and inter-village disparities in the distribution of RMPs are visible in the study area. In Bhiwani, a RMP was not available in more than 84 per cent of villages, while the figure for Rohtak District is just less than 20 per cent. Interestingly, about 19 per cent of Rohtak villages had more than one RMP.

Table-6.21: Availability of RMPs, 1981 (Rural and Urban)

District	Number of villages				Percentage of villages			
	None	One	More than one	Total	None	One	More than one	Total
Rohtak	332	55	90	477	69.6	11.5	18.9	100
Bhiwani	365	40	28	433	84.3	9.2	6.5	100
Total	697	95	118	910	76.6	10.4	13.0	100

Source: DCHB Rohtak and Bhiwani District, 1981

In 1991, more than 78 per cent of the villages were without a RMP; only 9.3 per of the villages have one RMP and 11.8 per cent more than one RMP. The number of villages with a

RMP has declined marginally in Rohtak District from 1981 to 1991. However, in Bhiwani District more than 90 per cent of the villages did not have any RMP, which proves inter-district disparities in the availability of RMPs (in other words private health services in rural areas).

Table-6.22: Availability of RMPs, 1991(Rural and Urban)

District	Number of villages				Percentage of villages			
	None	One	More than one	Total	None	One	More than one	Total
Rohtak	321	60	96	477	67.3	12.6	20.1	100
Bhiwani	397	25	11	433	91.7	5.8	2.5	100
Total	718	85	107	910	78.9	9.3	11.8	100

Source: DCHB Rohtak and Bhiwani District, 1991

Distance from the town and/or city plays an important role in the location of RMPs as most of the practitioners live in urban areas and prefer to locate their clinics in areas to which they can easily commute. Therefore, distance and availability of transport facilities have an impact on the locations of RMPs in rural areas. The association between availability of a clinic and distance from the nearest town and/or city is examined in the following section (Tables-6.23 and 6.24). There is an inverse relationship between availability of RMPs and distance from the nearest town and/or city. The chi-squared value for both the years was statistically significant at the 5 per cent level of significance, but this was insignificant when the analysis was performed separately for rural areas for the year 1981. However, for 1991 the chi-squared value was 22.34, statistically significant at the 1 per cent level of significance. It can be concluded that the relationship between the availability of RMPs and distance from the nearest town and/or city has been accentuated from 1981 to 1991.

Table-6.23: Availability of RMPs and distance from the nearest town, 1981

Distance from the nearest town (km)	Number of villages				Percentage of villages			
	None	One	More than one	Total	None	One	More than one	Total
Less than 5	76	21	15	112	67.9	18.8	13.4	100
5 to 10	137	20	20	177	77.4	11.3	11.3	100
10 to 20	266	25	53	344	77.3	7.3	15.4	100
20 to 40	218	29	30	277	78.7	10.5	10.8	100
Total	697	95	118	910	76.6	10.4	13.0	100

Source: DCHB Rohtak and Bhiwani District, 1981

Table-6.24: Availability of RMPs and distance from the nearest town, 1991

Distance from the nearest town (km)	Number of villages				Percentage of villages			
	None	One	More than one	Total	None	One	More than one	Total
Less than 5	106	14	15	135	78.5	10.4	11.1	100
5 to 10	148	15	36	199	74.4	7.5	18.1	100
10 to 20	291	44	44	379	76.8	11.6	11.6	100
20 to 40	173	12	12	197	87.8	6.1	6.1	100
Total	718	85	107	910	78.9	9.3	11.8	100

Source: DCHB Rohtak and Bhiwani District, 1981

Figures - 6.19 and 6.20 show the actual locations of RMPs in 1981 and 1991 respectively. The availability of RMPs is better in Rohtak as compared to Bhiwani District. In a radius of about 20 kilometres from Rohtak City not many RMPs are available. The vicinity of a city (where a large number of private and Government health services are available) may explain the poor availability of RMPs in this region. Surprisingly, many villages in Gohana and Meham tashils located in the northern parts of Rohtak Districts have a large number of RMPs. Both these tahsils are well developed agriculturally. It is interesting to note that there has been a significant decline in the number of RMPs in Jhajjar tahsil of Rohtak District from 1981 to 1991.

On the examination of geographical distribution of RMPs, it was observed that the average distance between the location of RMPs and demand points was 3.6 kilometres in 1981, increasing to 4.2 kilometres by 1991. In Bhiwani in 1991, people had to travel more than 6.6 kilometres to access a RMP against less than three kilometres for Rohtak District (Figure-6.21 and 6.22). In 1981, the actual average distance for RMPs was 58 per cent more than the modelled locations, which declined to 52 per cent in 1991. The figures for any of the Government health services were never more than 40 per cent. Therefore, it can be concluded that the geographical efficiency of Government health services is far superior than the private health services. For the location of private health services is always biased in the favour of city and/or town or more accessible (developed) areas.

There is a greater degree of dissimilarity between actual and modelled locations of RMPs (Table-6.26). During both the Census years just 22 per cent of RMPs were available at the locations suggested by the model, again showing inter-district disparities in their distribution (Figure-6.23 and 6.24). In absolute terms, only 29 and 15 actual and modelled locations were

the same in Bhiwani and Rohtak Districts respectively. But in terms of percentage, more than 41 per cent of the RMPs in Bhiwani were available at the modelled locations against 18.6 per cent in Rohtak District in 1991.

Table-6.25: Actual and modelled distance from RMPs (kilometres)

Year	Rohtak		Bhiwani		Total	
	Actual	Modelled	Actual	Modelled	Actual	Modelled
1981	2.85	1.90	4.79	3.03	3.68	2.32
1991	2.72	1.75	6.55	4.60	4.20	2.75

Source: Author's calculation

Table-6.26: Actual and modelled locations of RMPs

Year	Rohtak			Bhiwani			Total		
	Number of PHCs		Actual=	Number of PHCs		Actual=	Number of PHCs		Actual=
	Total	Actual= Modelled	Modelled (%)	Total	Actual= Modelled	Modelled (%)	Total	Actual= Modelled	Modelled (%)
1981	145	29	20.0	68	18	26.5	213	47	22.1
1991	156	29	18.6	36	15	41.7	192	44	22.9

Source: Author's calculation

6.5 GOVERNMENT VERSUS PRIVATE AND QUALITY OF HEALTH SERVICES

In terms of number, there has been a significant improvement in the Government health services in rural areas. One of the important tasks of Government health services has been to provide preventative health services. No doubt, these services have a significant impact on declining death and increasing life expectancy rates. Trained and qualified staff are employed in the Government health services in rural areas, especially in PHCs and CHCs. But due to various forms of negligence, the reliability of Government health services is declining and people have to depend on expensive private doctors in the city or town or nursing homes. It is appropriate to report here the comments of one interviewee:

> "I was ill and went to the Government hospital in Tosham. The doctor declared that I was suffering from TB, and prescribed TB treatment. There was not any improvement in my condition with the medicines doctor prescribed, and my condition deteriorated day by day. Then I went to a private doctor, who wanted to X-ray my chest. When I was going to get my chest x-rayed I became faint and my friends brought me back to my village. When I woke up my family members were crying as they thought I was dead. I asked them why are you crying, I am still alive. I asked them to arrange a taxi. I, along with another family members, went to a private nursing home in Bhiwani run by Dr. Shiv Kumar Sharma, and this doctor found that I was not suffering from TB, but pneumonia and anaemia. He properly diagnosed me and discharged me within 7 days". But the doctor charged him heavily. When he was telling me his story his eyes were full of tears (Sarjit Singh, Patodi, 1998).

If this is the type of care and diagnosis by the trained MBBS doctors in the Government hospitals how can people rely on these services? Moreover, the Government has not been able to cater to the demand for clinical health services. There seem to be three important reasons for that. Firstly, clinical health services are generally required for ill people. If Government services are not available within the village, people have to rely more on a private doctor, as it is difficult to take patients to the neighbouring villages if transport facilities are not available. Secondly, as discussed in the next chapter, the availability of a PHC in a village greatly enhances the chances of its utilisation. But a large number of villages do not have a PHC, which is the first direct link between people and clinical health services. Health sub-centres are available in more than 50 per cent of villages, but these are primarily engaged in preventive health measures. Finally, due to a shortage and misallocation of funds, adequate medicines and other essential drugs are not available to patients at Government health centres. The CMO's comment further substantiates this argument:

> "Earlier patients were fewer and they were likely to get medicines from the Government health centres...now it is not so. The financial crisis and increasing pressure on the available services are some of the important reasons for poor maintenance and quality of services" (CMO, Bhiwani, 1998).

Within the limited resource availability, it may not be practically possible to provide health services in all the villages (especially in small villages). But at least public transport must be available in all the villages, so that villagers can access health services located in neighbouring villages. Many households reported that 'if we go to a Government health centre, the doctor would prescribe medicines and injections and the cost of these would be more than a private doctor's fee for the complete treatment (consultation and medicines)'. Because of increasing demand, Government health services are over crowded and patients have to wait for a long time. A doctor in a PHC reported that:

> "We have good clinical services. Many patients come to our clinic, but because of the limited staff and resources we are unable to give as much time to each patient as private doctors in the village can and we can provide limited clinical health services. Therefore, some of the patients also go to private doctors" (Dr. Sunil Verma, MBBS, Doctor, PHC Kehrawar, 1998).

As a consequence, a large number of patients have to rely on private doctors within villages. But many of these RMPs in villages are not well trained and qualified. Therefore, some people do not like to consult these doctors. A villager, Mr. Pal, reported that:

"The private doctors in the village are unable to diagnose properly and when the patient is beyond their control, they refer him/her to a Government hospital. Therefore, I do not consult private doctors, as it is better to get a proper treatment in the Government hospital right at the beginning of illness, or the case might be distorted by a private doctor. Let me cite an example, when my son fell ill, firstly, I took him to a private doctor, but this private doctor could not diagnose him properly and ultimately I had to take him to the civil hospital, Bhiwani. Therefore it is better to consult qualified doctor in the Government hospital right at the beginning of any illness" (Rishi Pal, Bapora, 1998).

The non-availability of adequate medicines, injections and other necessary equipment are some of the other important reasons for the deteriorating quality of Government health services and the lack of funds has resulted in a shortage of medicines and materials. To examine the allocation of funds, expenditure data on health was collected from the civil surgeon's office for the financial years 1996-97 and 1997-98. A major proportion of total expenditure on general health is spent on the payment of salaries of doctors and other supporting staff (Tables-6.27 and 6.28). For both financial years, more than 85 per cent of the total expenditure on general health was spent on the payment of salaries and less than 15 per cent on maintenance and consumables (medicine and other related materials). It is interesting to note that in Rohtak District the expenditure on maintenance and consumables is more than 10 per cent for both years, while in Bhiwani (which is a less developed district) it is less than 10 per cent. Overall, there was more than a 20 per cent increase in expenditure on general health services, but (surprisingly) in Bhiwani, a 32 per cent decline in expenditure on maintenance from 1996-97 to 1997-98, while on the payment of salaries about a 30 per cent increase. A major proportion of funds allocation to general health services is spent of the payment of salaries; consequently, a meagre amount of funds is left for the maintenance and improvement in the quality of Government services.

Private services, however, do not provide any of the preventative health services, as the rate of return would not be profitable to them. Secondly, a majority of these private doctors are located at the most accessible locations. Moreover, the Government does not have control on their functioning and location. The declining number of private doctors in rural areas further raises the question of the viability of private health service provision in the study area.

Table-6.27: Expenditure on general Government health services, 1996-97

District	Million Rupees				Percent			
	Salary	Maint-enance	Others	Total	Salary	Maint-enance	Others	Total
Bhiwani	27.060	2.32	1.06	30.44	88.90	7.63	3.47	100
Rohtak	25.530	4.51	1.30	31.34	81.46	14.39	4.15	100
Total	52.590	6.83	2.36	61.78	85.13	11.06	3.82	100

Source: Civil surgeon's office, Rohtak and Bhiwani Districts

Table-6.28: Expenditure on general Government health services, 1997-98

District	Million Rupees				Percent			
	Salary	Maint-enance	Others	Total	Salary	Maint-enance	Others	Total
Bhiwani	35.200	1.57	0.80	37.57	93.70	4.17	2.13	100
Rohtak	31.900	5.34	1.40	38.64	82.56	13.82	3.62	100
Total	67.100	6.91	2.20	76.21	88.05	9.06	2.89	100

Source: Civil surgeon's office, Rohtak and Bhiwani Districts

6.6 SUMMARY OF RESULTS AND DISCUSSION

6.6.1 Summary of results: Since the beginning of the planning era in 1951, the Government of India has developed a vast network of public health services staffed by a large number of medical and paramedical personnel. But the majority of public health services are not functioning optimally and effectively to cater for the needs of villagers, because of the lack of essential infrastructure, suitable equipment and an appropriate workforce especially in some critical positions and due to poor referral services (Government of India, 1997). A major proportion of the people (particularly in rural and less developed areas) lacks access to public health services, although there has been a substantial increase in the number of CHCs, PHCs and Sub-Centres, doctors and per capita expenditure on health services over the last three decades.

There is a positive relationship between population size and the availability of a sub-centre, PHC and CHC that means demand might have been responding to the location of these services (if population size is considered to be a proxy of demand). Another noticeable feature is the regional disparities in the distribution of health services. Urban areas succeed in attracting a large proportion of high-tech sophisticated secondary and tertiary (Government as well as private) health services. However, in most of the rural areas only sub-centres and PHCs are available.

The number of public health services, namely sub-centres, CHCs and PHCs, has increased dramatically from 1981 to 1996; and the average distance to access them has also declined from 1981 to 1996. But there is little evidence supporting the improvement in their geographical efficiency, which suggests a lack of rationality behind the locations of new and/or upgrading of existing public health services (in terms of distance and demand).

Private doctors (RMPs) in rural areas cater for the needs of a substantial proportion of the population (especially for clinical/curative health services), but many of the RMP doctors (practising in rural areas) are not qualified. The cost of utilisation of RMPs or nursing homes in urban areas is relatively high as compared to rural areas; and because of this only a small proportion of villagers consult private health services in a town and/or city. Moreover, the number of RMPs (especially in rural areas) has declined from 1981 to 1991 in both the districts (including 50 per cent decline in Bhiwani District alone). Distance from the town and/or city and availability of transport facilities have a significant impact on the locations of RMPs in rural areas, because most of the practitioners commute to rural areas and prefer to locate their clinics in the areas to where they can easily commute.

The field observations suggest that the quality of Government health services does not make people's expectation. The non-availability of adequate medicines, injections and necessary equipment are some of the important reasons for the deteriorating quality of Government health services. A lack of funds has resulted in a shortage of medicines and materials and more than 85 per cent of the total Government health expenditure is incurred on the salary payment of doctors and other supporting staff. This may not leave adequate funds for medicine and maintenance of health services. In these circumstances, a large number of patients have to depend on private services. But the private health services are available only at the most accessible and profitable locations. Moreover, the Government does not have control on their functioning and location, which further raises the doubt about the reliability of private health services provision in rural areas. Besides, private services do not provide any of the preventative health services, as the rate of return would not be profitable to them.

Inter-district disparities can be noticed in the availability of sub-centres, PHCs, CHCs and RMPs. Villagers of Rohtak District have a relatively better geographical access to both

Government and private health services as compared to Bhiwani. In fact, people in Rohtak District have to travel lesser distances to access Government health services, but their geographical efficiency level is lower than in Bhiwani District.

6.6.2 Discussion: The pressure has been building for better health since 1960 and state Governments and international funding agencies have assisted in the provision of health services throughout the world (with major emphasis on the Developing Countries). On two separate occasions in 1970 and 1977, the World Health Assembly Organisation has proclaimed that 'health is a human right'. The right to a standard of living adequate for health and well-being are enshrined in Article 25 of the Declaration of Human Rights and 'health as a human right' is one of the 10 themes to be emphasised during WHO's and UDHR's (Universal Declaration of Human Rights) 50^{th} anniversaries.

It is beyond doubt that there has been a significant improvement in the provision of Government health services in the study area from 1981 to 1996. The CMO's comment will further verify this:

> "At the inception of Haryana State, Bhiwani was a part of Hisar District and negligible health facilities were available to the people. There used to be only one CMO in the whole of Hisar District. Now four districts have been carved out of Hisar, and in each of these four districts a CMO and all type of specialists are available. Now, we have considerably more facilities and manpower" (CMO, Bhiwani, 1998).

Not only in the study area but throughout the Developing World rural-urban and inter-regional disparities in the provision of health services are noticeable (Pillai and Shannon, 1995). In India inequalities have been widening over the years despite many-fold increases in the health budget in every plan period (Akhtar and Izhar, 1994). Jeffery (1991) describes these inequalities in terms of neglect of the needs of the disadvantaged. He argues that 'health services respond to the demands of some groups rather than others: men's complaints rather than those of women or children, town-dwellers' rather than villagers, ruling races, classes or parties rather than those of the ruled... These groups experience different disease spectrums and they also interpret their experiences differently' (Jeffery, 1991, 102).

The advantaged groups represent a relatively small section of the population and their disease patterns are somewhat different from the other sections of the society. Therefore, the

provisions of health services in relation to their demand may not take into account the needs of other sections of the society. In the Developing Countries, 60 to 80 per cent of public health budgets is spend on 'urban hospitals' despite the fact that only a small fraction of population may need hospital services and more than three quarters of their population live in rural areas (Griffin, 1991).

About 70 per cent of the populations of the Third World Countries do not have access to modern medicines or health care, and in some countries this figure is even above 80 per cent (Phillips, 1990). Therefore, 'the enjoyment of the highest attainable standards of health to all', which the WHO describes as 'one of the fundamental rights' is still a distant reality, for two important reasons. Firstly, a mechanical approach has been adopted and this objective is seen as a by-product, something that will trickle down to the bottom sometime in the future. Secondly, almost all Developing Countries are suffering from financial crises, but Green (1991) argues that access to universal primary health is financeable. The real problem is not funding, but the obstacle from medical professional conservatism together with its interaction with elite interests and political priorities. Medical professionalism tends to be a conservative force in favour of curative and high quality/limited access services and against towards preventative and low cost/universal access ones (Green, 1991). These forces are constantly at work. Therefore, there is a long way to go before 'the fundamental right to health' reaches those who are destitute (currently one fifth of the human race), those who survive precariously in the informal sector, or those whose access to health care is limited by their age or their disabilities.

Some researchers emphasise the need for change in Governments' priorities from high-tech sophisticated hospitals to universal provision of PHCs. Within the prevailing financial constraints, the Developing Countries cannot afford to spend considerable health budgets on hospitals. Therefore, the best way to allow Governments to concentrate on public health is to privatise hospitals and remove them from Government budgets (Griffin, 1991). Exploitation of the private sector to provide high-cost curative services will allow Governments to divert their meagre health resources to activities that are more appropriate to the health problems faced by the majority of their citizens. But the major problem is an appropriate financing mechanism for private hospital care and contractual relationships for some aspects of

outpatient or clinic care (Griffin, 1991, 46). The role of private sector investment in health is always doubted, as it may not improve poor people's access to these services.

Besides availability, other important issues are: (a) whether the available health services are accessible to needy people, (b) how effectively these services are catering for the needs of people and (c) what governs the accessibility to these services. In the next chapter an attempt will be made to examine these issues in detail based on an extensive field survey in the study area.

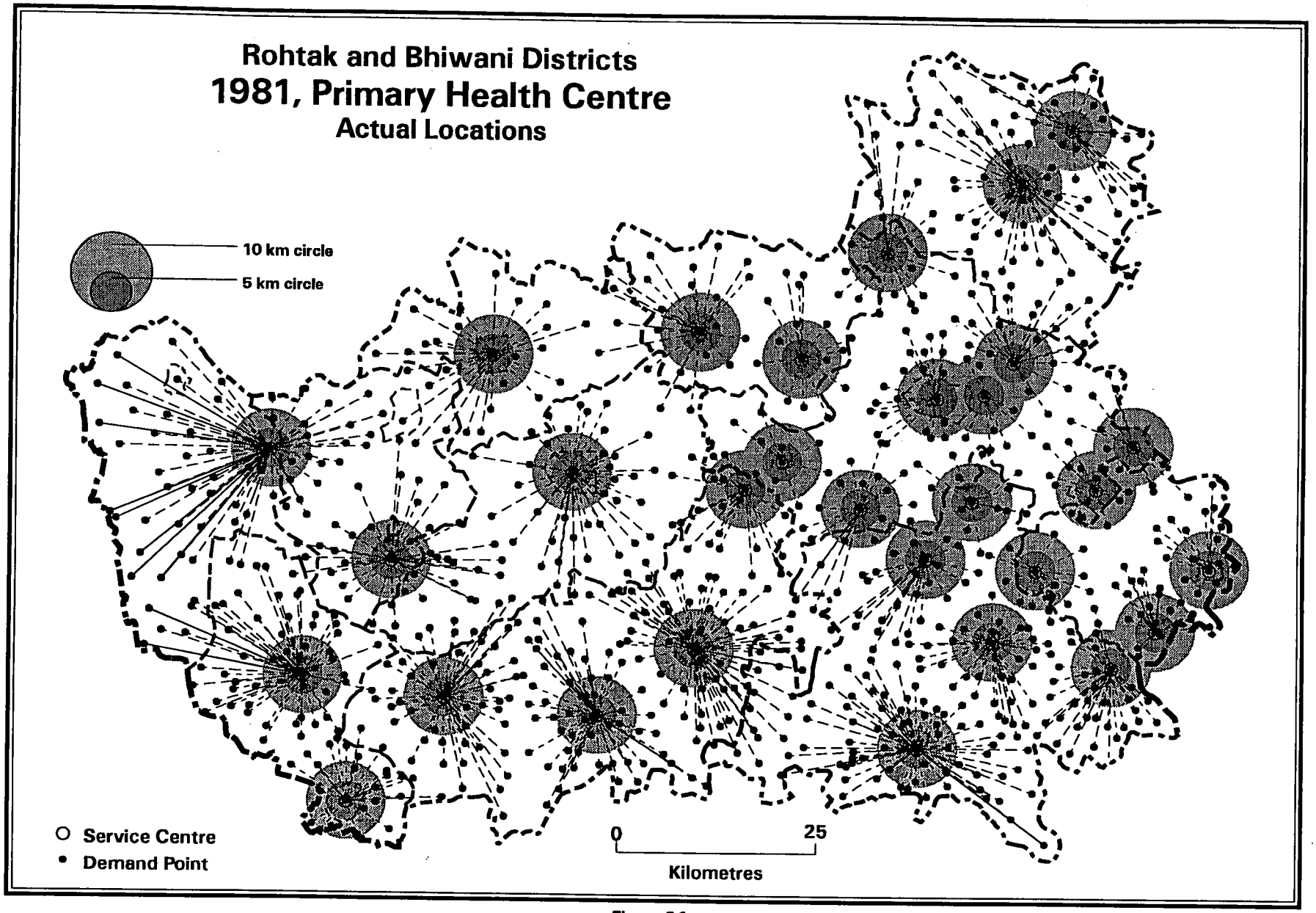

Rohtak and Bhiwani Districts
1981, Primary Health Centre
Actual Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-6.1

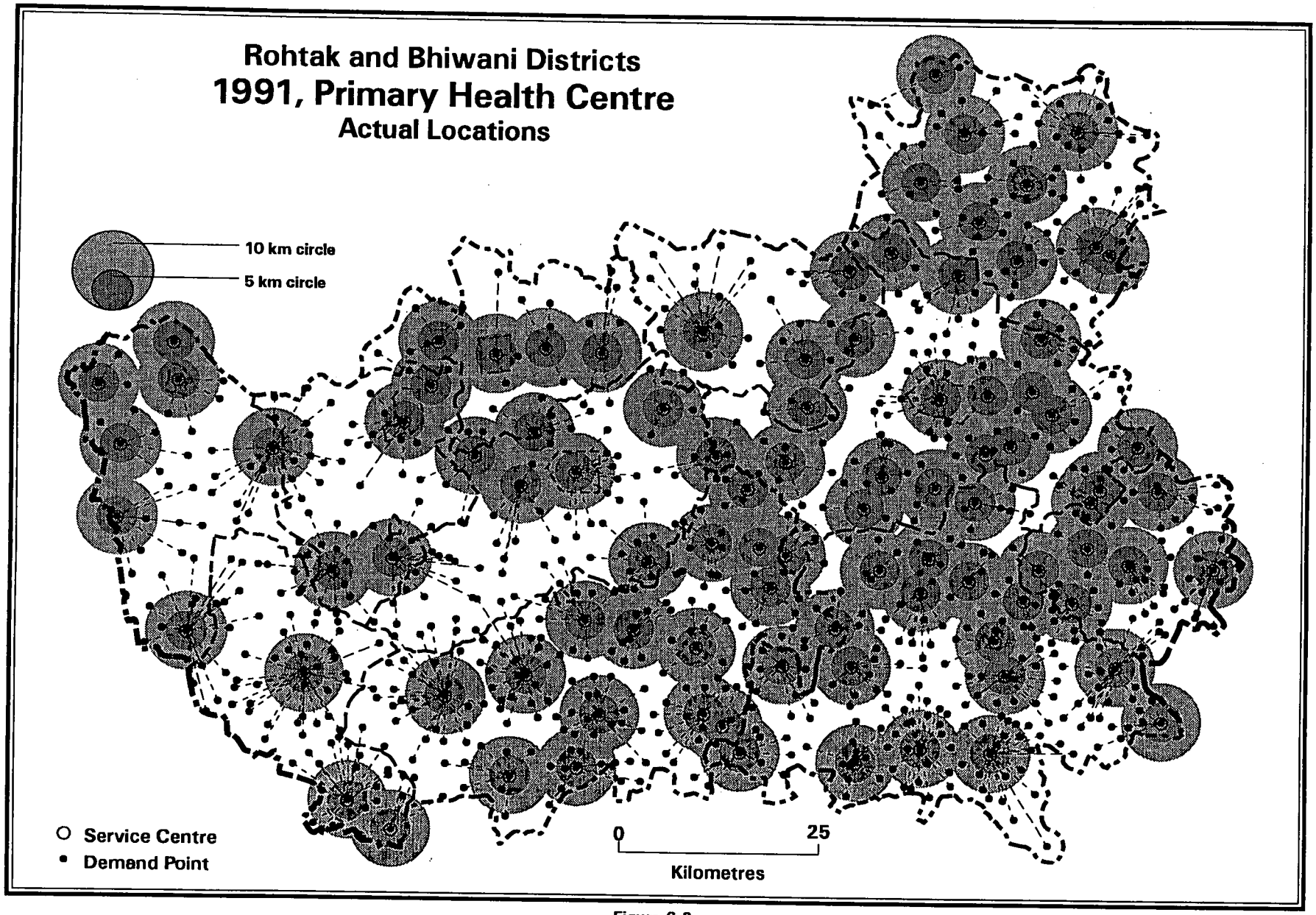

Rohtak and Bhiwani Districts
1991, Primary Health Centre
Actual Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-6.2

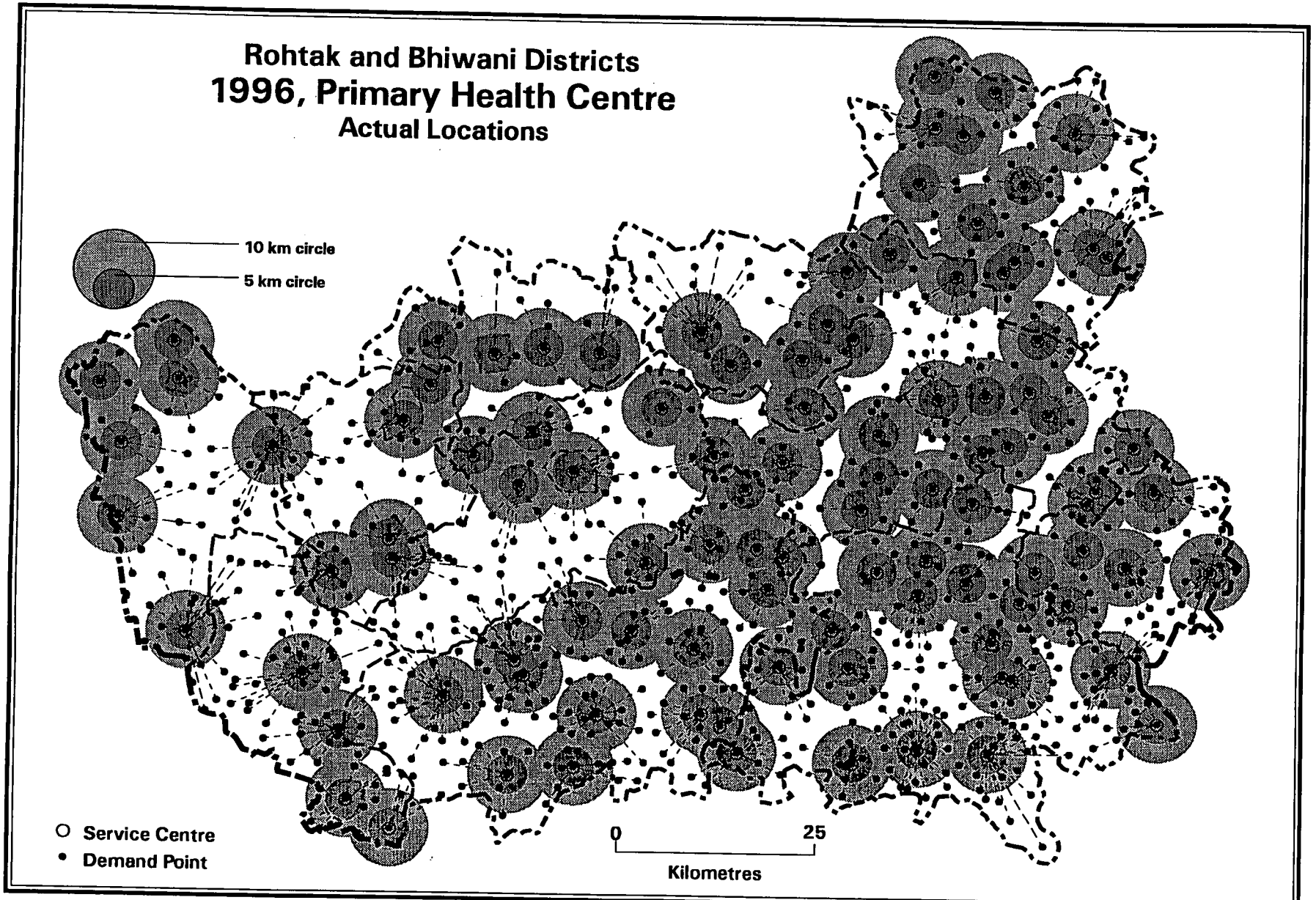

Rohtak and Bhiwani Districts
1996, Primary Health Centre
Actual Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-6.3

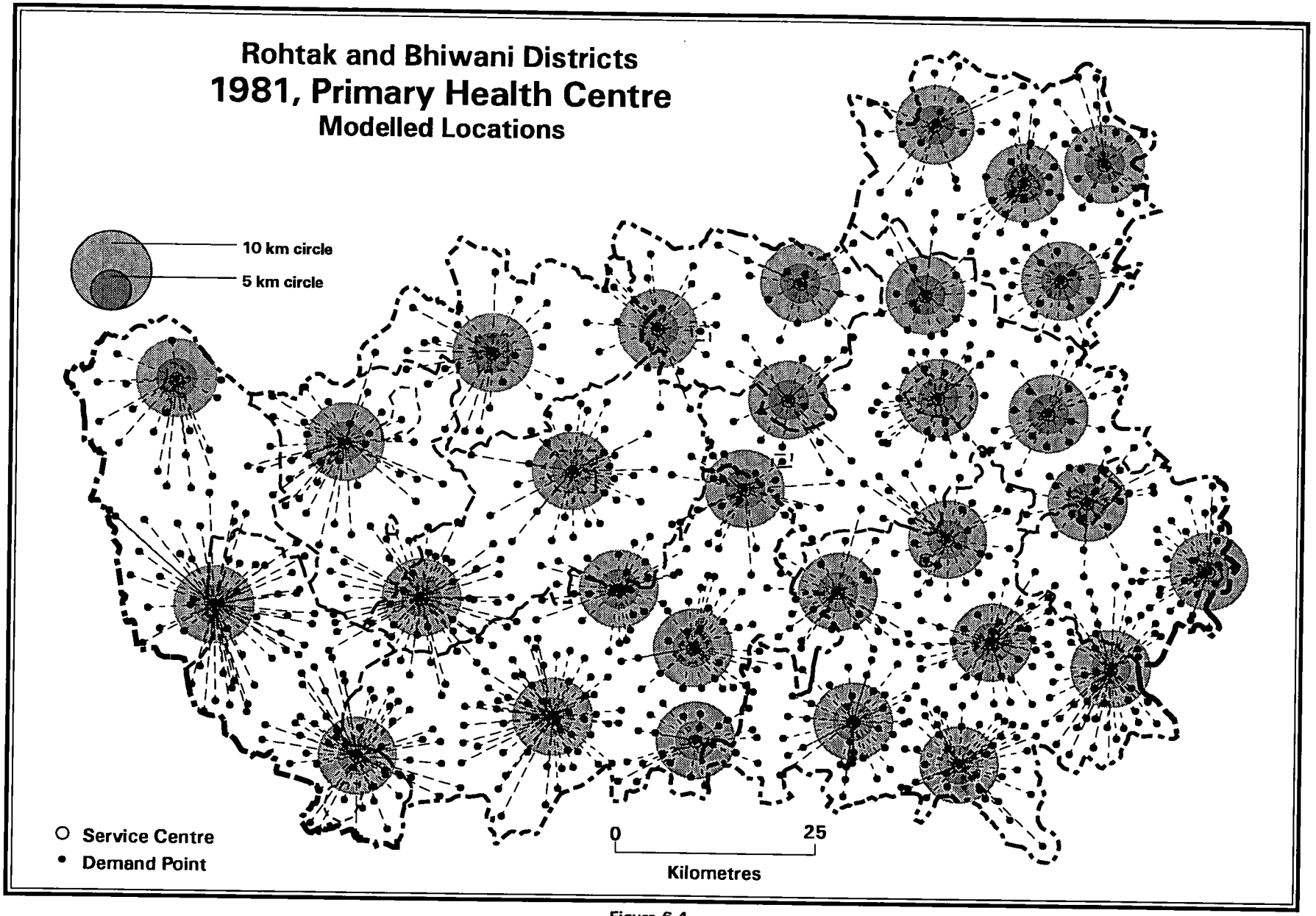

Rohtak and Bhiwani Districts
1981, Primary Health Centre
Modelled Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-6.4

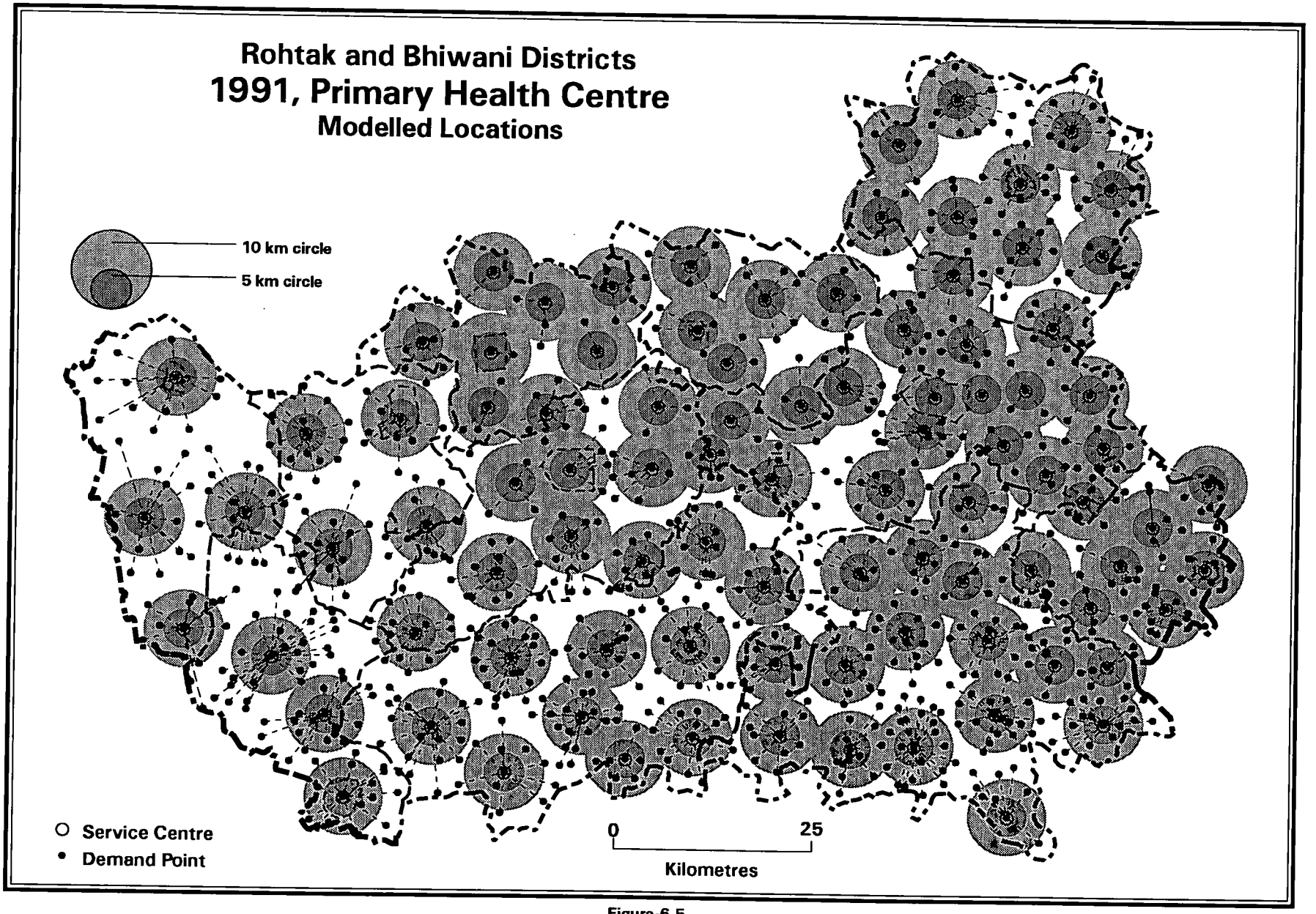

Rohtak and Bhiwani Districts
1991, Primary Health Centre
Modelled Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-6.5

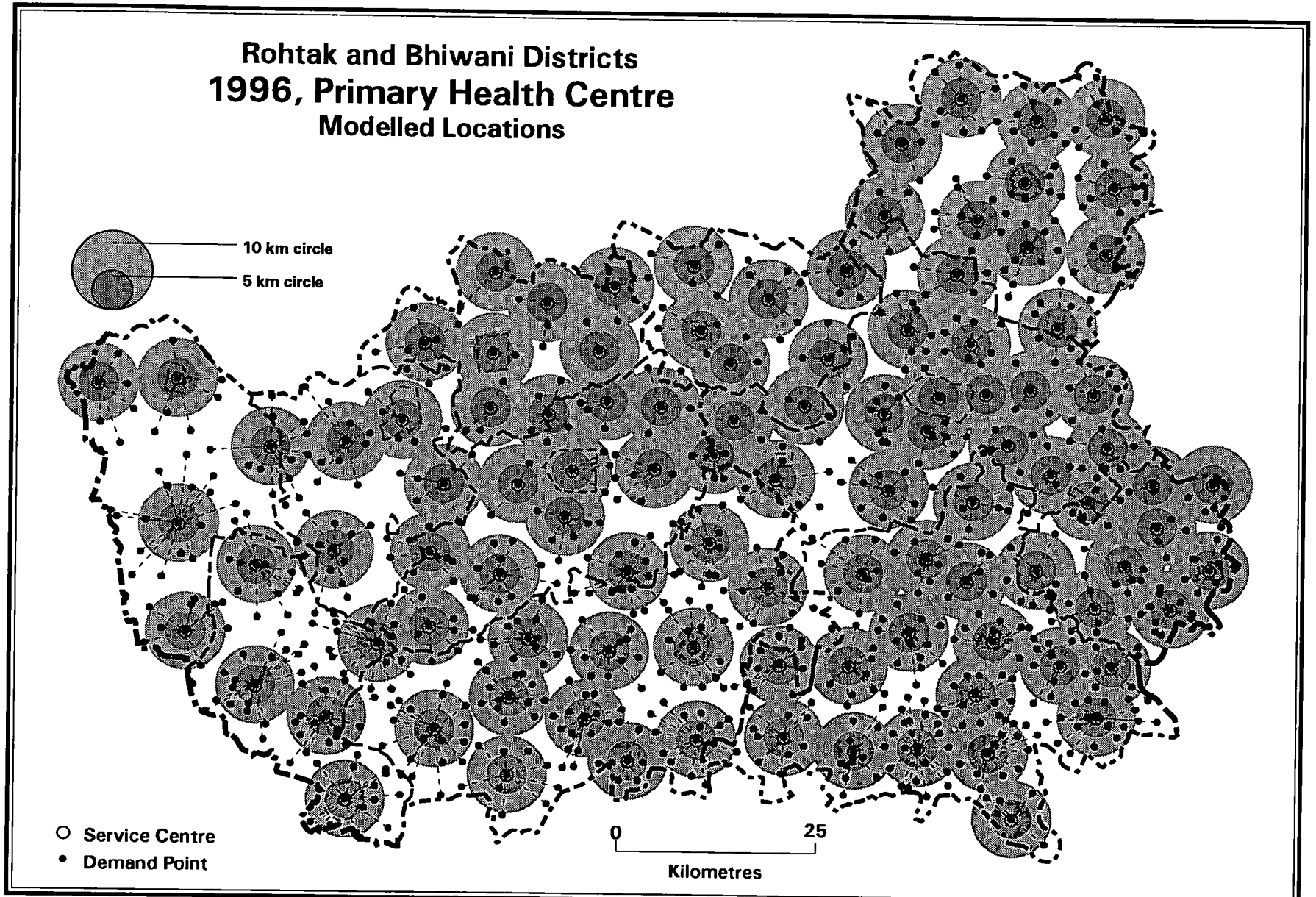

Rohtak and Bhiwani Districts
1996, Primary Health Centre
Modelled Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-6.6

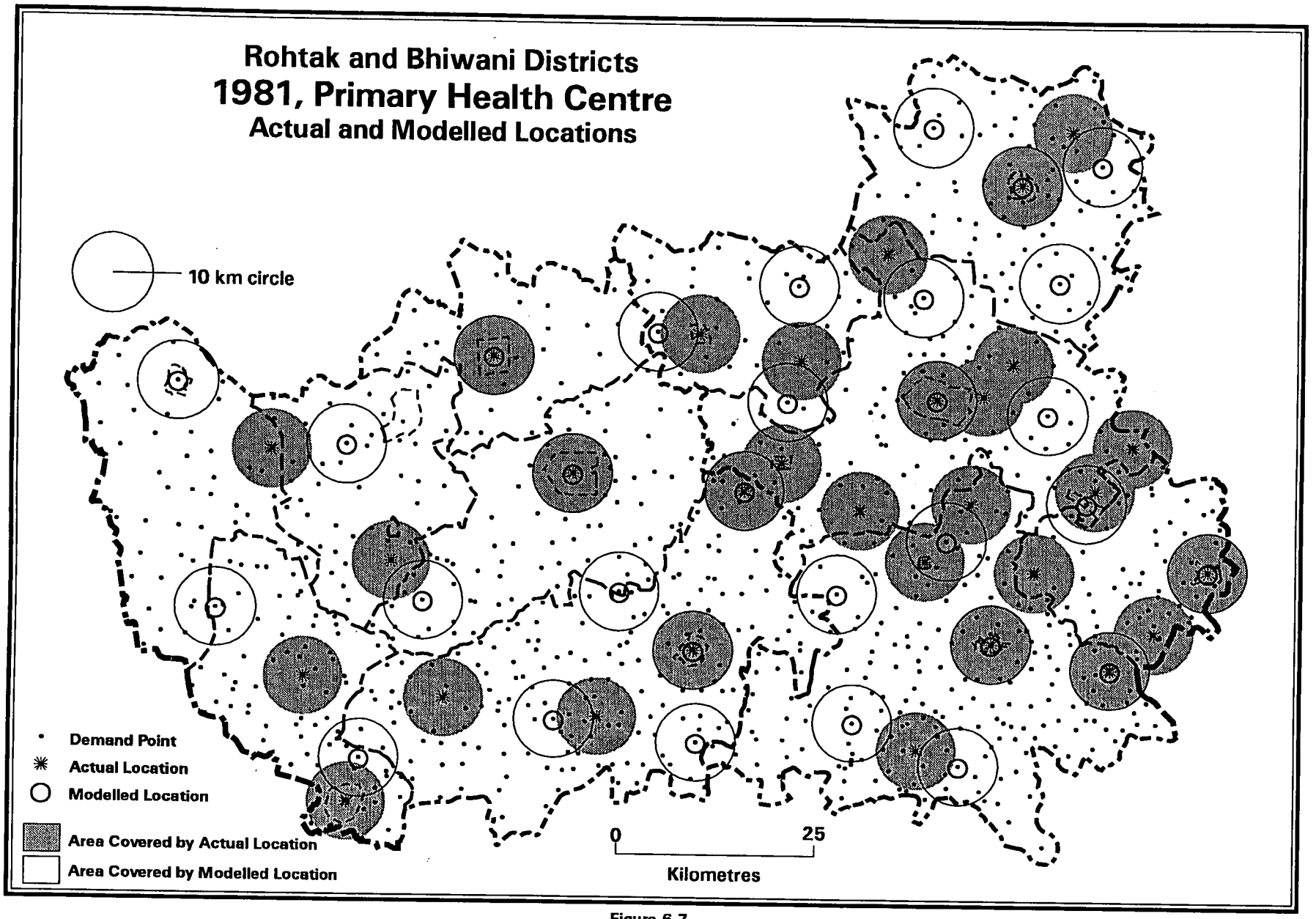

Rohtak and Bhiwani Districts
1981, Primary Health Centre
Actual and Modelled Locations
10 km circle
Demand Point
Actual Location
Modelled Location
Area Covered by Actual Location
Area Covered by Modelled Location
0
25
Kilometres

Figure-6.7

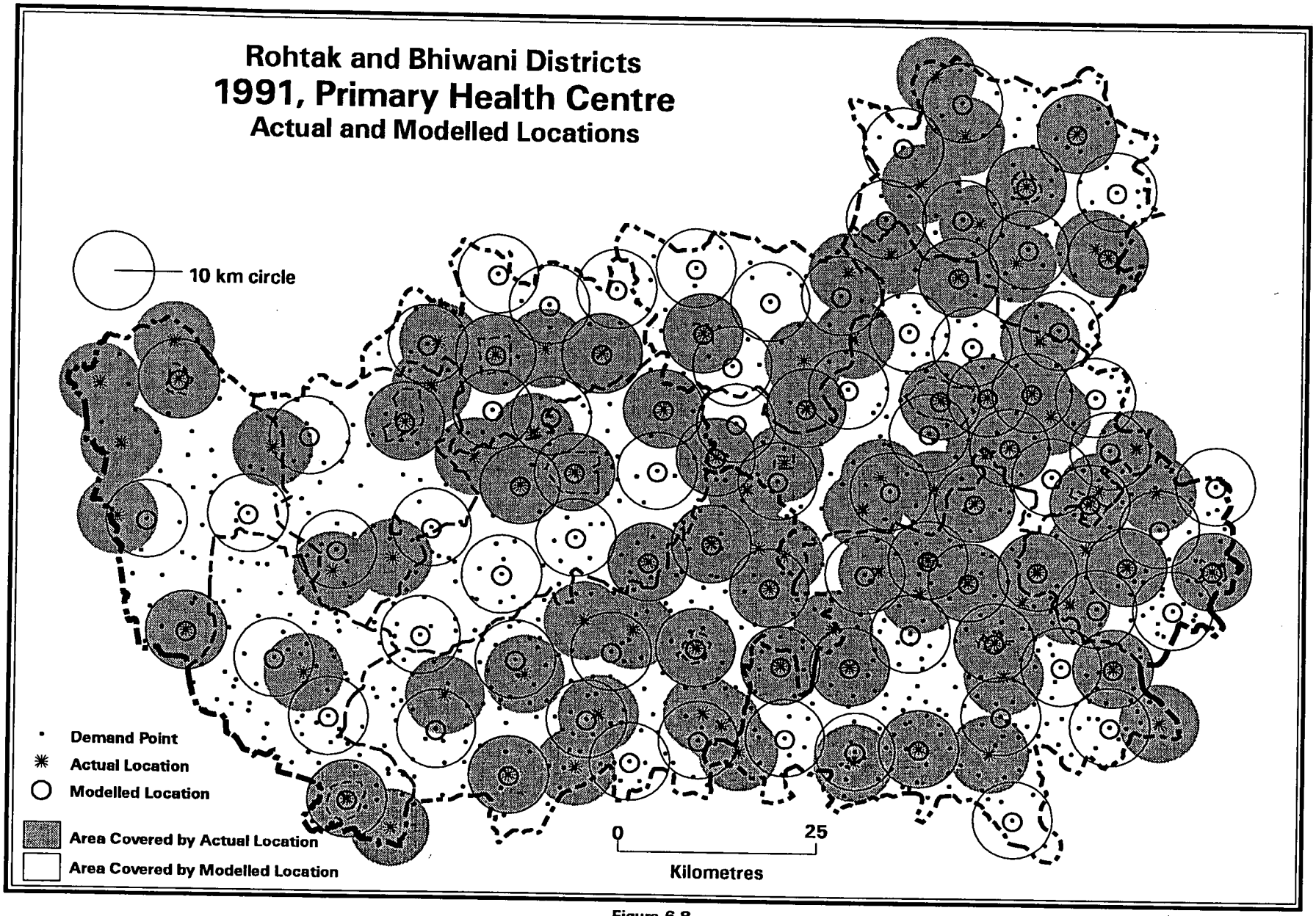

Rohtak and Bhiwani Districts
1991, Primary Health Centre
Actual and Modelled Locations
10 km circle
Demand Point
Actual Location
Modelled Location
Area Covered by Actual Location
Area Covered by Modelled Location
0
25
Kilometres

Figure-6.8

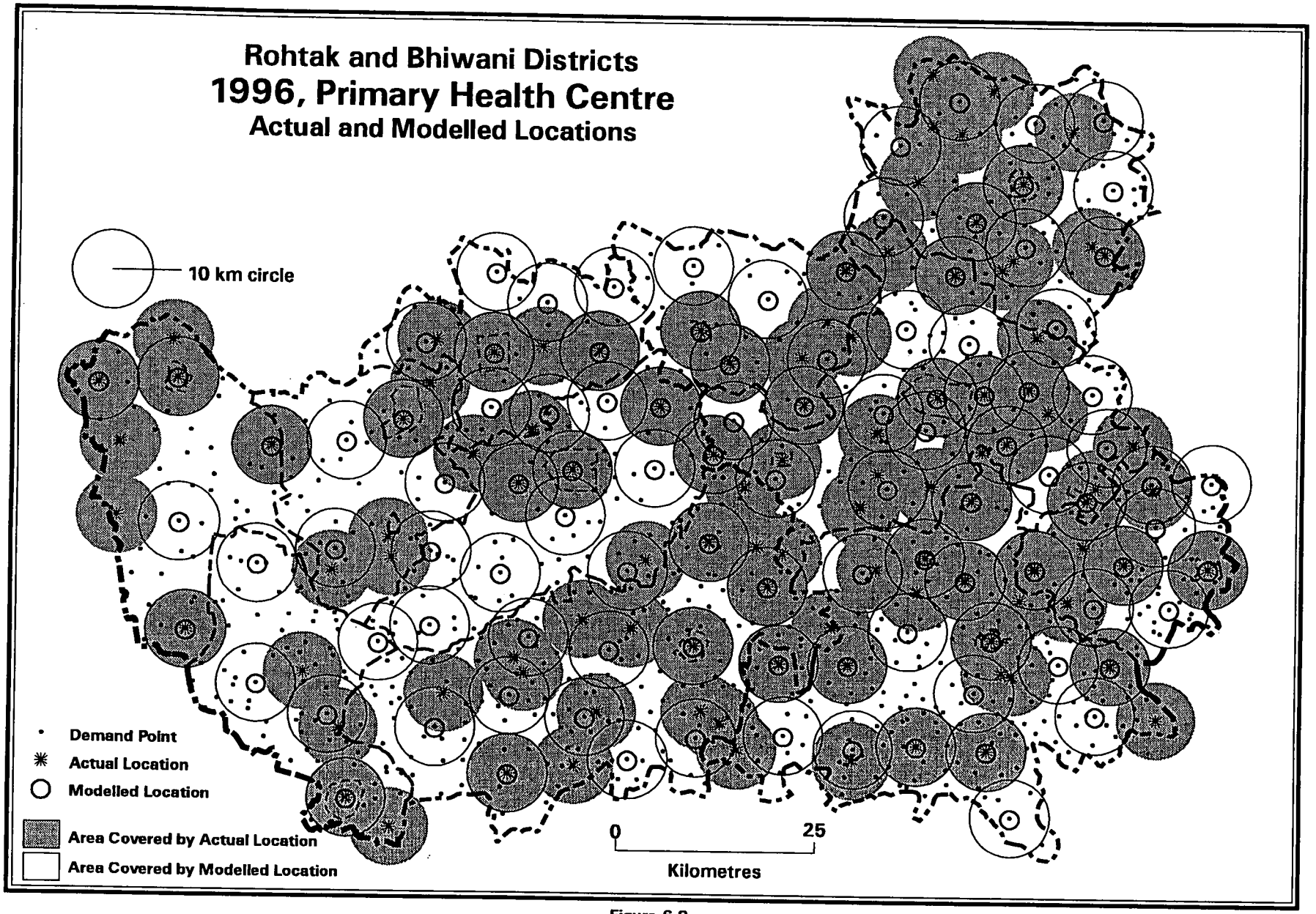

Rohtak and Bhiwani Districts
1996, Primary Health Centre
Actual and Modelled Locations
10 km circle
Demand Point
Actual Location
Modelled Location
Area Covered by Actual Location
Area Covered by Modelled Location
0
25
Kilometres

Figure-6.9

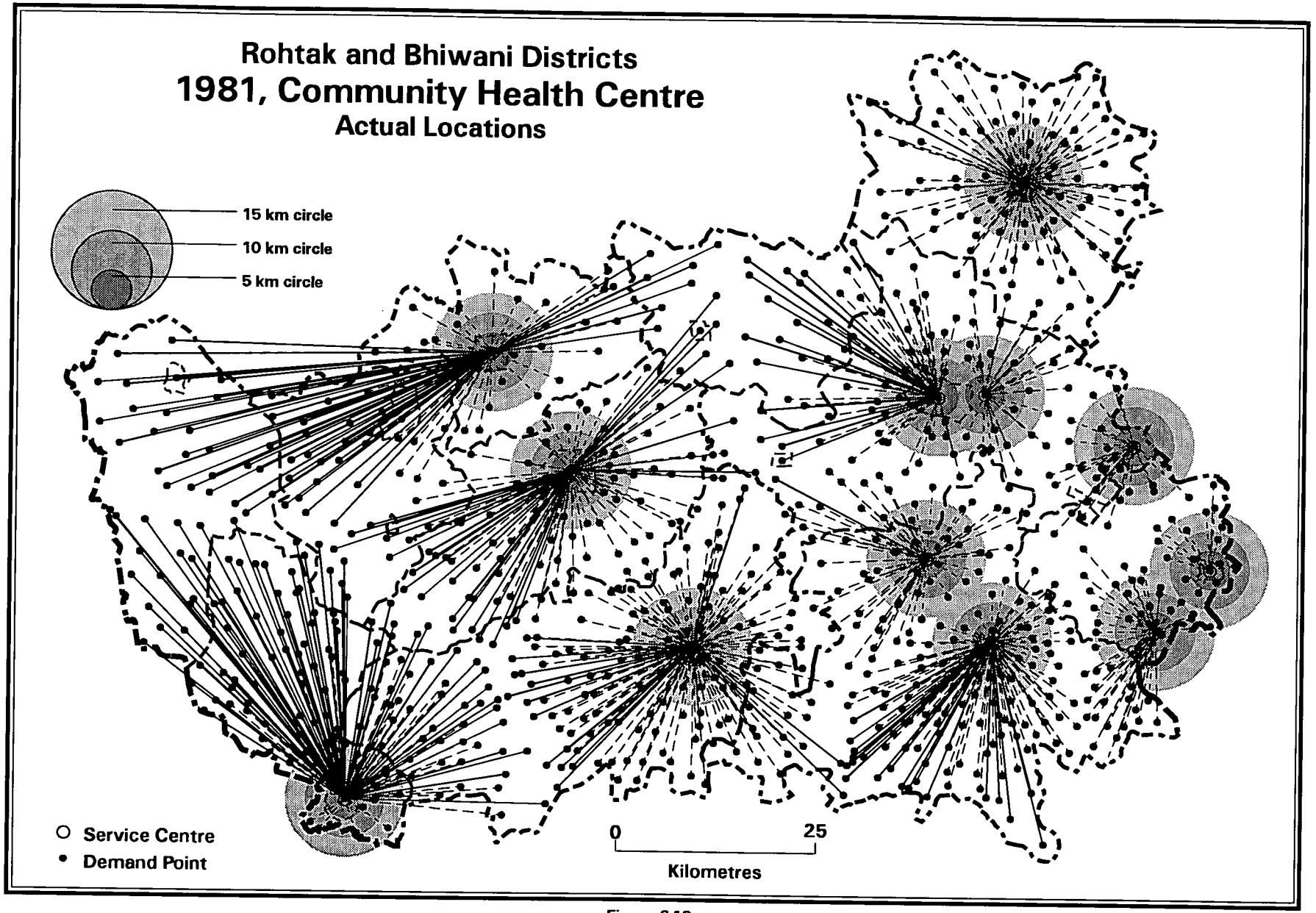

Rohtak and Bhiwani Districts
1981, Community Health Centre
Actual Locations
15 km circle
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-6.10

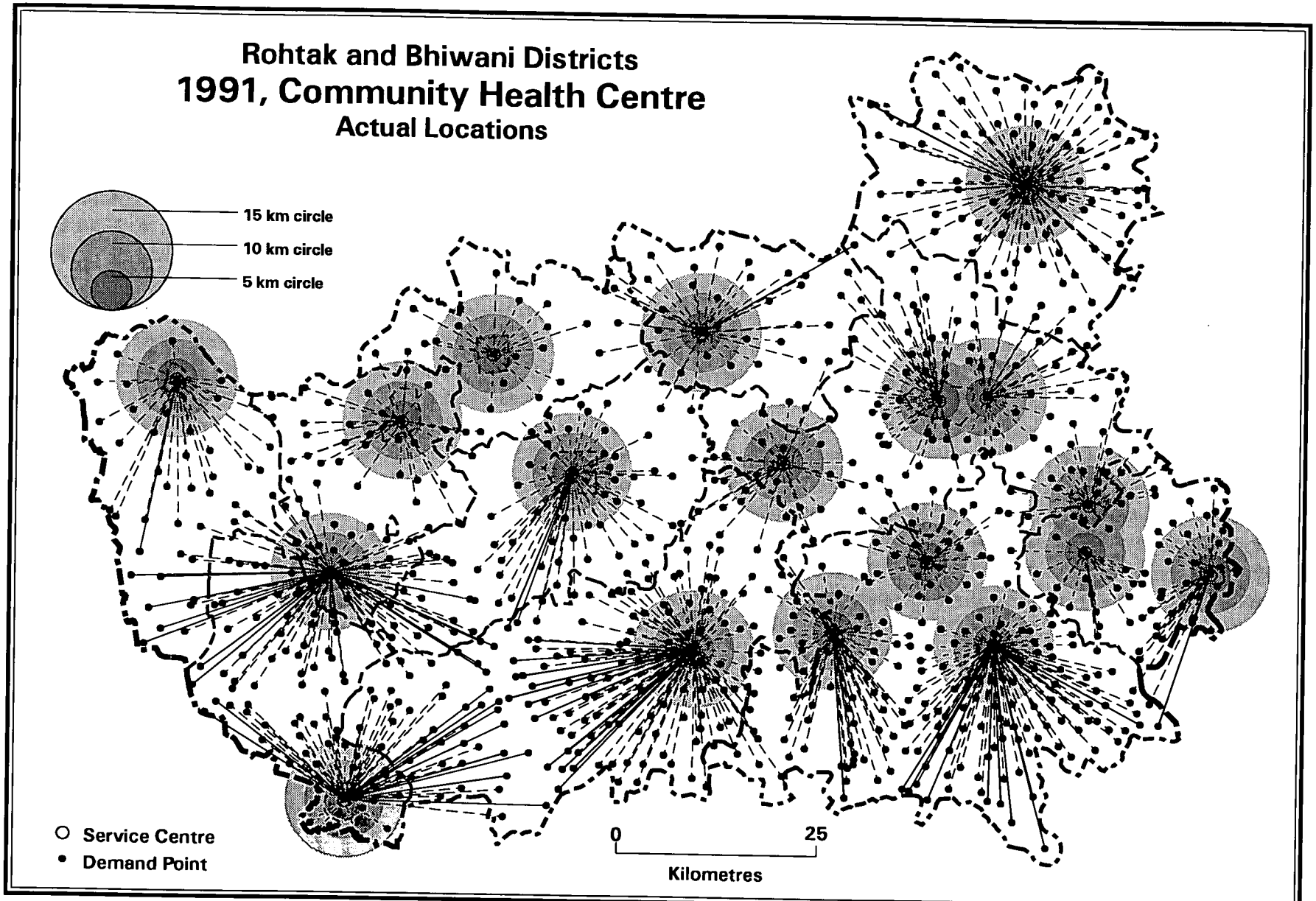

Rohtak and Bhiwani Districts
1991, Community Health Centre
Actual Locations
15 km circle
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-6.11

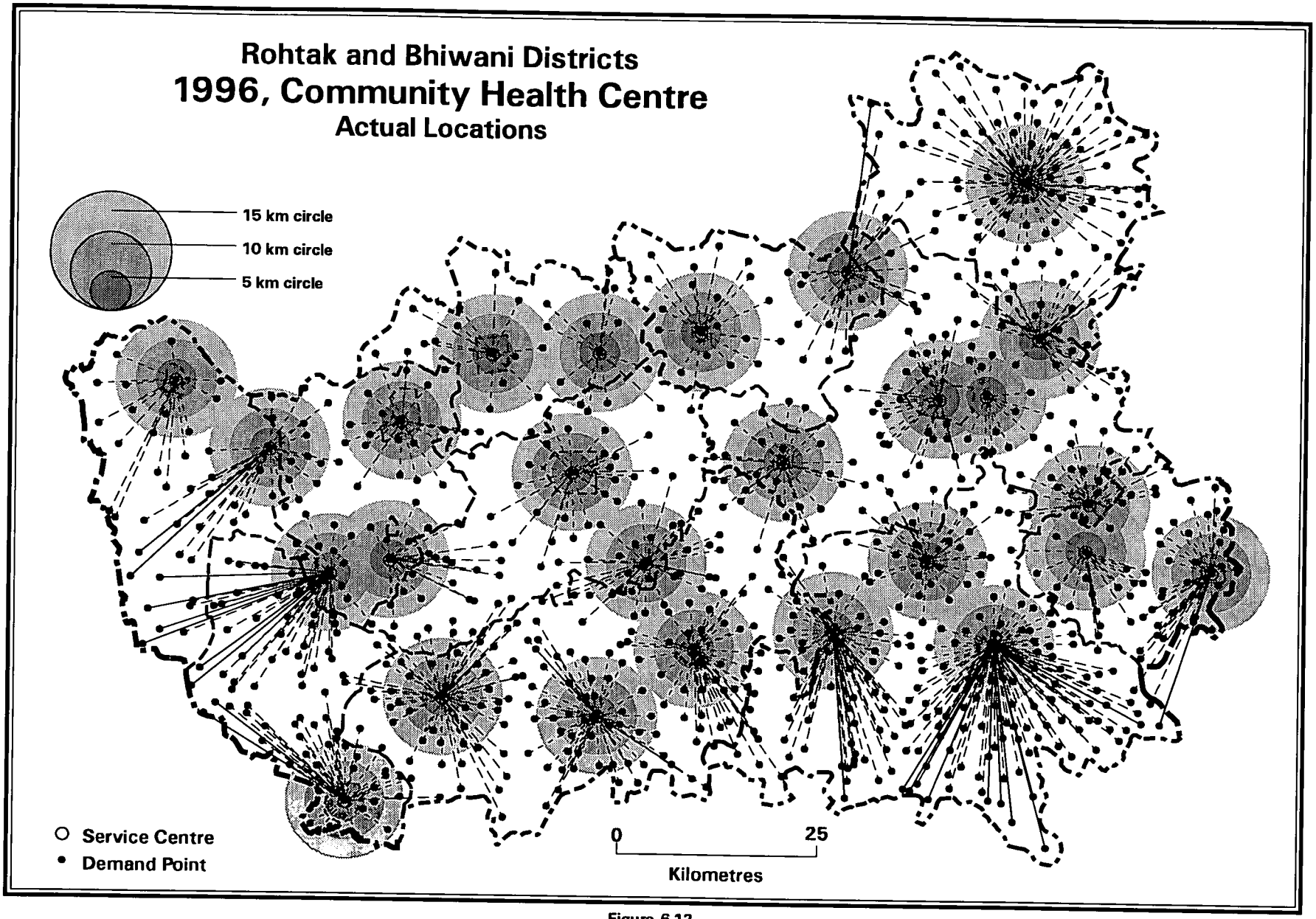

Rohtak and Bhiwani Districts
1996, Community Health Centre
Actual Locations
15 km circle
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-6.12

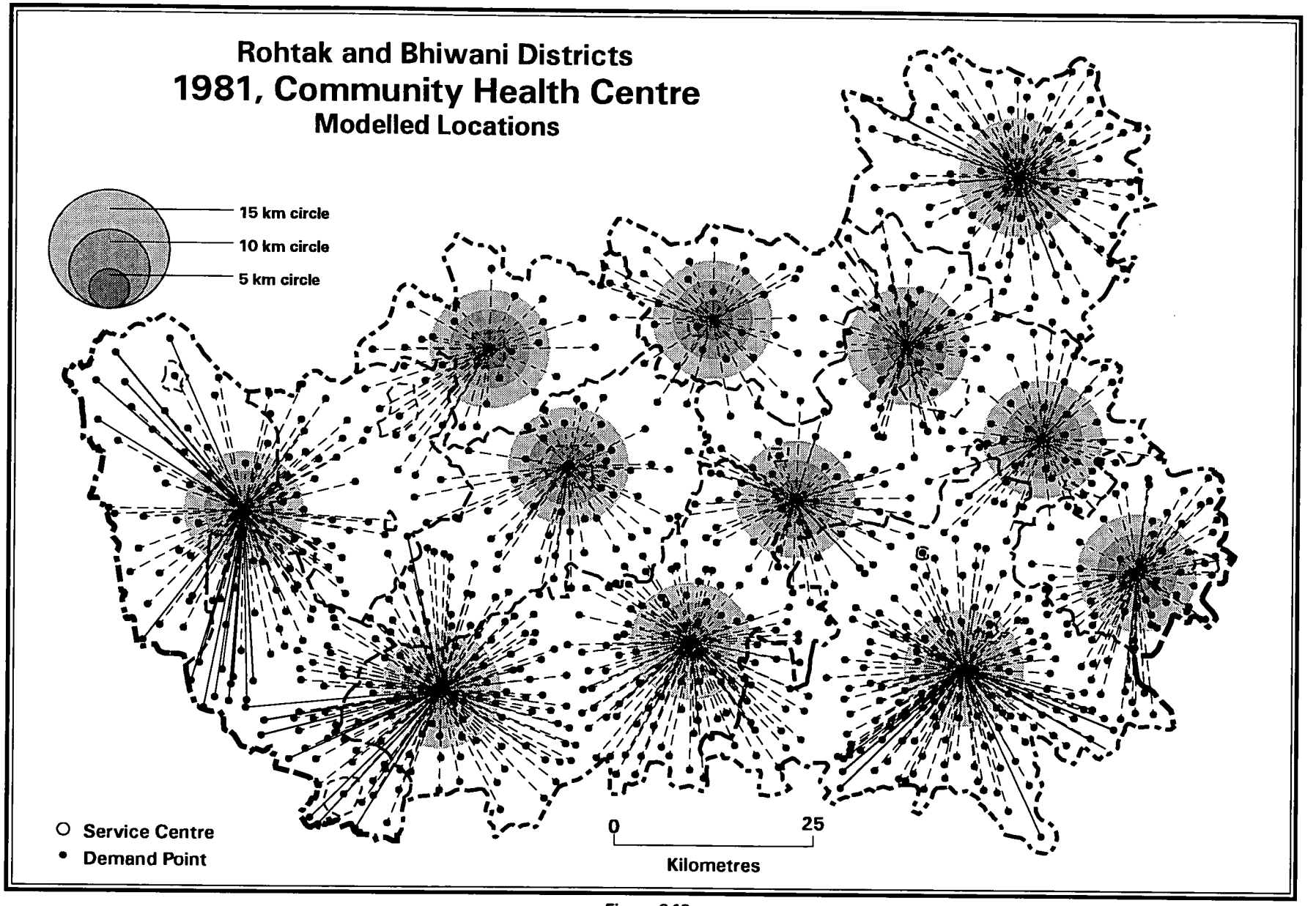

Rohtak and Bhiwani Districts
1981, Community Health Centre
Modelled Locations
15 km circle
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-6.13

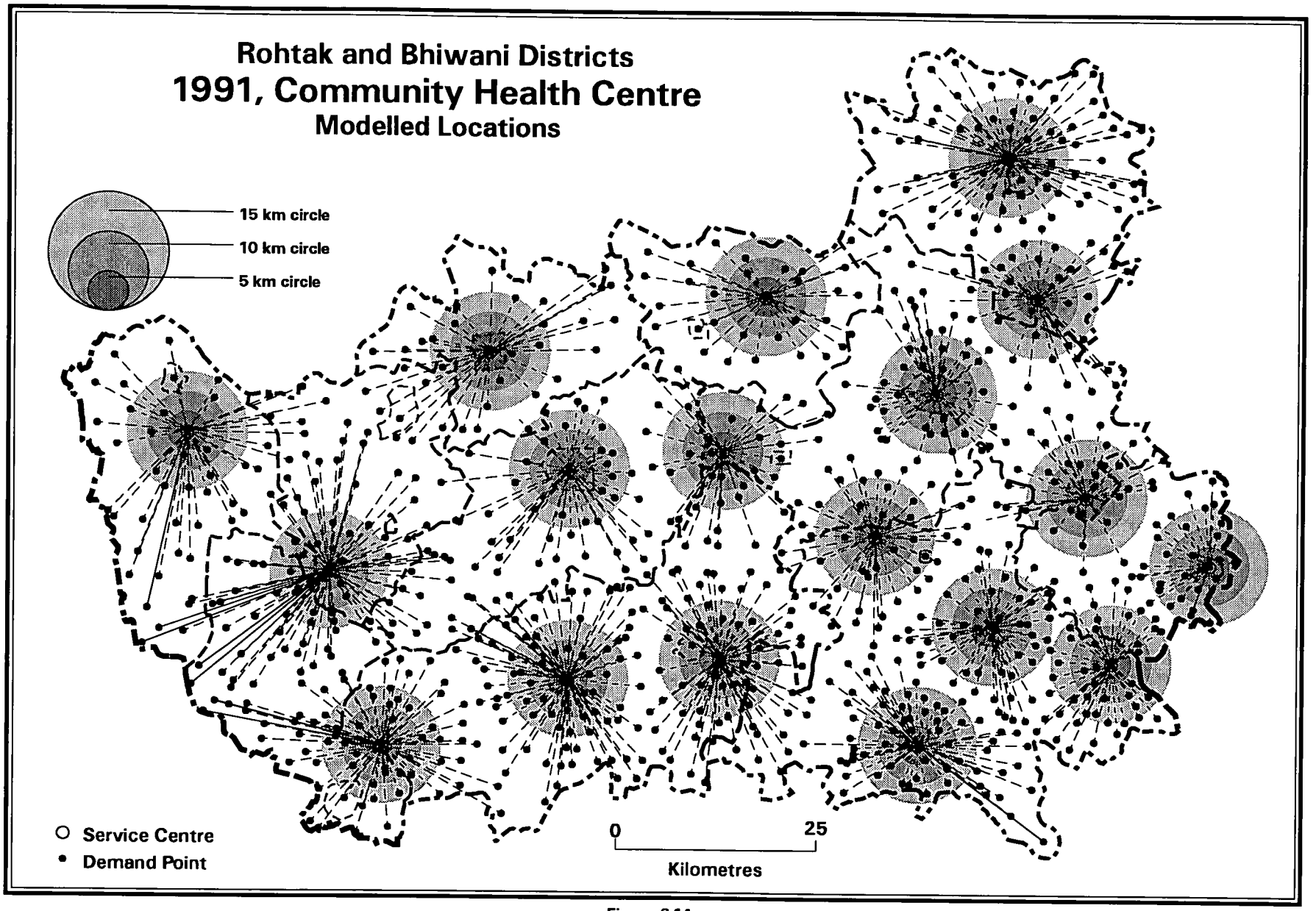

Rohtak and Bhiwani Districts
1991, Community Health Centre
Modelled Locations
15 km circle
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-6.14

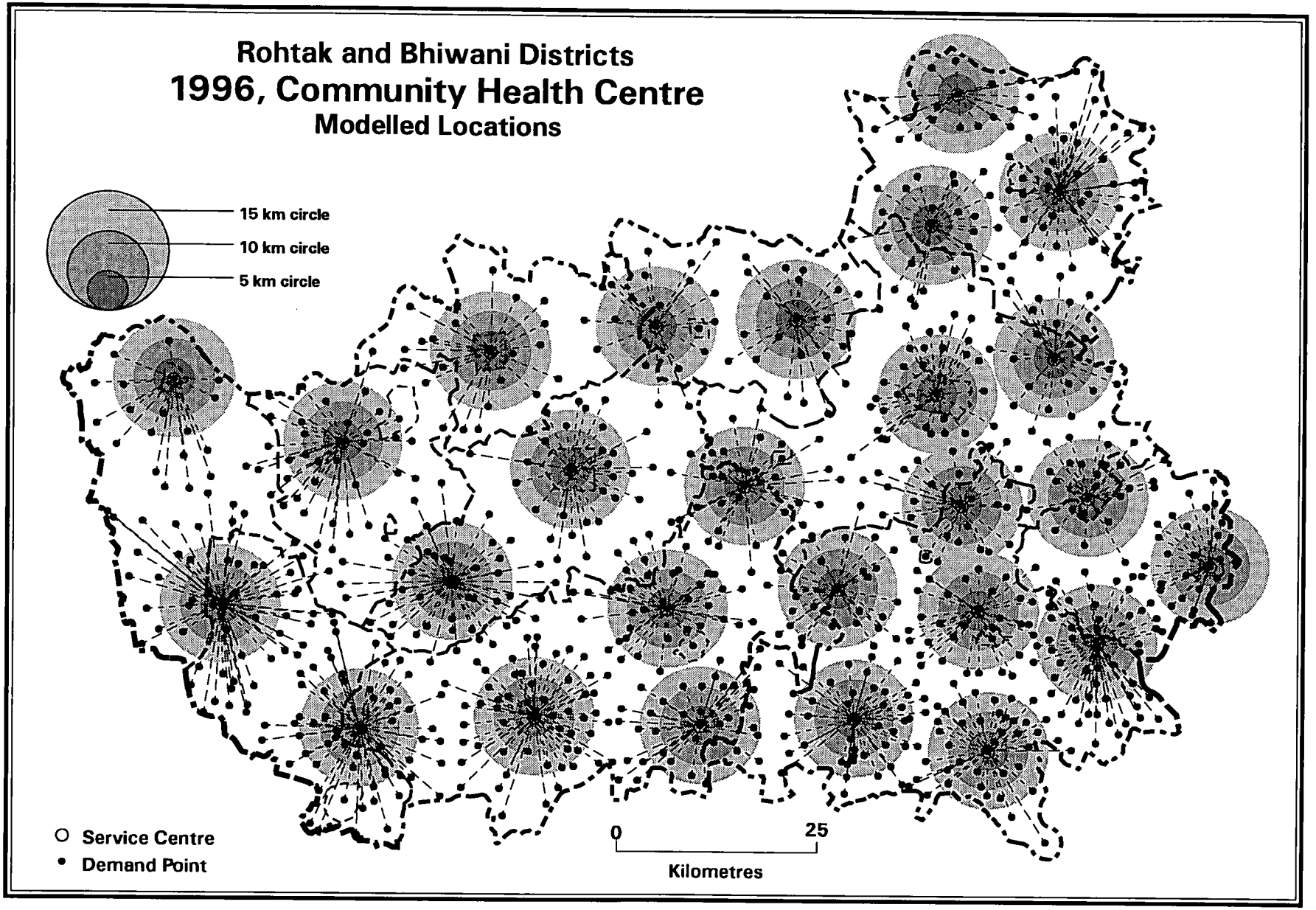

Rohtak and Bhiwani Districts
1996, Community Health Centre
Modelled Locations
15 km circle
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-6.15

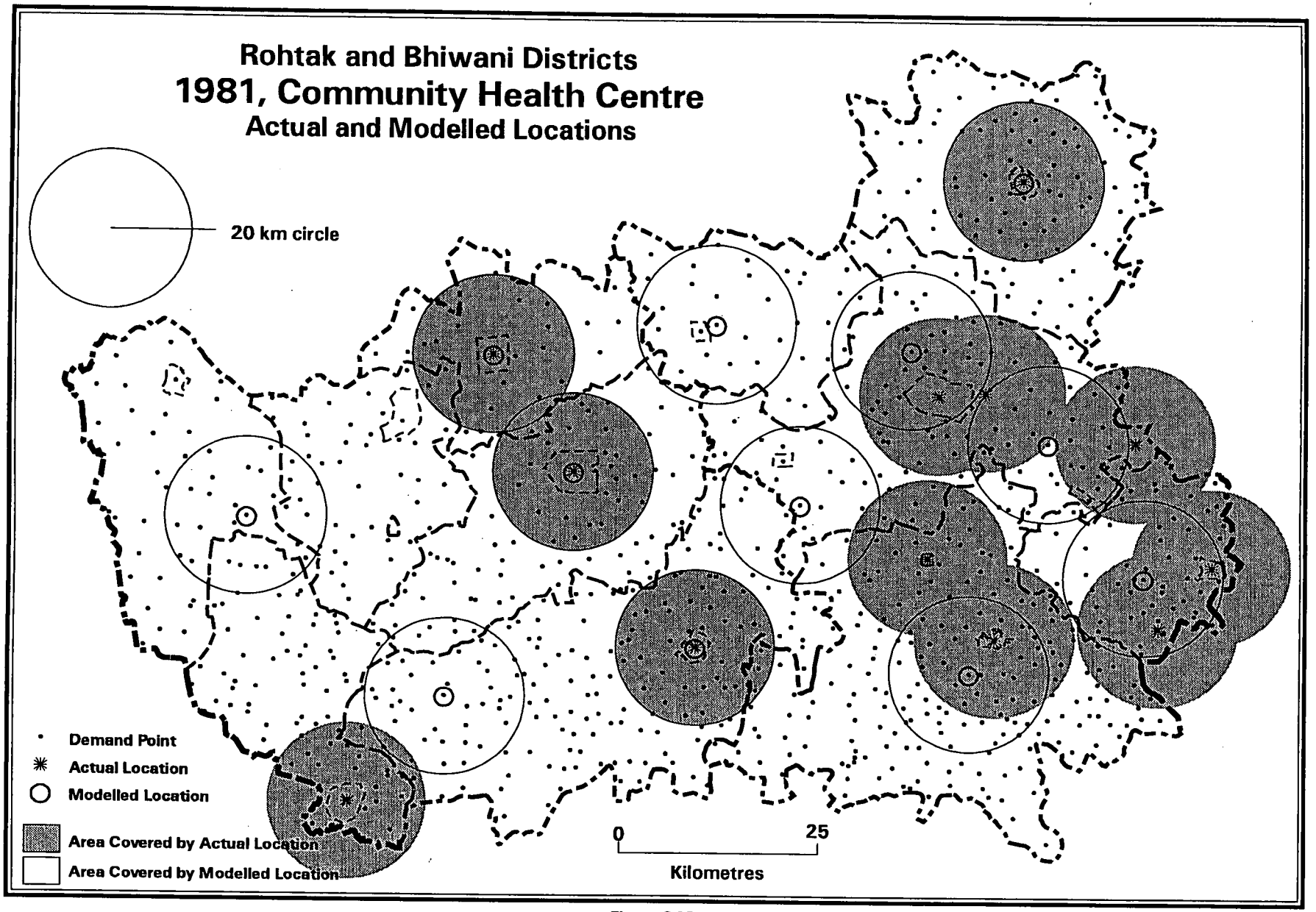

Rohtak and Bhiwani Districts
1981, Community Health Centre
Actual and Modelled Locations
20 km circle
Demand Point
Actual Location
Modelled Location
Area Covered by Actual Location
Area Covered by Modelled Location
0
25
Kilometres

Figure-6.16

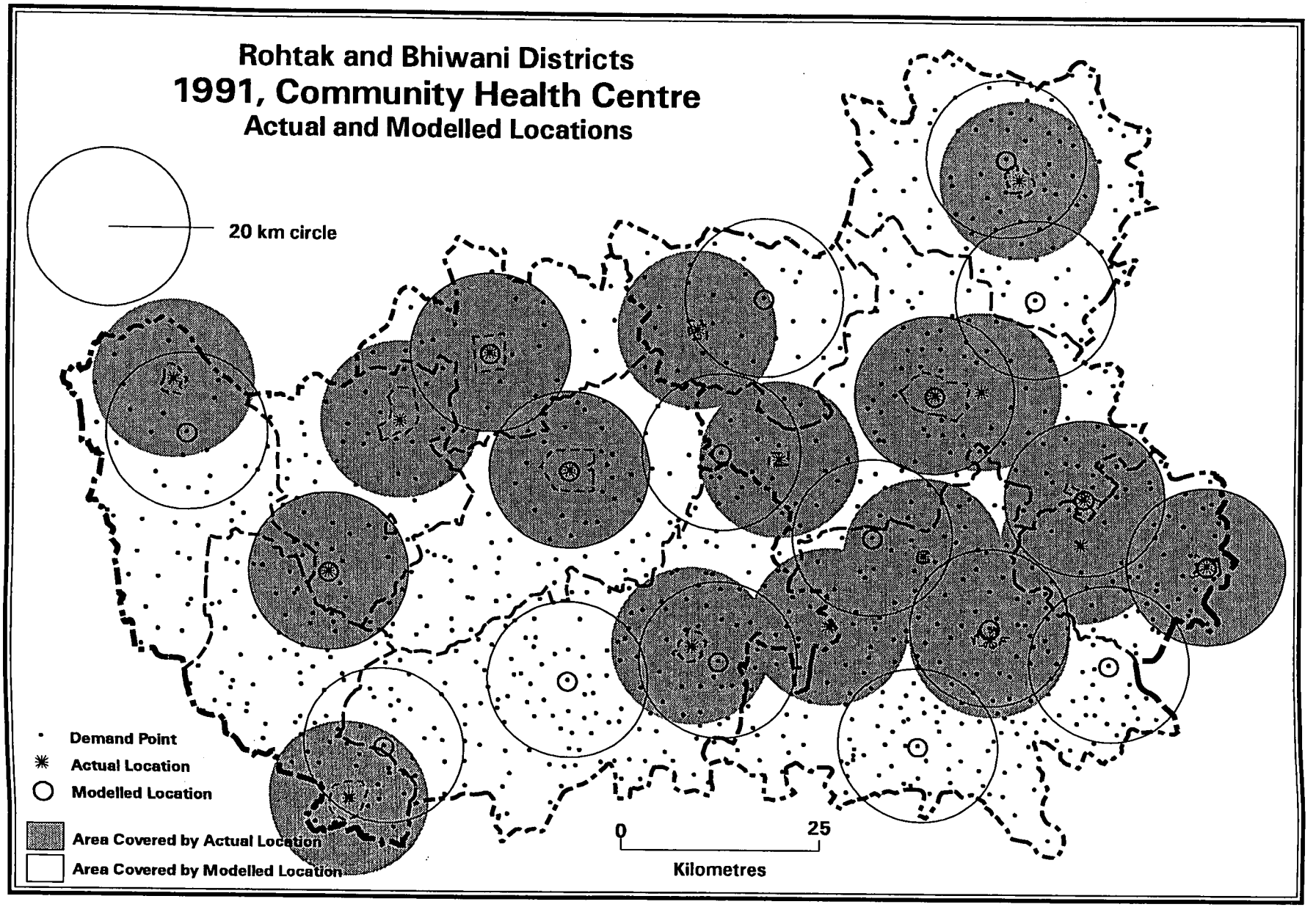

Rohtak and Bhiwani Districts
1991, Community Health Centre
Actual and Modelled Locations
20 km circle
Demand Point
Actual Location
Modelled Location
Area Covered by Actual Location
Area Covered by Modelled Location
0
25
Kilometres

Figure-6.17

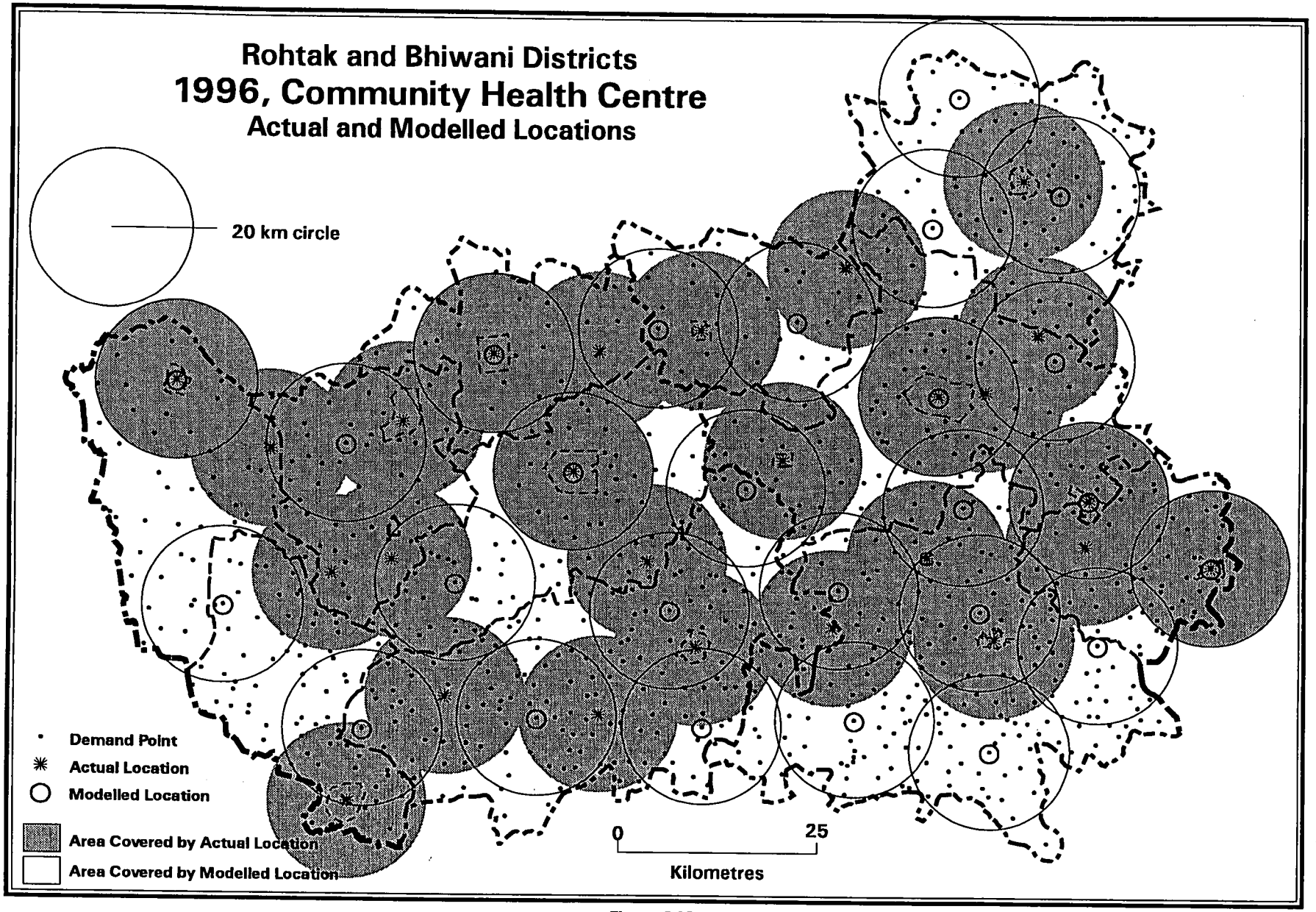

Rohtak and Bhiwani Districts
1996, Community Health Centre
Actual and Modelled Locations
20 km circle
Demand Point
Actual Location
Modelled Location
Area Covered by Actual Location
Area Covered by Modelled Location
0
25
Kilometres

Figure-6.18

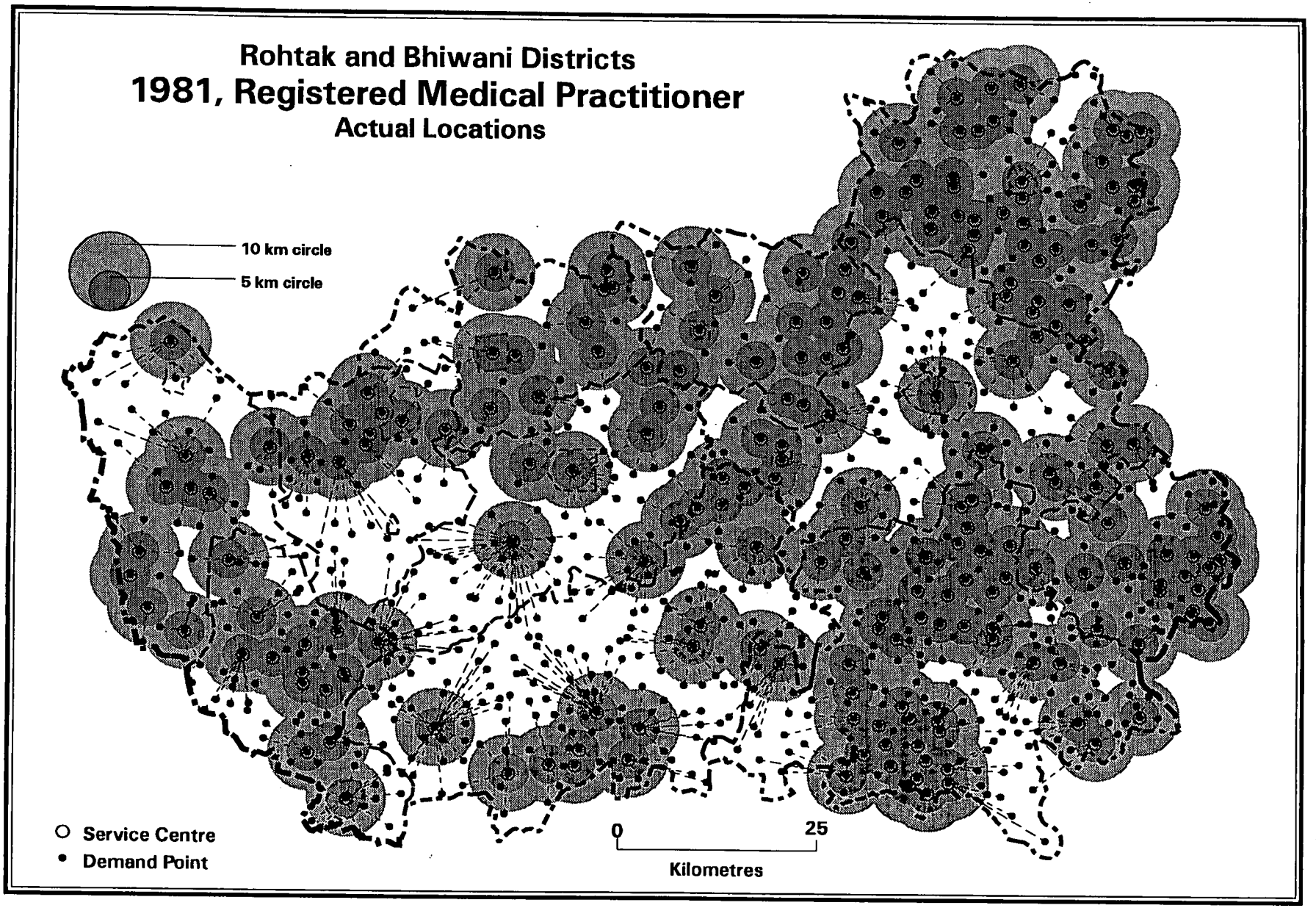

Rohtak and Bhiwani Districts
1981, Registered Medical Practitioner
Actual Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-6.19

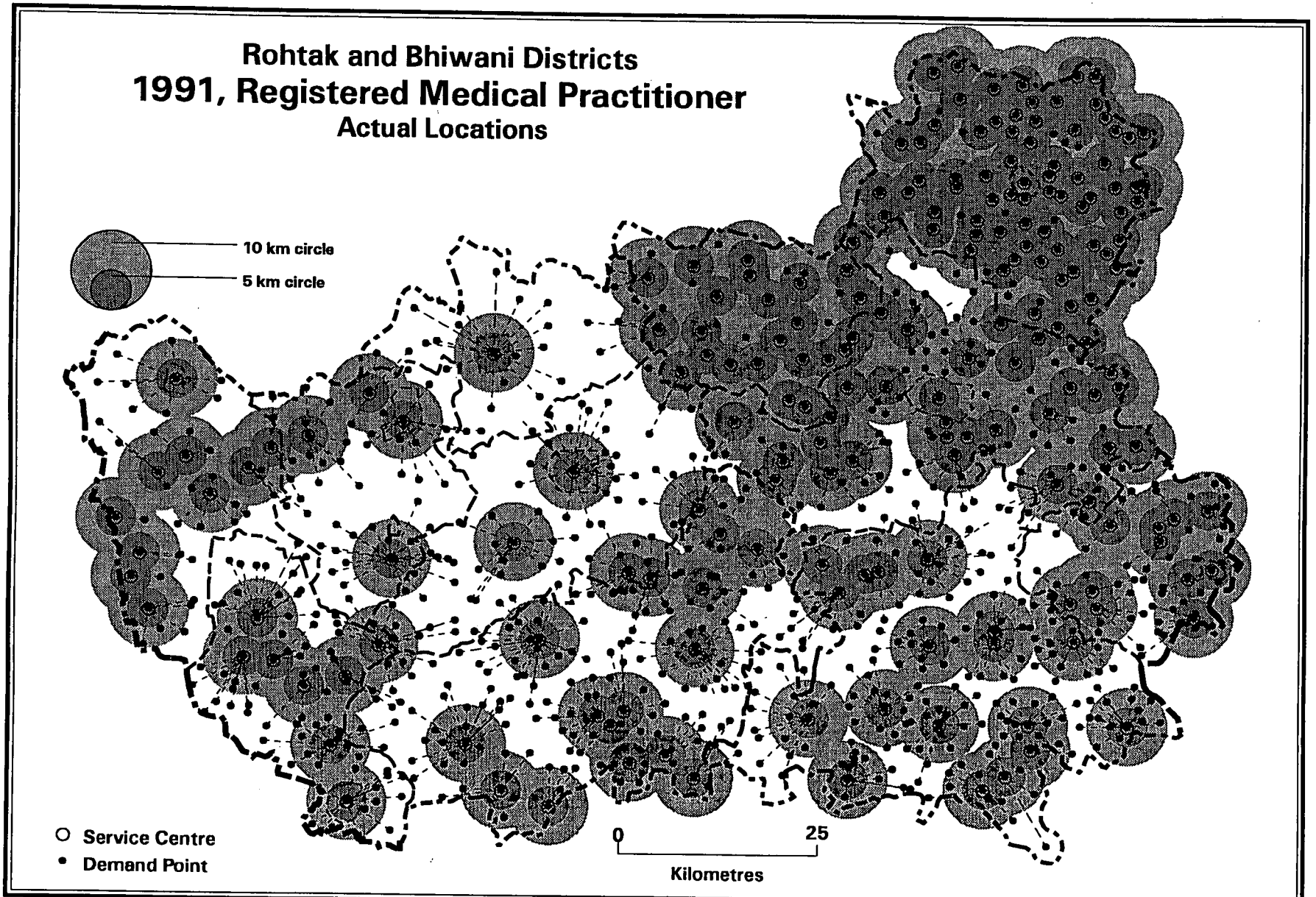

Rohtak and Bhiwani Districts
1991, Registered Medical Practitioner
Actual Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-6.20

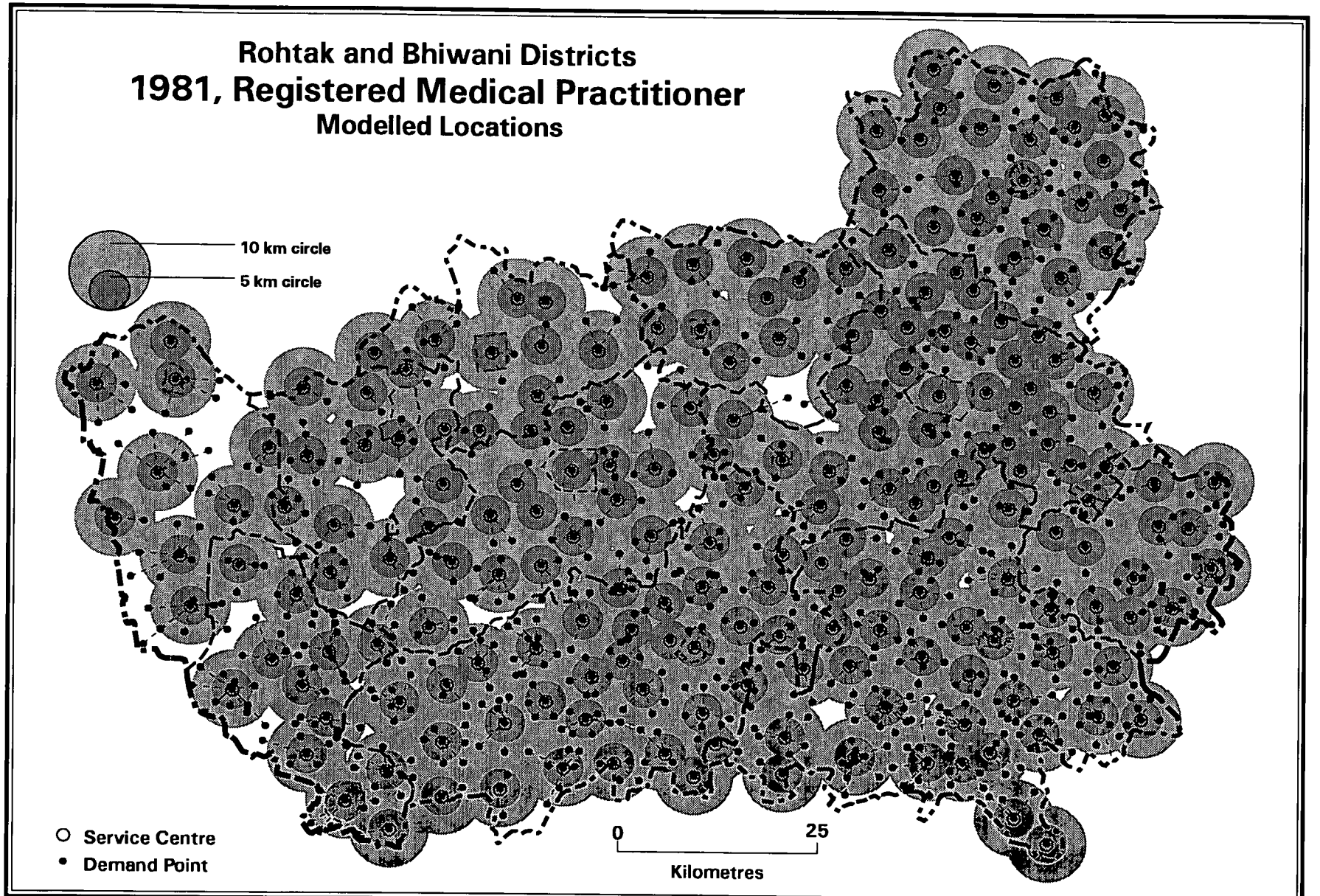

Rohtak and Bhiwani Districts
1981, Registered Medical Practitioner
Modelled Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-6.21

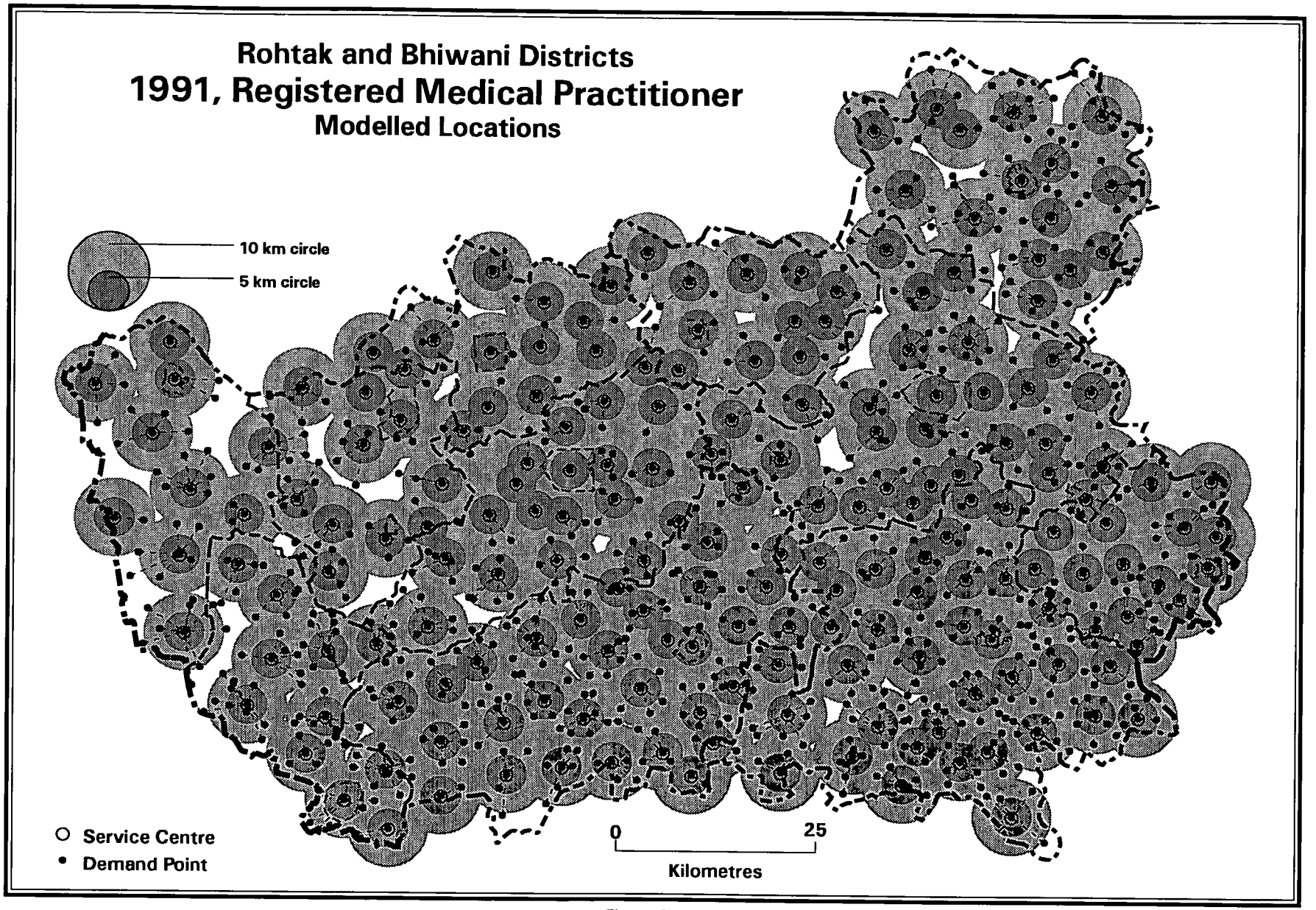

Rohtak and Bhiwani Districts
1991, Registered Medical Practitioner
Modelled Locations
10 km circle
5 km circle
Service Centre
Demand Point
0
25
Kilometres

Figure-6.22

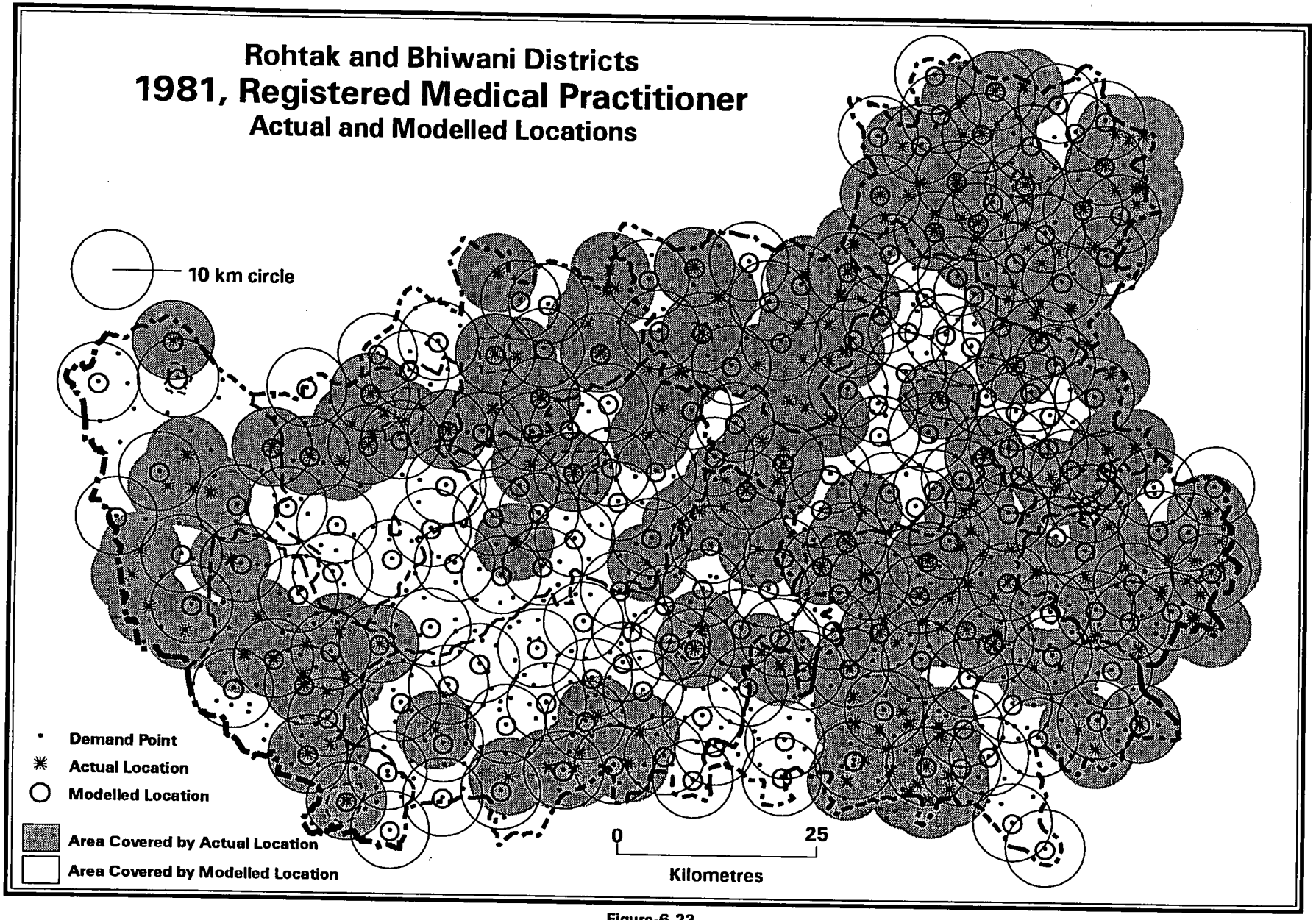

Rohtak and Bhiwani Districts
1981, Registered Medical Practitioner
Actual and Modelled Locations
10 km circle
Demand Point
Actual Location
Modelled Location
Area Covered by Actual Location
Area Covered by Modelled Location
0
25
Kilometres

Figure-6.23

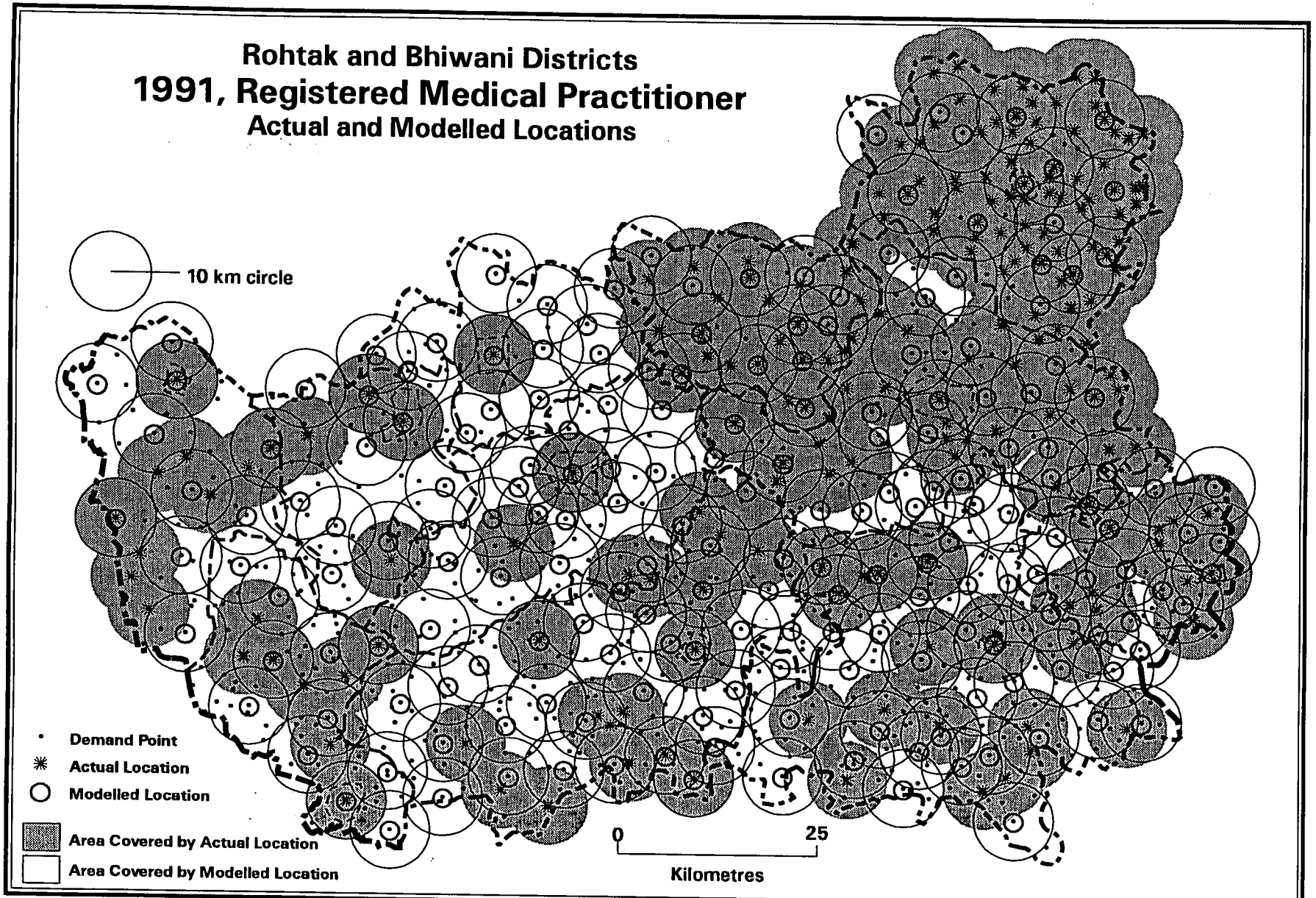

Rohtak and Bhiwani Districts
1991, Registered Medical Practitioner
Actual and Modelled Locations
10 km circle
Demand Point
Actual Location
Modelled Location
Area Covered by Actual Location
Area Covered by Modelled Location
0
25
Kilometres

Figure-6.24

Chapter - 7

ACCESSIBILITY TO AND UTILISATION OF HEALTH SERVICES

7.1 INTRODUCTION

Health is closely associated with development (Phillips, 1990) and it (directly and indirectly) affects the labour productivity and wealth of a nation (World Bank, 1993 and 1994). Therefore, attempts have been made to provide primary health care facilities in the Developing Countries (including India). State Governments and international organisations (concerned with the provision of health services in the Developing Countries) have assumed 'health for all' as a by-product, which will trickle down to grass root level sometime in the future through making health services available. The social, economic and political position of an individual and his/her perception of the availability of different types of health services play a vital role in determining 'real access' to health services. A number of researchers interpret health inequalities in terms of inequality in social and economic status of the people (Akhtar, 1991; Evans, et al, 1995; Phillips, 1990; Pillai and Shannon, 1995). And others have argued that social and economic conditions determine health and nutrition level, which in turn (directly and indirectly) affect income.

It could be argued that the present health structure in the Developing Countries is not effectively responding to people's needs, because of the inappropriate way in which health services are offered, which include ignoring other forms of local knowledge and belief systems, imposing an agenda from above or outside, or failing to understand the complex social and power relations that affect people's behaviour and their expectations (Eade, 1997; Fajewonyomi, 1991). Therefore, a great majority of people in the Developing Countries suffer from excess mortality and morbidity, as they do not have access to appropriate health care facilities.

In this chapter, an attempt is made to examine accessibility to health services in Haryana. It must be noticed that the measure of access to health is not a simple exercise; it is not like education, where we have assumed that frequency and duration of utilisation serve as measures of access and duration of access respectively. The utilisation of educational services is age-specific, while the need for the utilisation of health services is an erratic phenomenon that can arise at any time for anyone in any age group although certain age groups may use

them more often. Secondly, one needs health care under compulsion of ill health or its prevention. Therefore, it is difficult to measure the level of access to health services, even though an attempt will be made to examine access to and utilisation of public and private health services in the study area.

Analysis in this chapter is based on two sets of data. The first dataset is at the household level, which represents the respondents' views about the type of health services used for minor illnesses and the reasons behind that. The second set of data pertains to individuals. Data on the type of disease, source of treatment, distance from the source, reason for the utilisation of a source, and the outcome were collected for individuals who had suffered from (any) illness during the six months before the time of the interview. Based on these data, The following questions will be investigated in the sequence given below:

- What type of services do people use for minor illness?
- How many people fall ill? Does the pattern of illness vary across different castes and income groups?
- What are the sources of treatment?
- What are the reasons for using different health services?
- Up to which distances are health services used?
- Who accompanies patients to the treatment source?
- What is the expenditure on the utilisation of health services?
- What are the outcomes from illness and treatment?

7.2 WHAT TYPE OF SERVICES DO PEOPLE USE FOR MINOR ILLNESS?

In India, the provision of health facilities is the responsibility of the state Government (with the assistance from the Central Government). The Government has undertaken the task of providing general health services in rural and urban areas since the inception of Haryana State on 1st November 1966. The general criterion for the location of health services in rural areas is population size. But this norm is not always followed. The 'sub-centre' is the smallest unit of public health services in rural areas, followed in turn by the Primary Health Centre (PHC) and the Community Health Centre (CHC). Civil hospitals are not available in rural areas, but these are generally located at district headquarters.

Along with those provided by the Government, private health services are also available in the study area. There is a contrast in the availability of health services in this area. The staff (doctors and nurses) employed in the Government health services are at least trained and qualified and there are few variations in their qualifications. Based on their qualifications, doctors can be divided into three categories: (1) trained Bachelor of Medicine and Surgery (MBBS), (2) Bachelor of Ayurvedic Medicine and Surgery (BAMS), and (3) Registered Medical Practitioner (RMP). MBBS doctors are available either in the Government health centres (in villages and towns), or private clinics or nursing homes in towns. In none of the surveyed villages is a trained MBBS doctor available except in Kehrawar village, where one is available in the Primary Health Centre (PHC). An MBBS doctor is qualified to run a private clinic or a nursing home. The consultation fees of a private MBBS doctor are relatively high (say more than Rs. 25). BAMS doctors can also run their own private clinics, but most do this in a city or town. Out of the eight surveyed villages, only one BAMS private doctor was available in Bapora village. Except for Bapora and Kehrawar, an MBBS or a BAMS doctor was available in the rest of the six villages under study.

Generally, a Registered Medical Practitioner (RMP) is not considered to be a fully qualified doctor, and he/she can diagnose only minor illnesses and give first aid treatment. But RMPs can run their own private clinics. The consultation fee of RMP doctors including the cost of medicine, is reasonable and many poorer people in villages can afford it. One year ago, the Haryana Government banned the practice of RMP doctors, but eventually this ban was lifted after a court case. In all of the surveyed villages, except for Dhani Mansukh, RMPs were available and a large proportion of patients depend on them (although these doctors are not fully trained and qualified).

Out of the total surveyed, as many as 47.9 per cent of households consulted private RMPs (located in the villages of their residence) for minor illnesses (Table-7.1[a] and [b]). About 40 per cent of households, however, relied on either a Government or a private doctor located in the town or city. It is clear that more than 70 per cent of households relied on a private doctor for any minor illnesses and the Government health services catered for the needs of the remaining 30 per cent. In seven villages none of the households consulted a public health centre (available in rural areas), except in Kehrawar village, because of their non-availability in these villages. Although a Government-planning document states that the Government health sub-centres cover all of these villages, and one male and one female health worker are

employed in these sub-centres, they are primarily engaged in special programmes such as family planning, malaria, TB control and limited clinical/curative services. Dr. Sunil's comments in the previous chapter further substantiate this point. Clinical health services are provided either in a PHC or a CHC (Community Health Centre) or a hospital. In Kehrawar village, one PHC is available with an MBBS doctor, which explains people's access to Government health services in this village.

Table-7.1(a): Source of treatment and minor illness (Number of households)

	Government		Private		Total
Code	Village	Town	Village	Town	
Kehrawar	36	22	27	14	99
Chuliana	0	8	40	24	72
Diwana	0	3	9	5	17
Brahana	0	20	56	23	99
Rohtak	**36**	**53**	**132**	**66**	**287**
Bhera	0	24	21	5	50
Patodi	0	14	14	12	40
Bapora	0	20	76	9	105
Dhani Mansukh	0	2	0	23	25
Bhiwani	**0**	**60**	**111**	**49**	**220**
Total	**36**	**113**	**243**	**115**	**507**

Source: Author's fieldwork, 1997-98

Out of the total, as many as 36 per cent of households in Kehrawar use this facility. This confirms the obvious conclusion that the availability of a service in a village facilitates its utilisation. Chuliana is just three kilometres away from Kehrawar and none of the households in Chuliana uses the PHC located at Kehrawar.

In the further analysis, health services are identified in three categories only, namely Government, private in the village and private in the town or city. Government health services in village and town are amalgamated into one category for two reasons. Firstly, in seven villages there is no Government general health facility and generally, people do not use Government services located in their neighbouring villages. Secondly, there are no major differences in the qualifications of the staff employed in Government health services in villages and towns. Therefore, it will make little difference if Government health services are pooled in one category. In the case of private health services, however, two separate categories will be included, for two reasons. Firstly, there are differences in the qualifications

of private doctors located in a village and in a town or city. Secondly, the consultation fee of a private doctor in a town or city is much higher than that of a private village doctor.

Table-7.1(b): Source of treatment and minor illness (% households)

	Government		Private		Total
Code	Village	Town	Village	Town	
Kehrawar	36.4	22.2	27.3	14.1	100
Chuliana	0.0	11.1	55.6	33.3	100
Diwana	0.0	17.6	52.9	29.4	100
Brahana	0.0	20.2	56.6	23.2	100
Rohtak	**12.5**	**18.5**	**46.0**	**23.0**	**100**
Bhera	0.0	48.0	42.0	10.0	100
Patodi	0.0	35.0	35.0	30.0	100
Bapora	0.0	19.0	72.4	8.6	100
Dhani Mansukh	0.0	8.0	0.0	92.0	100
Bhiwani	**0.0**	**27.3**	**50.5**	**22.3**	**100**
Total	**7.1**	**22.3**	**47.9**	**22.7**	**100**

Source: Author's fieldwork, 1997-98

Reasons for source of treatment: Respondents were asked to provide two reasons for the selection of a health source. Both the reasons are discussed separately. Out of the total, as many as 149 households use Government health services (Table-7.2[a] and [b]), of which, 130 households use this health service for two major reasons, namely cost and the availability of trained and specialist doctors.

In Government health centres there is no consultation fee and sometimes medicines are also supplied to the patients without any charge. But in the majority of cases, patients have to buy medicines from the market. Dr. Sunil told me about this.

> "In this PHC, we do not have a regular supply of necessary medicines and injections. Due to the non-availability, we have to ask patients to buy these medicines from outside, but they have to go to a town or city to buy these medicines, but that involves time and transportation cost. Therefore, some patients prefer to consult a private doctor in the village instead of coming to the PHC. The private doctor will issue all the needed medicines and injections a patient needs, but he/she will charge more money from them. Moreover, we have a large number of patients, but limited staff; we can not spend much time on each patient. But the private doctors in the village spend more time with their patients and satisfy them more psychologically than we do (Dr. Sunil Verma, MBBS, Doctor, PHC Kehrawar, 1998).

The second important reason for use is that doctors in Government health centres are qualified and trained. When investigating the second reason for the utilisation of Government

health services, again two factors are found to be most important, but in reverse order (i.e. firstly, doctors are trained and qualified and, secondly, there is no consultation fee for Government health services).

Table-7.2(a): The first reason for using health service

Reason for using health service	Number of households			
	Govern -ment	Private		Total
		In Village	In Town	
Known to doctor	1	6	4	11
Economic reasons	104	8	0	112
Effective medicine and treatment	4	31	93	128
Home Service	0	10	0	10
Treatment without cash money	0	15	0	15
Specialist/trained doctors	26	0	6	32
No medicine available in Government health centre	0	2	4	6
Time and money saving	2	59	0	61
No other source available	11	111	8	130
Others	1	1	0	2
Total	149	243	115	507

Source: Author's fieldwork, 1997-98

Both reasons show that people prefer to use Government health services firstly, because there is no consultation fee and the doctors are qualified. When I asked Mr. Rishi 'why do you use the Government hospital'? His response was:

> "Private hospital/nursing homes in Bhiwani City are very expensive and private doctors in the village are not qualified enough. Therefore, we have to rely on the Government hospital at Bhiwani, where not only is treatment free but doctors and other support staff are qualified" (Rishi Singh, Bapora, 1998).

People prefer to consult private doctors located within the village for three main reasons. The most important reason is the lack of any other health service in the village. Second there is a saving of time and money, for going out of a village not only implies a transportation cost, but also high consultation fees if the source is a private doctor, and the cost of medicines if it is a Government doctor. Going to town also expends the patient's time and that of at least one attendant. Treatment without cash is the third most important reason. Poor people just have to depend on a private doctor within the village, as private doctors in town will not entertain them without cash payment. One villager reported that:

> "We have to depend on private doctors in the village, as in the Government dispensary we are not issued medicines or if medicines are issued either these are not effective or

(sometimes) are time expired. Therefore, we do not have any other choice except private doctors in the village" (Kheem Chand, Kehrawar, 1998).

Table-7.2(b): The first reason for using health service

Reason for using health service	% households			
	Govern-ment	Private		Total
		In Village	In Town	
Known to doctor	9.1	54.6	36.4	100
Economic reasons	92.9	7.1	0.0	100
Effective medicine and treatment	3.1	24.2	72.7	100
Home Service	0.0	100.0	0.0	100
Treatment without cash money	0.0	100.0	0.0	100
Specialist/trained doctors	81.3	0.0	18.8	100
No medicine available in Government health centre	0.0	33.3	66.7	100
Time and money saving	3.3	96.7	0.0	100
No other source available	8.5	85.4	6.2	100
Others	50.0	50.0	0.0	100
Total	29.4	47.9	22.7	100

Source: Author's fieldwork, 1997-98

If they want to consult a Government doctor (in a town) they have to bear the transportation cost, and there is no surety that they will be issued medicines from the Government hospital. One villager told me that:

> "My husband is suffering from a skin disease. He went to the PHC (in Dighal) and the doctor prescribed him some medicines to buy from outside. These medicines were very expensive and we really could not afford them. Now he is using local medicine (that is free) a paste of bark of the *neem* tree" (Shanti, Brahana, 1998).

For as many as 183 households, time and money saving, economic and non-availability of other sources are the second most important reasons for consulting a private doctor in the village. The first two are directly and indirectly associated with the income level of the household. For the people who cannot afford to consult a private or a Government doctor in town or city, a private village doctor is a cheap source of treatment. Besides, the people know doctors in the villages personally and they treat a patient even if he/she does not have money to pay in cash. Mr. Jit generally consults a RMP in the village and explained to me why

> "For any health problem we have to depend on private (RMP) doctors in the village, as Government health services are not available in this village; and if we go out of the village we have to pay the transportation cost, on the one hand, and we need to have cash with us, on the other hand. A private doctor in the village can consult and diagnose even if we do not have cash. If we do not have money we can pay him later. But the

private doctors in the city will never see us if we do not have cash to pay him/her" (Jit Singh, Chuliana, 1998).

Table-7.3(a): The second reason and source of treatment

Reason for health source	Number of households			
	Govern-ment	Private		Total
		In Village	In Town	
No response for second reason	14	9	37	60
Known to doctor	0	2	13	15
Economic reasons	36	51	7	94
Effective medicine and treatment	11	10	14	35
Home Service	0	18	0	18
Treatment without cash money	0	11	0	11
Specialist/trained doctors	56	3	6	65
No medicine available in Government health centre	0	5	18	23
Time and money saving	2	91	2	95
No other source available	26	41	15	82
Others	4	2	3	9
Total	149	243	115	507

Source: Author's fieldwork, 1997-98

Out of the total, 115 (just more than 20 per cent) households consulted private doctors located in town/city. Effective medicines and treatment are the most important reasons for consulting these doctors; these are either trained MBBS or BAMS doctors who are running their own clinics or nursing homes. These doctors are relatively expensive compared to private doctors in the village.

Table-7.3(b): The second reason and source of treatment

Reason for health source	% households			
	Govern-ment	Private		Total
		In Village	In Town	
No response for second reason	23.3	15.0	61.7	100
Known to doctor	0.0	13.3	86.7	100
Economic reasons	38.3	54.3	7.5	100
Effective medicine and treatment	31.4	28.6	40.0	100
Home Service	0.0	100.0	0.0	100
Treatment without cash money	0.0	100.0	0.0	100
Specialist/trained doctors	86.2	4.6	9.2	100
No medicine available in Government health centre	0.0	21.7	78.3	100
Time and money saving	2.1	95.8	2.1	100
No other source available	31.7	50.0	18.3	100
Others	44.4	22.2	33.3	100
Total	29.4	47.9	22.7	100

Source: Author's fieldwork, 1997-98

People feel that their treatment and medicines are quite effective. Instead of going to a Government health centre in a town/city many people prefer to go to a private doctor, as the Government doctor will prescribe medicines and the cost of these medicines may be almost equal to the total treatment cost by a private doctor. A villager told me that:

> "For any illness we have to go to Rohtak. The reason is that there are not enough facilities and medicines in the Government dispensary, on the one hand, and the staff in the dispensary stay until 12 noon, on the other hand. Private doctors in the village are not trained enough to diagnose properly. Therefore, we are not left with any other option except going to Rohtak even for a minor illness. In Rohtak, treatment is expensive, but relatively reliable. The consultation fee of any private doctor is not less than Rs. 50" (Balraj Singh, Kehrawar, 1998).

7.3 HOW MANY PEOPLE FALL ILL? DOES THE PATTERN OF ILLNESS VARY ACROSS DIFFERENT CASTES AND INCOME GROUPS?

This section is based on the individuals' data set. Respondents were asked 'whether someone in the household has suffered from any illness during the last six months'? If the reply was yes, then other questions were asked related to the type of disease, the source of treatment, and the reason for using this source. Firstly, the general pattern of illness will be examined. This will be followed by an investigation of the type of diseases people have suffered from during the previous six months, the type of health services people have used, the reasons for the utilisation of different health services and the distance to these health services.

Out of the 3427 people in the 507 surveyed households, 984 people, more than 25 per cent, had fallen ill during the six months before the date of the interview (Table-7.4). In Rohtak District more than 30 per cent of people had fallen ill, while in Bhiwani it was only 26 per cent. In Kehrawar village the highest percentage of people have suffered from illness, although this village is the most accessible and developed and the percentage of ill people is lowest in Patodi, one of the least accessible villages (which is a quite unusual trend). One of the important reasons for higher morbidity in Kehrawar is water-logging around the village. Many of the households are located near to pond and sometimes, these houses are flooded during the rainy season, which may aid the spread of mosquitoes and cause many of the waterborne diseases.

Table-7.4: Illness during the last six months

Village/District	People			% of people		
	Suffered from illness			Suffered from Illness		
	No	Yes	Total	No	Yes	Total
Kehrawar	415	251	666	62.3	37.7	100
Chuliana	386	121	507	76.1	23.9	100
Diwana	99	42	141	70.2	29.8	100
Brahana	469	192	661	71.0	29.1	100
Rohtak	**1369**	**606**	**1975**	**69.3**	**30.7**	**100**
Bhera	252	87	339	74.3	25.7	100
Patodi	227	67	294	77.2	22.8	100
Bapora	480	183	663	72.4	27.6	100
Dhani Mansukh	115	41	156	73.7	26.3	100
Bhiwani	**1074**	**378**	**1452**	**74.0**	**26.0**	**100**
Total	**2443**	**984**	**3427**	**71.3**	**28.7**	**100**

Source: Author's fieldwork.

Type of illness: People in the study area suffer from various types of diseases. These have been grouped into 12 categories as described by themselves (Table-7.5). Fever (probably malaria) is the most frequently occurring disease in the study area, with more than 50 per cent of patients have suffered from fever. More than 13 per cent of patients have suffered from chest-related diseases, which include influenza, colds, coughs and tuberculosis. The third most frequently occurring diseases are miscellaneous or unclassified, which accounts for more than 8 per cent of the total patients.

It is interesting to note that in Rohtak more than 60 per cent of people have suffered from fever, while the percentage is only 37.6 per cent for Bhiwani District. In Bhiwani District, however, more than 24 per cent of people have suffered from chest-related diseases. One of the probable reasons for this contrast seems to be because of seasonal variations in interviews conducted in these two districts. In Rohtak, I started interviewing just after the rainy reason. In this season, occurrences of fever are quite common due to the spread of mosquitoes after the rains; while in Bhiwani District, I started interviewing in the winter when large numbers of people suffer from colds, flu and other chest-related problems.

Table-7.5: Type of disease people suffered from during the previous six months

Disease	People			% People		
	Rohtak	Bhiwani	Total	Rohtak	Bhiwani	Total
Fever	379	142	521	62.5	37.6	53.0
Chest Related	46	91	137	7.6	24.1	13.9
Pneumonia	13	16	29	2.2	4.2	3.0
Typhoid	24	9	33	4.0	2.4	3.4
Abdominal pain	37	8	45	6.1	2.1	4.6
Gynaecological	4	8	12	0.7	2.1	1.2
Casualty/Accident	19	17	36	3.1	4.5	3.7
Skin related	16	12	28	2.6	3.2	2.9
Nausea	16	11	27	2.6	2.9	2.7
ENT	20	8	28	3.3	2.1	2.9
Others	32	56	88	5.3	14.8	8.9
Total	606	378	984	100.0	100.0	100.0

Source: Author's fieldwork, 1997-98

7.4 SOURCE OF TREATMENT

As discussed earlier, treatment sources have been grouped into three categories. The largest proportion of patients consult a private doctor within the village (Table-7.6[a] and [b]), and about one third of the total patients have relied on private doctors in the town or city. This means that more than three-quarters of the total need[1] is catered for by private doctors, and the rest by Government doctors. It is interesting to note that in Rohtak about 29 per cent of patients have utilised a Government source, which is 10 per cent more than in Bhiwani District. There are two probable reasons for this: firstly, a PHC is available in Kehrawar village of Rohtak District. Secondly, more Government health services are available in Rohtak District: for instance a medical college is within a distance of 25 kilometres from all the four surveyed villages of Rohtak District.

In Bhiwani District, more than 80 per cent of patients have consulted only private doctors. Of these more than 50 per cent relied on private doctors within the village of their residence. In Rohtak only 35 per cent of patients have consulted private doctors in the village (Table-7.6[b]). It is important to note that the non-availability of Government health services might have compelled the higher percentage of patients to consult private doctors in the village.

[1] This represents need for only curative and/or clinical health services, but it does not include need for preventive health services.

Table-7.6(a): Treatment source

Village/District	Number of people			
	Government	Private		Total
		In Village	In Town	
Kehrawar	103	66	79	248
Chuliana	18	48	53	119
Diwana	8	19	15	42
Brahana	45	80	64	189
Rohtak	**174**	**213**	**211**	**598**
Bhera	24	43	19	86
Patodi	7	41	18	66
Bapora	27	111	45	183
Dhani Mansukh	7	0	34	41
Bhiwani	**65**	**195**	**116**	**376**
Total	**239**	**408**	**327**	**974**

Source: Author's calculation, 1997-98

Private health services in town or city catered for the needs of one third of the patients. In Rohtak District, the percentage of patients (who consulted private doctors in the town or city) is higher than in Bhiwani District. In Dhani Mansukh, which is only 4 kilometres from Loharu town and where no public and private health service is available, more than 80 per cent of the patients consulted a private doctor in the town or city. However, in three other villages of Bhiwani District the figure was less than 30 per cent. In two villages of Rohtak District, namely Diwana and Chuliana (both considered to be less accessible) more than 35 per cent of the patients consulted a private doctor in a town or city. This discussion reveals that in geographically less accessible villages a large number of patients consult private doctors in town or city; non-availability or poor availability of public and private health services in these villages may force villagers to rely on private health services in town or city.

There seem to be apparent inter-district variations in the utilisation of different type of health services. This argument is further substantiated by a chi-squared value of 29.01 that is statistically significant at the 0.1 per cent level of significance with 2 degrees of freedom. This means that the utilisation of different health services varies significantly across the villages of Rohtak and Bhiwani Districts.

Table-7.6(b): Treatment source

Village/District	% of people			
	Government	Private		Total
		In Village	In Town	
Kehrawar	41.5	26.6	31.9	100
Chuliana	15.1	40.3	44.5	100
Diwana	19.1	45.2	35.7	100
Brahana	23.8	42.3	33.9	100
Rohtak	**29.1**	**35.6**	**35.3**	**100**
Bhera	27.9	50.0	22.1	100
Patodi	10.6	62.1	27.3	100
Bapora	14.8	60.7	24.6	100
Dhani Mansukh	17.1	0.0	82.9	100
Bhiwani	**17.3**	**51.9**	**30.9**	**100**
Total	**24.5**	**41.9**	**33.6**	**100**

Source: Author's fieldwork, 1997-98

Source of treatment and controlling variables: The utilisation of a treatment source may be a function of many variables. In the following analysis it is assumed that sex, income, caste and village are associated with the source of treatment. Two variables, namely sex and caste, do not show any statistically significant association with the utilisation of treatment source. Statistically, there may not be any significant relationship, but gender discrimination in access to health was observed in the study area and Mr. Maman's comments seem to substantiate this:

> "My wife has consulted both private and Government hospitals and both have declared that she has a tumour in the stomach and she has to be operated on. I did not have money get her operated. After two months I will get her operated when I will have some money (after harvesting)" (Maman Chand, *Rajput*, Bapora, 1998).

One of Shoraj's daughters Puja died two months ago. He said:

> "She was anaemic. We took her to the Civil Hospital, Bhiwani and the doctor referred her to the Medical College, Rohtak. I could not take her there, as I did not have enough money. When I brought her back she died" (Shoraj, Bapora, 1998).

However, treatment in the Medical College, Rohtak is free (except for a nominal fee of say Rs. 1) especially if there is an emergency, so Shoraj's given reason of lack of money seems to be an unrealistic representation or he was unaware of the free treatment. It is true that people with a certain income level have to pay the cost of medicines, but they can borrow money in the case of a boy being ill.

Table-7.7: Sex and source of treatment

Sex	% of people			
	Government	Private		Total
		In Village	In Town	
Rohtak				
Male	27.3	38.0	34.8	100
Female	31.2	33.0	35.8	100
Total	29.1	35.6	35.3	100
Bhiwani				
Male	16.9	53.6	29.5	100
Female	17.8	49.7	32.5	100
Total	17.3	51.9	30.9	100
Total				
Male	23.2	44.1	32.7	100
Female	26.1	39.3	34.6	100
Total	24.5	41.9	33.6	100

Source: Author's fieldwork, 1997-98

Table-7.8: Caste and source of treatment

Caste	% of people			
	Government	Private		Total
		In Village	In Town	
Rohtak				
General	27.8	36.9	35.3	100
BCs	37.4	41.0	21.7	100
SCs	27.8	28.6	43.6	100
Total	29.1	35.6	35.3	100
Bhiwani				
General	19.9	48.2	31.9	100
BCs	13.5	57.7	28.9	100
SCs	11.0	60.3	28.8	100
Total	17.3	51.9	30.9	100
Total				
General	24.6	41.4	34.0	100
BCs	28.2	47.4	24.4	100
SCs	21.8	39.8	38.4	100
Total	24.5	41.9	33.6	100

Source: Author's fieldwork, 1997-98

Although there are some variations in the source of treatment among different castes, these are not clear cut or statistically significant. For instance, 34 per cent of patients in the upper castes have consulted a private doctor in a town or city, which is about 10 per cent more than the BCs, and 2.4 per cent less than the SCs; and about 47 per cent of patients in the BCs have used private doctors in the village as compared to 41 per cent in upper castes and 39 per cent

in the SCs. From Table-7.8 a clear-cut trend cannot be established in the treatment sources across different castes.

Income has the highest degree of association with the treatment source, but even this association does not reveal any clear trend (Table-7.9). As already discussed, it is difficult to measure access to health services and the impact of controlling variables, because consulting a doctor is not a spontaneous action, rather one of compulsion. For example, if someone falls ill and does not have money to consult a doctor, money may have to be borrowed to consult a doctor if it is a matter of life and death. More than 25 per cent of patients whose income level was less than Rs. 500 (which is a relatively low income level locally) have consulted a private doctor located in the town or city. Income level may not show a statistically significant association with the source of treatment, but some poor people cannot afford expensive private health services in towns and cities. Ms Shanti is very poor, helplessly lying on her bed. When I asked her the reason for not being diagnosed she told me that

> "A 'mad dog' bit me four years ago and now I am ill almost all the time. I went to the PHC at Dighal. The doctor referred me to the Medical College at Rohtak and asked for an X-ray of my abdomen. I did not have the money to go to Rohtak....helplessly I am laying in bed. I do not have any milk cattle so that I could have some milk. We are too poor to buy milk and butter even. I am so weak that I feel giddiness when I stand" (Shanti, Brahana, 1997).

Village accessibility shows the second most important association with the source of treatment. In more accessible villages the percentage of people who use Government health services is relatively higher than for the less accessible villages. There are two probable reasons for this. Firstly, in Kehrawar, which is an accessible village, the Government health service is accessible to villagers. Secondly, the availability of good transport facilities in these villages may help people to access a Government health service located in a town or city.

Villages with different levels of accessibility do not show significant variations in the percentages of patients using a private village doctor. However, in the more accessible villages a smaller number of patients consult private doctors in town or city as compared to the less accessible villages. Inter-district variations in the utilisation of treatment source can be noticed from Table-7.10: in the more accessible villages of Bhiwani District, more than 60

per cent of the patients consulted a private village doctor, while the figure was only 26.6 per cent for Rohtak District.

Table-7.9: Income and source of treatment

Gross per capita income (Rs.)	% of people			
	Government	Private		Total
		In Village	In Town	
Rohtak				
Below 250	13.7	47.4	39.0	100
250 to 500	38.7	32.4	28.9	100
500 to 1000	31.2	32.6	36.2	100
1000 to 2000	22.7	39.1	38.2	100
2000 to 4000	41.7	25.0	33.3	100
Above 4000	33.3	16.7	50.0	100
Total	29.1	35.6	35.3	100
Bhiwani				
Below 250	14.3	61.2	24.5	100
250 to 500	27.4	44.3	28.3	100
500 to 1000	12.9	54.8	32.3	100
1000 to 2000	9.9	52.5	37.6	100
2000 to 4000	29.2	45.8	25.0	100
Above 4000	0.0	100.0	0.0	100
Total	17.3	51.9	30.9	100
Total				
Below 250	13.9	52.1	34.0	100
250 to 500	33.9	37.5	28.6	100
500 to 1000	25.8	39.2	35.0	100
1000 to 2000	16.6	45.5	37.9	100
2000 to 4000	35.4	35.4	29.2	100
Above 4000	22.2	44.4	33.3	100
Total	24.5	41.9	33.6	100

Source: Author's fieldwork, 1997-98

The non-availability of good private doctors in the less accessible villages may compel the patients to go to a town or city to access quality health services. In both of the more accessible villages (Kehrawar and Bapora) either an MBBS or a BAMS doctor is available. The chi-squared value for a cross-tabulation between village accessibility and treatment source is 15.4, which is statistically significant at the 0.01 level of significance with 2 degrees of freedom (Table-7.11). This substantiates the argument that variations in the sources of treatment differ significantly across the villages with different accessibility levels.

Table-7.10: Village accessibility and source of treatment

Accessibility level	% of people			
	Government	Private		Total
		In Village	In Town	
Rohtak				
Less	20.3	42.0	37.7	100
More	41.5	26.6	31.9	100
Total	29.1	35.6	35.3	100
Bhiwani				
Less	19.7	43.5	36.8	100
More	14.8	60.7	24.6	100
Total	17.3	51.9	30.9	100
Total				
Less	20.1	42.5	37.4	100
More	30.2	41.1	28.8	100
Total	24.5	41.9	33.6	100

Source: Author's fieldwork, 1997-98

Table-7.11: Source of treatment and controlling variables

Variable	Chi-Squared	Probability	Degrees of Freedom
Sex	2.4	0.295	2
Income	33.3	0.000	10
Caste	7.3	0.119	4
Village Accessibility	15.4	0.000	2

Source: Author's fieldwork.

7.5 WHAT ARE THE REASONS FOR USING DIFFERENT SOURCES OF TREATMENT?

From Tables-7.12(a) and (b) it appears that the utilisation of health services is reason specific. The chi-squared value for reasons and sources of treatment is quite high at 899.8, and is statistically significant at the 0.01 per cent level, proving that different reasons determine the utilisation of different types of health services. Government health services are utilised for two important reasons. Firstly, the cost of utilisation for these services is reasonable; and secondly, the availability of trained and experienced doctors and other support staff. For more than 40 per cent of the patients who have utilised Government health services, the doctor's qualification is the second most important reason for using this source. In Government hospitals, and Medical College Rohtak, many experienced and specialist doctors are also available. These hospitals have sophisticated modern facilities, but many of the illiterate and

poor people feel hesitant to approach these services, because of the lack of care. Mr. Mahabir's story is relevant here:

> "When my mother fell ill, I took her to the Medical College, Rohtak as she was seriously ill. We reached there in the morning around 9.00 AM. They told me to wait until my number came up. We waited there until 4.00 PM, but doctors did not pay any attention and did not check my mother. Then a nurse came and told me to come tomorrow morning. That is why I brought her back in the village as she was coughing phlegm and it was looking awkward. Next day, I took her in a private nursing home at Sampla and I had to spend more than Rs. 500" (Mahabir Singh, Kehrawar, 1998).

More than 16 per cent of patients have also used Government health services for another two important reasons: emergencies and negligence by a previous doctor. 24-hour emergency services are available at Medical College Rohtak and the civil hospital at Bhiwani. Most patients depend on Government health services in the case of emergencies. Villagers reported in the field that some private doctors in the villages do not diagnose patients properly, and when a patient's condition starts to deteriorate they have to depend on either private nursing homes or on the emergency services available in Government hospitals. The CMO, Bhiwani confirmed this:

> "Frequently, we have noticed that the patients are not properly diagnosed by the private doctors (particularly in rural areas [as many of them are not fully trained and equipped]) and if the condition of patients becomes serious then they are referred to us" (CMO, Bhiwani, 1998).

More than 36 per cent of patients consulted a private doctor in the village because no other source of treatment was available to them. About 12 per cent of patients used this source because it is time-and cost-effective. It is clear from the analysis that the private village doctors attract a large number of patients. Reasonable treatment cost and easy access may explain their popularity in the study areas even though a majority of these doctors is not fully qualified and trained to diagnose major illness. Mahabir commented that:

> "We prefer a private doctor in the village mainly for two reasons: (1) going to Rohtak or Smapla Town involves additional transportation cost and time, and (2) we need to have cash to consult a private doctor there. The village doctor, however, can examine the patient even if we do not have any cash to pay his fee and we can pay him as and when we have money" (Mahabir Singh, Kehrawar, 1998).

Table-7.12(a): Reasons and source of treatment (number of patients)

Reason for source	First Reason				Second Reason			
	Gover-nment	Private		Total	Gover-nment	Private		Total
		Village	Town			Village	Town	
Known to Doctor	1	16	8	25	5	10	23	38
Economic	128	32	8	168	56	84	18	158
Emergency	19	6	9	34	9	3	5	17
No other source available	7	147	13	167	2	22	9	33
Care & treatment	7	40	162	209	15	14	37	66
Not diagnosed by pervious doctor	21	15	56	92	5	0	12	17
Home service	1	36	0	37	0	25	3	28
Treatment without cash	0	17	0	17	0	15	1	16
Trained/specialist doctor	49	1	57	107	69	2	27	98
Others	3	8	12	23	2	11	52	65
Time & cost effective	0	50	1	51	1	141	0	142
Minor illness	2	39	0	41	0	25	2	27
Total	238	407	326	971	164	352	189	705

Source: Author's fieldwork, 1997-98

Table-7.12(b): Reasons and source of treatment (% of patients)

Reason for source	First Reason				Second Reason			
	Gover-nment	Private		Total	Gover-nment	Private		Total
		Village	Town			Village	Town	
Known to Doctor	0.4	3.9	2.5	2.6	3.1	2.8	12.2	5.4
Economic	53.8	7.9	2.5	17.3	34.2	23.9	9.5	22.4
Emergency	8.0	1.5	2.8	3.5	5.5	0.9	2.7	2.4
No other source available	2.9	36.1	4.0	17.2	1.2	6.3	4.8	4.7
Care & treatment	2.9	9.8	49.7	21.5	9.2	4.0	19.6	9.4
Not diagnosed by pervious doctor	8.8	3.7	17.2	9.5	3.1	0.0	6.4	2.4
Home service	0.4	8.9	0.0	3.8	0.0	7.1	1.6	4.0
Treatment without cash	0.0	4.2	0.0	1.8	0.0	4.3	0.5	2.3
Trained/specialist doctor	20.6	0.3	17.5	11.0	42.1	0.6	14.3	13.9
Others	1.3	2.0	3.7	2.4	1.2	3.1	27.5	9.2
Time & cost effective	0.0	12.3	0.3	5.3	0.6	40.1	0.0	20.1
Minor illness	0.8	9.6	0.0	4.2	0.0	7.1	1.1	3.8
Total	100	100	100	100	100	100	100	100

Source: Author's fieldwork, 1997-98

A large number of patients cited good care and effective treatment and medicine as the most important reasons for the utilisation of a private doctor in the town or city. This seems to

indicate that these doctors pay attention to their patients and that their treatment and medicines are effective and patients have quick relief. Sometimes, these doctors prescribe very strong dosages of medicines for a quick effect, which may have many side effects, but most of the villagers may not notice them due to their ignorance and they think that medicine and treatment of these doctors is quite effective. Another important thing to observe is that more than 17 per cent of patients had to rely on this source because a previous doctor (either a private doctor in the village or a Government doctor) could not diagnose properly or did not give due care and attention to the patients. Often in the beginning patients were not keen to use this source, because it is the costliest among all three sources of treatment, but they were compelled to use this source because of the negligence of previous doctors. When Ms Sunitha was asked 'which health service do you generally use', she told me that

> "Firstly, we try the PHC in the village, if the medicines are not effective then we have to go to a private doctor in the village, and if even his medicines are not effective, then we have to go to a private doctor in Rohtak City" (Sunita, Kehrawar, 1998).

Another 17.5 per cent of the patients relied on this source of treatment because of the doctor's qualification.

7.6 UP TO WHICH DISTANCES ARE HEALTH SERVICES USED?

Geographical distance is considered to be one of the important determinants of access to services (Oppong and Hodgson, 1994; Rushton, 1991), having an inverse impact on access. Distances from the source of treatment were grouped into five categories: within the village of residence, 10, 20, 40 and over 40 kilometres. Out of the total as many as 462 patients (about 47 per cent) have used a health service located within the village (Table-7.13[a] and [b]). Another important thing to notice from the Table-7.13(b) is that about 40 per cent of patients have utilised a health source outside the village but within a distance of 20 kilometres. It is quite probable that within this distance the required health services may be available to patients of all the eight surveyed villages; and only 10 per cent of the total patients have consulted health services beyond a distance of 20 kilometres.

The utilisation of health services does not decline up to a distance of 20 kilometres, but it does decline gradually after 20 kilometres. 20 per cent of patients have used external health services within a distance of 10 kilometres and it is 22.5 per cent up to a distance of 20 kilometres. Then there is a sharp decline beyond a distance of 20 kilometres. We can

conclude that 20 kilometres is a threshold limit for access to health services provided that adequate transport facilities are available in the villages. Distance from a treatment source was examined in relation to caste, sex, income and village accessibility, but there does not exist any statistically significant association between them. It is common for people to consult a doctor only when an illness is acute and life-threatening and the emergency nature of the service demand may override the everyday patterns of consumption.

Table-7.13(a): Distance from the source of treatment used (kilometres)

Village/ District	Number of patients					
	Within Village	1-10	11-20	21-40	Above 40	Total
Kehrawar	123	4	119	1	4	251
Chuliana	49	8	54	5	5	121
Diwana	17	7	0	16	2	42
Brahana	80	78	1	31	2	192
Rohtak	**269**	**97**	**174**	**53**	**13**	**606**
Bhera	44	2	26	2	13	87
Patodi	36	6	19	4	2	67
Bapora	113	65	1	1	3	183
Dhani Ma	0	33	1	4	3	41
Bhiwani	**193**	**106**	**47**	**11**	**21**	**378**
Total	**462**	**203**	**221**	**64**	**34**	**984**

Source: Author's fieldwork, 1997-98

Table-7.13(b): Distance from the source of treatment used (kilometres)

Village/ District	% of patients					
	Within Village	1-10	11-20	21-40	Above 40	Total
Kehrawar	49.0	1.6	47.4	0.4	1.6	100
Chuliana	40.5	6.6	44.6	4.1	4.1	100
Diwana	40.5	16.7	0.0	38.1	4.8	100
Brahana	41.7	40.6	0.5	16.2	1.0	100
Rohtak	**44.4**	**16.0**	**28.7**	**8.8**	**2.2**	**100**
Bhera	50.6	2.3	29.9	2.3	14.9	100
Patodi	53.7	9.0	28.4	6.0	3.0	100
Bapora	61.8	35.5	0.6	0.6	1.6	100
Dhani Ma	0.0	80.5	2.4	9.8	7.3	100
Bhiwani	**51.1**	**28.0**	**12.4**	**2.9**	**5.6**	**100**
Total	**47.0**	**20.6**	**22.5**	**6.5**	**3.5**	**100**

Source: Author's fieldwork, 1997-98

7.7 PATIENTS ACCOMPANIED TO TREATMENT

Traditionally speaking the study area has been a male-dominated society and women's role and their mobility have been limited. Men can go out of their village unaccompanied, but

women in the age group 15 to 30 years are required to be accompanied by someone, and dependency on someone's company, perhaps, restricts their mobility. Therefore, it is interesting to study whether a patient was accompanied by someone or not to the treatment source.

When a patient is seriously ill someone has to accompany him/her while going to consult a doctor. But for minor illness a patient can go alone even if female. In the following text an attempt will be made to examine 'whether patients have been accompanied or not' to treatment sources located at different distances.

Tables -7.14(a) and (b) show the distribution of male and female patients with and without a companion when visiting a health centre. It is quite clear from this table that more women patients have been accompanied by someone while they have visited a treatment source. In the case of men, less than three quarters of the total patients were accompanied, while more than 89 per cent of female patients have some company. In Rohtak, more male patients were accompanied by someone as compared to Bhiwani, but in the case of women the pattern is the reverse. In Bhiwani District 92 per cent of female patients had some company when they visited a health centre, 4 per cent more than for Rohtak District.

Table-7.14(a): Accompanied to treatment source (number of patients)

Village / District	Male			Female		
	Accompanied			Accompanied		
	No	Yes	Total	No	Yes	Total
Kehrawar	41	86	127	19	105	124
Chuliana	16	50	66	8	47	55
Diwana	4	23	27	1	14	15
Brahana	28	75	103	6	83	89
Rohtak	**89**	**234**	**323**	**34**	**249**	**283**
Bhera	13	35	48	1	38	39
Patodi	13	21	34	3	30	33
Bapora	31	76	107	9	67	76
Dhani Mansukh	7	12	19	1	21	22
Bhiwani	**64**	**144**	**208**	**14**	**156**	**170**
Total	**153**	**378**	**531**	**48**	**405**	**453**

Source: Author's fieldwork, 1997-98

Table-7.14(b): Accompanied to treatment source (% of patients)

Village / District	Male			Female		
	Accompanied			Accompanied		
	No	Yes	Total	No	Yes	Total
Kehrawar	32.3	67.7	100	15.3	84.7	100
Chuliana	24.2	75.8	100	14.6	85.5	100
Diwana	14.8	85.2	100	6.7	93.3	100
Brahana	27.2	72.8	100	6.7	93.3	100
Rohtak	**27.6**	**72.5**	**100**	**12.0**	**88.0**	**100**
Bhera	27.1	72.9	100	2.6	97.4	100
Patodi	38.2	61.8	100	9.1	90.9	100
Bapora	29.0	71.0	100	11.8	88.2	100
Dhani Mansukh	36.8	63.2	100	4.6	95.5	100
Bhiwani	**30.8**	**69.2**	**100**	**8.2**	**91.8**	**100**
Total	**28.8**	**71.2**	**100**	**10.6**	**89.4**	**100**

Source: Author's fieldwork.

It is apparent from Tables-7.15 and 7.16 that the probability that someone will accompany a patient increases with distance. This relationship is rather weak for men (because of social factors men can go alone over longer distances), but very strong for women, especially in age group 15 to 25 years. It is interesting to note that none of the female patients in this age group visited a health service located out of village without company, while more than 20 per cent of male patients did so. Regression coefficients for both sex and location of treatment source within and out of village of residence show statistically significant positive values. For sex it is statistically significant at the 0.01 per cent level of significance (Table-7.17). This indirectly points towards women's poor access to health services located out of their village, as they have to depend on others; and dependency on other family member may constrain their access to health services.

Table-7.15: Distance from treatment source and patients' company (number of patients)

Distance from source of treatment (km)	Accompanied by someone					
	Male			Female		
	No	Yes	Total	No	Yes	Total
Within Village	83	175	258	30	174	204
1 to 10	30	82	112	6	85	91
10 to 20	23	89	112	11	98	109
20 to 40	8	23	31	1	32	33
Above 40	9	9	18	0	16	16
Total	153	378	531	48	405	453

Source: Author's fieldwork.

Table-7.16: Distance from treatment source and patients' company (% of patients)

Distance from source of treatment (km)	Accompanied by someone					
	Male			Female		
	No	Yes	Total	No	Yes	Total
All age groups						
Within Village	32.2	67.8	100	14.7	85.3	100
1 to 10	26.8	73.2	100	6.6	93.4	100
10 to 20	20.5	79.5	100	10.1	89.9	100
20 to 40	25.8	74.2	100	3.0	97.0	100
Above 40	50.0	50.0	100	0.0	100.0	100
Total	28.8	71.2	100	10.6	89.4	100
In age group 15 to 25 years						
Within Village	50.8	49.2	100	13.9	86.1	100
1 to 10	28.6	71.4	100	0.0	100.0	100
10 to 20	29.2	70.8	100	0.0	100.0	100
20 to 40	16.7	83.3	100	0.0	100.0	100
Above 40	25.0	75.0	100	0.0	100.0	100
Total	39.7	60.3	100	6.2	93.8	100

Source: Author's fieldwork, 1997-98

Table-7.17: Patient's company and controlling variables

Dependent variable = patient's company	Regression Coefficient	Standard Error	Z-Value	P>|Z|
Sex	1.2214	0.1808	6.7550	0.0000
Location of treatment source	0.0009	0.0003	2.7600	0.0060
Constant	-0.5381	0.2578	-2.0870	0.0370

Source: Author's fieldwork, 1997-98

7.8 EXPENDITURE ON THE UTILISATION OF HEALTH SERVICES

Table-7.18 shows expenditure on illness and treatment source. Expenditure data show an association with the utilisation of private health services, but there is no particular trend in the case of Government health services. Expenditure experiences a negative association with the utilisation of private doctors in the village, but a positive relationship with private doctors in the town or city. For a private doctor in a village, the percentage of patients spending more than Rs 100 declines sharply, while in the case of a private doctor it increases abruptly after this limit. This supports the argument that private doctors in the town or city are costlier than private doctors in the village.

Table-7.18: Expenditure and treatment source

Expenditure on illness (Rs)	Number of patients				% Patients			
	Govern -ment	Private		Total	Govern -ment	Private		Total
		Village	Town			Village	Town	
Below 25	75	79	14	168	44.6	47.0	8.3	100
25 to 50	17	121	17	155	11.0	78.1	11.0	100
50 to 100	18	90	36	144	12.5	62.5	25.0	100
100 to 250	46	79	100	225	20.4	35.1	44.4	100
250 to 500	38	31	81	150	25.3	20.7	54.0	100
500 to 1000	16	5	28	49	32.7	10.2	57.1	100
Above 1000	29	3	51	83	34.9	3.6	61.5	100
Total	239	408	327	974	24.5	41.9	33.6	100

Source: Author's fieldwork.

7.9 OUTCOME FROM TREATMENT

Respondents were also asked 'what was the outcome of treatment'? This question has three responses: cured, still under treatment, and stopped treatment but not cured. Out of the total 981 patients who fell ill during the previous six months, 786 (83.5 per cent), were cured, more than 14 per cent were under treatment at the time of the survey; and about 2 per cent were not cured (Table-7.19).

Table-7.19: Treatment outcome.

Treatment outcome	Number of patients			% patients		
	Male	Female	Total	Male	Female	Total
Cured	441	345	786	83.5	76.2	80.1
Still under treatment	77	92	169	14.6	20.3	17.2
Not cured	10	16	26	1.9	3.5	2.7
Total	528	453	981	100.0	100.0	100.0

Source: Author's fieldwork, 1997-98

It is interesting to note that the percentage of female patients who were cured is 7 per cent lower than that of male patients (Table-7.19). More than 20 per cent of female patients were under treatment and more than 3 per cent of female patients were not cured from the illness that they were suffering from, but they were not under treatment at the time of the survey. This clearly shows higher morbidity among females as compared to males in the study area.

7.10 SUMMARY OF RESULTS AND DISCUSSION

7.10.1 Summary of results

This analysis confirms that the availability of a health service (in a village) significantly determines its utilisation, which is evident from the utilisation pattern of the PHC available in Kehrawar; in Chuliana (located only three kilometres away from Kehrawar, and which is on the way to Rohtak City), none of the patients has used the PHC available in Kehrawar.

In the study area, private doctors cater for more than 70 per cent of the total demand for curative and clinical health services (for minor illness), and the rest is catered for by Government health services. The cost of utilisation and availability of trained and experienced doctors and other support staff have a significant impact on the utilisation of Government health services. A number of patients also depend on Medical College Rohtak and the civil hospital at Bhiwani (where 24-hour emergency services are available) in emergencies and due to negligence by private doctors. In the field, villagers reported that some private village doctors do not diagnose patients properly, and when the patient's condition starts to deteriorate they have to rush either to private nursing homes or to the emergency services available in Government hospitals. But lack of care and negligence is also observed in Government health centres. Moreover, sophisticated Government hospitals are not easily accessible to village commoners.

A private village doctor is a cheap source of treatment for the people who cannot afford to consult a private or Government doctor in a town or city. These doctors attract a large number of patients because of their reasonable treatment costs and easy access. Besides, villagers know these doctors personally; and they can always consult them even if they do not have the cash to pay him/her. Villagers in the field also reported that a majority of these doctors are not qualified and trained to diagnose any major illness.

In the study, a number of patients also consulted private doctors in a town or city due to non-availability of medicines and other drugs in the Government health centre, and also because village doctors (Government or private) could not diagnose the patients. People in the study area feel that the private doctors in the city and towns are effective in diagnosing a patient, but in the beginning, patients generally try the less costly health services available in their village such as a private village doctor. But if a patient is not diagnosed or there is no

improvement in a patient's condition then they consult a private or Government doctor in a town or city. Expenditure on treatment and utilisation of different health services suggests that private doctors in the town/city are more costly compared to the private doctors in the village.

The availability of Government and private health services varies across the villages in the study area. Some villages succeed in attracting more health services than others, which also affects their utilisation pattern. It was observed that the type of health services used varies significantly across the two districts under study. In Rohtak District, the percentage of patients who consulted private doctors in the town or city is higher than in Bhiwani District. Moreover, women's access to health services is better in Rohtak as compared to Bhiwani District.

Income and other controlling variables do not experience any statistically significant association with treatment source and distance from health service. As discussed earlier, people have to consult a doctor under compulsion (irrespective of income, age, sex, education level and location of service), particularly when illness is life-threatening. Nevertheless, it was observed in the field that sex and a low level of income definitely constrain access to private doctors in the city or towns. Another noticeable thing is that a distance of 20 kilometres can be considered as a threshold limit for convenient access to a health service provided that adequate transport facilities are available in the villages.

7.10.2 Discussion: At the inception of Haryana State in 1966, not many health care services were available, particularly in the villages. Now, at all district headquarters civil hospitals are available. These hospitals are equipped with all the modern facilities and many types of specialist doctors are available. Overall, there has been considerable expansion of health services in Haryana quantitatively and qualitatively since 1966. The number of Sub-centres, PHCs and CHCs has increased substantially (CMO, Bhiwani, 1998). Multi-purpose health workers employed in sub-centres cover almost all of the villages in the state. Their major objective is immunisation, vaccination, malaria control, family planning etc., which accounts for declining infant and child mortality rates and increasing life expectancy in Haryana. Now, people are more aware of their health physically and mentally. The availability of Government and private health services, the education of the people, and the public's positive response towards the available health care services, have contributed significantly towards the

improvement in people's health (Discussion with the CMO, Bhiwani, 1998). But still a significant proportion of the population suffers from an excess of morbidity and mortality, because modern health services are practically inaccessible to this section of society (Akhtar, 1991). Further, the Additional Deputy Commissioner (ADC) argues that:

> "Increasing the number of facilities does not serve any purpose unless these facilities effectively cater for villagers' needs. The availability of a PHC is not of any use if doctors and medicines are not available and it does not provide the services people need. The Government (instead of providing some new facility) must improve the standard and quality of already existing services to cater effectively for the needs of villagers" (ADC, Rohtak, 1998).

Villagers and service providers reported in the field that Government services are not meeting villagers' needs effectively. Most of the Government health services are engaged in preventive measures, such as vaccination, immunisation, family welfare programmes etc. Multi-purpose health workers are available in villages, but they are neither qualified nor fully equipped to provide curative and/or clinical services to villagers. But in the towns and cities, Government health services provide both clinical and preventive services. Moreover, a large number of private doctors are also available in towns and cities, so urban dwellers take advantage of both Government and private clinical and preventive health services. People in rural areas are not happy with the Government health services for two reasons: many a time medicines and other essential drugs are not available, and doctors and other support staff stay in the villages only for a limited time during the day. But the question is 'why do they not stay in villages'? The lack of other necessary facilities in rural areas seems to be the most important reason. The Senior District Magistrate (SDM) reported that

> "Rural areas have always been given a discriminatory treatment. In the urban areas, we have better facilities. If electricity supply is for 20 hours in urban areas it is only 6 hours in rural areas; none or poor transport facilities; the same is the condition of water supply and any of the other facilities. If we cannot provide better services in the rural areas at least we must provide as good services in rural areas as in urban areas. Only then will doctors and other workers stay in rural areas and work for and with the rural dwellers" (SDM, Rohtak, 1998).

Further the Block Development Officer (BDO) reported that

> "Doctors and other staff do not stay in the villages, as other necessary services are not available in almost all the villages, such as a proper accommodation, drinking water, 24 hour electricity supply etc. Therefore, staff employed in Government services in rural areas neither can stay in the villages nor they can work comfortably" (BDO, Rohtak, 1998).

Many villagers also reported that doctors do not pay proper attention to their patients; and medicines, essential drugs and injection are not provided. The quality of Government health services has deteriorated to such an extent that villagers are compelled to use quality private health services in towns/cities. Some of the officers also admitted that Government employees are over-secure in their job and have been negligent in their duties and they do not feel accountable to anyone. The ADC's comments will further substantiate this argument:

> "Once you get a Government job you become over-secure and this is the most probable reason that people are negligent towards their duties. If a doctor (in a village PHC) is not punctual; we do not have any authority (at district headquarters) to penalise him" (ADC, Rohtak, 1998).

Some of the officers are of the view that Government services have not been able to cater to the needs of people effectively, including health services and a significantly large proportion of patients have to rely on private health services, particularly clinical and curative.

The CMO of Bhiwani explained that declining standards of Government curative/clinical health services are due to budgetary constraints and increasing demand. He confirmed that

> "The budget is sanctioned and imposed from above. We are not sanctioned the amount of money we need for the proper management and functioning of the available health care facilities. This is one of the important reasons that we have not been able to maintain the existing health services effectively" (CMO, Bhiwani, 1998).

The CMO further argues that with the increasing demand for Government health services, people's expectations have also become very high. Moreover, they do not co-operate. He cited an example:

> "A patient will come to me and will expect that a doctor spend at least 15 minutes on him, issue all the medicines he needs, show sympathy and do everything else he/she needs. We have limited staff and limited medicines and other resources and the number of patients has increased. In such a situation, we are unable to spend enough time with each patient and cannot provide all the medicines and drugs a patient needs. Even if I spend more time with one patient another patient will think why is the doctor spending so much time on him" (CMO, Bhiwnai, 1998).

The CMO admitted that improvement in the health of people is a combined effect of Government and private health services in the state, and some Government health services can

be privatised. But the ADC, Rohtak further stated that 'complete privatisation' is not a viable solution. He argues that:

> "Wherever a private agency fails to intervene, Government must provide facilities. For example, why should we have a big PHC in Bahadurgarh where many other private doctors are available? We must locate a PHC somewhere private health care is not available" (ADC, Rohtak, 1998).

Dr. Sunil and the CMO, Bhiwani reported that people do not take free services seriously:

> "People take these goods and services more seriously for which they have to pay...If somebody delivers a lecture free of cost there would not be many listeners...but the audience will be big if they have to pay to attend this lecture. Side by side only the interested audience will attend this lecture. What is happening these days, people prefer private health services despite the fact that most private doctors are not as qualified as Government doctors. Moreover, they do not have facilities as good as Government hospitals have...If a patient is not charged for the medical services he/she is not satisfied" (CMO, Bhiwani, 1998).

> "At least nominal fees must be charged so that patients take these services seriously. For example, before we used to charge one Rupee for a prescription slip, now it is totally free. Therefore, patients need not to pay even if they do not have their old prescription slip. Earlier they used to bring along this slip while coming to health centre next time. Now, patients do not care to retain their prescription slips and they hardly bring along their prescription slip while visiting our clinic next time. Therefore, it is necessary that there must be reasonable charges for service utilisation so that service users takes them seriously (Dr. Sunil Verma, Kehrawar, 1998).

Utilisation fees may generate some funds, which can be spent on the maintenance of these facilities. But they may further restrict poor people's access to these services. Therefore, people who cannot afford to pay the cost of utilisation must be allowed to use these services. Most of health schemes seem to have some mechanism for enabling the poorest to claim free treatment, although there is little evidence of the effectiveness of such schemes (Diskett and Nickson, 1991). Even if some Government services are privatised, the question of poverty must be addressed in detail, so that the poor have adequate access to the required health services. An another important issue is inter-sectoral co-ordination, particularly between education and health. Health education is one of the important preventive measures and its integration with the school curriculum would help spread health consciousness and prevent many diseases.

Inadequate sanitation is one of the major problems in the villages and probably the root cause of many diseases in rural areas. There was no proper sewerage arrangement in any of the eight

surveyed villages (Plate-1.12). Streets were full of mud, water accumulated in the low laying areas, and garbage also built up (Plate-7.1 and 7.2). Villagers themselves reported that this was due to the uninterrupted flow of tap water supply and the breakage of pipes at several places (Plate-1.13). Mr. Suresh told me that:

> "Before Government started the tap water supply in this village, almost all of the streets were bricked and were neat and clean. Because of the uninterrupted flow of water and the breakage of pipes, streets have subsided and are broken at many places; the overflow of water accumulates in the subsided streets. The village *panchayat* really did not bother to get these streets repaired. After a year of the tap water supply starting, all bricked streets in the village have turned into muddy broken streets. Mismanagement and poor administration of local Government, and carelessness and the self-centred attitude of the people are the probable reasons for this problem. Only a few households have got legal tap water connections after depositing money. Many other households have not deposited any money for a tap water connection, but dig a hole and break the main pipelines to insert a pipe for their home use. That is why the main pipes leak and water accumulates in the holes and the main water supply becomes contaminated (Suresh, Bapora, 1998).

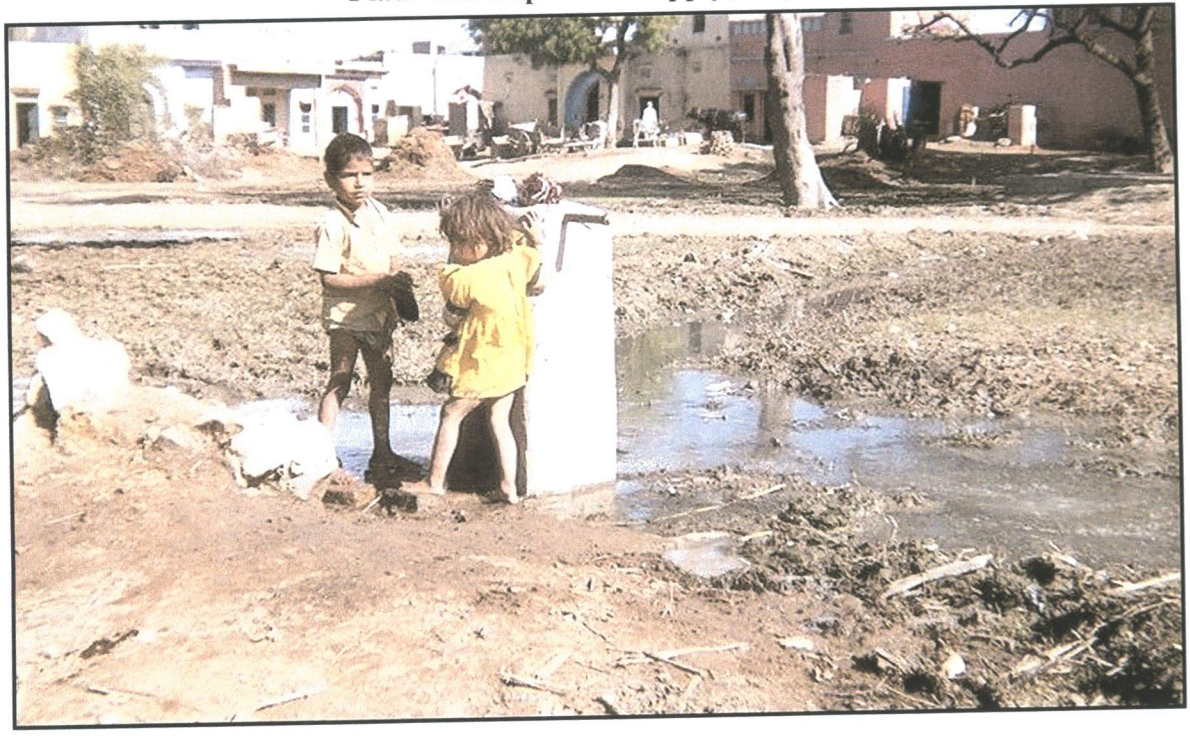
The accumulation of water in the subsided areas also encourages the breeding of mosquitoes, which not only spread malaria, but are also responsible for many other waterborne diseases (Plate-7.1). Therefore, the people's co-operation and co-ordination is essential for the proper sanitation of the villages and the effective functioning of other services. Lack of co-operation with service providers and an excessively bureaucratic approach (especially the Government departments) also hinders the effective delivery of goods and services to the people.

Many a time, Government resources are wasted and under-utilised. This is very clear from the one villagers' comments in Brahana:

> "The Government opened a dispensary some time ago. At present, this dispensary has been abandoned, as a doctor, and medicines and essential drugs are not available in this dispensary. The building is derelict and untamed pigs, sheep and goats lie in it (Plate-1.7). At present, there is no Government health service in the village despite the fact that this village has more than 1200 households. Both Government and villagers (especially the *Sarpanch*) are responsible for this. On the one hand the Government should have provided staff in the dispensary and if it did not do so, the *sarpanch* should have taken up the matter with the higher authorities. There has been negligence at the Government's and the village's end. The villagers went to the authorities sometimes, but nobody paid any attention and then the villagers stopped taking any interest" (Jagbir Singh, Brahana, 1997).

Plate-7.1: Open space, Bapora

Plate-7.2: Tap-water supply, Bapora



Brahana is the largest of the four selected villages of Rohtak District, with more than 7500 people (Census of India, 1991). But none of the Government health services is available in this village, although the national norm for the provision of at least one male and one female health worker is 5000 people. In Kehrawar, which is located on National Highway 10, a PHC is available although the population of Kehrawar is less than that of Brahana. Brahana is not located on a main road and is geographically less accessible..

From the above discussion it is obvious that Government health services are not effectively catering to villagers' needs, particularly for clinical and curative health services; and there is a need to re-evaluate the existing provision of health services. The *World Development Report 1993* emphasised (a) an improvement in the household environment (which includes poverty alleviation, economic and political empowerment, and legal protection etc.), (b) effective Government expenditure on health reoriented towards the poor and low-cost, highly effective programmes and basic health services, and (c) regulated private sector competition with the public services. Some other researchers emphasise building of an effective and well-organised health management system that integrates the various levels of health care delivery (Pillai and Shannon, 1995). This will not only raise life expectancy but also control major infectious and parasitic diseases, particularly among the children under five (Evans et al, 1995). Within the limited resources, health problems have to be prioritised. Some researchers argue that the greatest returns to health investment are from primary health, maternal and child health care services in rural and semi-rural areas. Moreover, the Developing Countries cannot afford to spend a high proportion of their health budgets on sophisticated hospitals. Therefore, the best way is to privatise hospitals and for Government to concentrate on low-cost basic health services (Griffin, 1991).

In a country like India, a large workforce is needed to cater to the needs of more than 900 million people. Due attention has to be paid to strengthen the capability of administrators, physicians, and other personnel in positions of leadership in the health system at central and local level in order to develop a population perspective in the analysis of health problems, a cost-effective attitude towards the use of resources and management of skills appropriate for a human-services organisation (Evans, et al, 1995). Therefore, investment in research and development on health cannot be denied. But this investment needs to be more cost-effective in relation to demand.

In India, there is unemployment among doctors, but side by side many health centres in rural areas are without medical staff, which reveals that physicians are unwilling to serve in rural areas, especially in remote parts of areas with poor infrastructure services (Akhtar and Izhar, 1994). This means that qualified doctors are not attuned to work in the rural and less developed areas. As discussed earlier, there is a need to create an adequate rural infrastructure so that doctors can stay in the villages and cater effectively to villagers' needs even in emergencies. Besides, some more steps have to be followed. Many doctors are trained in high tech medical Government institutes at the cost of public money. Therefore, at least five years of services in rural areas could be made compulsory for every doctor when he/she has finished his/her training.

The search for the technology appropriate to the financial and organisational circumstances of the Developing Countries must be seen as a high priority for the research and development community of the world. The existing technology must be critically evaluated and a new, simpler and more cost-effective technology is needed for the control and prevention of chronic diseases, with a major focus on 'tropical diseases'. Moreover, other forms of medical knowledge (such as *ayurveda)*, which could be given a higher priority; some diseases are effectively curable with local treatments. Mr. Das bears this out:

> "When my wife fell ill, in the beginning, I took her to a private doctor in the neighbouring village. He could not diagnose her properly. Then I took her to a private doctor in the Rohtak. His treatment was also not very effective. At last, I took her to her parents' village to a local '*vaid*'. He gave her (local) medicines free of cost and within four days she was cured" (G. Das, Diwana, 1997).

The scarcity of money for health is a critical limitation in progress towards the goal of 'Health for All by the Year 2000" (Evans et al, 1995). It was also observed in the study area that there have been budgetary constraints to maintain Government health services effectively. Researchers argue that the effective universal access to PHC is financeable in very poor countries, with only modest injection of external funding if there is a political priority (Green, 1991). Budgetary constraint is not the only issue in India, but health services do show a lopsided pattern, with expenditure concentrated on sophisticated facilities in towns, leaving the vast majority of rural areas practically unserved (Akhtar, 1991). Narrow class interests, medical professionalism and a lack of political will are the main obstacles working against the universal provision of quality health services in rural areas (Green, 1991; Akhtar, 1991; Jeffery, 1991; Sen, 1996). The urban professionals, bureaucratic and industrial

classes have a direct interest in expanding medical education (instead of public health services) in order to provide a career path for their sons (and to lesser extent, daughters [Jeffery, 1991]). Most of the elite class, politicians and industrialist can afford expensive private health care services and they do not rely on Government health services. They use Government hospitals only in an emergency or in cases (as with some urban teaching hospitals) where facilities are not available elsewhere (Jeffery, 1991).

The aim of the 'Alma-Ata Declaration was to develop a PHC system that would be widely accessible and sustainable at a level which poor communities can afford. Community participation (including in decision making) was identified as a key strategy through which PHC would be implemented, but this was often interpreted to mean merely 'Community Contributions', providing financial support and resources (Diskett and Nickson, 1991). Even in the study area, villagers had little say on the location, operation, maintenance and monitoring of public health services despite the fact that public involvement is essential for effectively catering for the health needs of villagers.

Without strong public demand it is not only difficult, but also perhaps impossible to prioritise the provision of universal primary health care services. Strong public demand (which is possible through the widespread expansion of health education and health consciousness) may develop a strong political will. But Jeffery (1991) argues that 'no one can be very optimistic about the health of Indians and the prospects for implementing community services... conversely no one should write off the possibility of improvement' (Jeffery, 1991, 116). One must not forget the saying that 'if there is a will there is a way'. Therefore, strong public demand, commitment and co-operation, and political will are needed for the effective provision of universal primary health care.

Chapter - 8

TRANSPORT, EMPLOYMENT AND LITERACY

8.1 INTRODUCTION

The role of transport in economic development has been recognised universally. In the late nineteenth and early twentieth centuries, transport and communications were the central foundation for opening up new colonies (Ruttan, 1984). In India under the British hegemony only the major administrative and industrial centres were connected to major port cities by rail and road networks, but little attention was paid to rural transport. After independence the Government paid special attention to rural road construction in the hope that rural-urban linkages would be established and the trickle down effect of urban growth enhanced. However, it is reported that even after five decades of India's planned development process 300,000 villages have yet to be connected by all-weather roads, and much of the available road network is in a poor condition, which can not be used for speedy and efficient transport (AITD, 1997 and 1998). In the study area, all the villages are connected by black top metalled roads which is an indication of the relatively advanced condition of Haryana State. The connectivity of rural roads, however, is not the major thrust of the present investigation, rather the impact of rural transport on the social and economic conditions of the population.

It is well established that transport is one of the most important forms of economic infrastructure that directly and indirectly influences economic and social conditions of people in general and those in rural areas in particular (World Bank, 1994). The availability of transport services greatly enhances people's mobility in rural areas. The impact of transport on rural development is widely recognised; three well-documented impacts of transport are:

- The availability of transport has an important impact on the mechanisation of agriculture and general modernisation due to farmers' access to market and other institutions.
- It helps villagers in accessing other important infrastructure services such as higher order education, health or agriculture institutions and the markets located in urban areas.
- It facilitates villagers in commuting to urban areas, where opportunities for non-farm employment are better than in the rural areas.

The availability of rural transport has significant economic impacts. It does not directly raise productivity, but provides a necessary precondition for economic development. Rural transport expands the product and factor markets, reduces the costs of marketing agricultural produce, and transmits and reduces labour market imperfections (Bhalla and Singh, 1999). The expansion of products and factor markets aids specialised agriculture and non-agriculture sectors. Backward villages, which could not interact with towns/cities earlier, had to specialise in the production of low value perishable products or cheap foodgrains for the limited local market, because adequate and cheap transport facilities were not available. With the availability of transport infrastructure, their agricultural and allied products may find a demand in the larger markets, which in turn increases agricultural productivity and incomes (Ahmed and Rustagi, 1987); and also helps in poverty alleviation. Further it is well documented that increase in income levels (from agriculture) help in generating employment in both agricultural and non-agricultural sectors (Nicholls, 1963; Ishikawa 1967; De Varies, 1963), which was observed in the first flush of the Green Revolution, when agriculture prospered in Haryana and the demand for agricultural labourers increased. Researchers argue that job opportunities are available in the agricultural sector only for a limited period of time in the year and the non-agricultural sector is not well developed in rural areas. But cities and/or towns (which are accessible by cheap and fast modes of transport) provide villagers with more opportunities for non-farm employment.

The impact of transport in rural areas has to be examined in two different ways. For the rich and big landlords, transport improves their access to market and expands their agricultural and allied activities and therefore helps in raising their income levels. But for landless labourers and marginal farmers it helps them commute to towns/cities where they find more working days at higher wage rates, and hence more income as compared to farm/agricultural employment (for details see Chadha, 1994; Epstein, 1962; Lanjouw and Stern, 1993). Therefore, the availability of transport in rural areas both directly and indirectly helps in improving economic conditions of people in general and that of landless labourers and marginal farmers in particular (they do not own their private conveyance but rely on the public transport system).

This chapter is divided into two sections. In the first section, an attempt will be made to examine the availability of transport facilities on the one hand and, on the other, village

distances from the bigger towns and cities and from Delhi metropolitan. The effect of these distances on literacy rates and non-farm employment is examined in the second section.

8.2 AVAILABILITY OF TRANSPORT SERVICES

Data on the availability of transport services were collected from District Census Handbooks (DCHBs) of Rohtak and Bhiwani Districts for the Census years 1981 and 1991. Two types of information are available from DCHBs: location of rail and bus stations and distance from the nearest market. The availability of public bus and rail stations[1] in rural areas greatly facilitates people's mobility, particularly of those who do not own a private conveyance. In 1981, a bus station was not found in as many as 201 villages (22.14 per cent), but this number declined to only 75 in 1991 (Table-8.1). The number of villages with a railway station was low in both 1981 and 1991. Out of the total, 46 villages (5 per cent) had a rail station, and, except for one, all of these also had a bus station; and only these few villages, therefore, have excellent transport availability. It is interesting to note that in Rohtak for both Census years the proportion of villages with a bus station was less than for Bhiwani District; but the reverse was true for rail stations.

Inter-district disparities in the distribution of bus stations can be explained in terms of the political factor. It must be noted that the provision of road transport is under the control of the State Government, while rail is under the Central Government. Therefore, the allocation of resources on road transport is at the disposal of the political parties in power in their respective states. After the separation of Haryana from 'Grand Punjab' in 1966, the state Government paid special attention to the development of rural infrastructure especially to road transport and electricity. Within ten years it became the first state in the country which provided electricity in every village. Mr. Bansi Lal, the current Chief Minister of Haryana State, also ruled this state in 1970s. He represents Bhiwani constituency and paid special attention to the provision of rural roads and electricity in his own area. However, in Rohtak District the local Member of Legislative Assembly (MLA) and Member of Parliament (MP) have belonged to the opposition parties for the majority of the time period after the separation

[1] The availability of bus or rail stations implies that at least one bus or train stops in the village a day and that a village is connected with a metalled road and a railway line respectively. However, connectivity does not guarantee frequency of services because buses/trains may pass through without stopping, but with a metalled road people can also use their own personal conveyance.

of Haryana State and their region has been disadvantaged because the ruling party divert resources to their supporters in order to secure their own vote bank.

Table-8.1: Availability of bus and rail stations.

District	Number of villages				Percentage of village			
	Bus		Rail		Bus		Rail	
	No	Yes	No	Yes	No	Yes	No	Yes
1981								
Rohtak	144	331	453	22	30.32	69.68	95.37	4.63
Bhiwani	57	376	414	15	13.16	86.84	96.50	3.50
Total	201	707	867	37	22.14	77.86	95.91	4.09
1991								
Rohtak	60	416	444	31	12.61	87.39	93.47	6.53
Bhiwani	15	414	414	15	3.50	96.50	96.50	3.50
Total	75	830	858	46	8.29	91.71	94.91	5.09

Source: DCHBs, 1981 and 1991

Figure-8.1 shows the rail and main road network and locations of rail and bus stations. It is interesting to note that more than 90 per cent of the villages have bus stations, but a large number of the remaining villages are not connected to a road. The condition of these roads has deteriorated due to poor maintenance and repair. Some of the state and district highways were washed out in the 1996 flood, and were not repaired until March 1998 (when I visited these villages last time [Plate-8.1]). The lack of funds and the poor organisation of Government authorities (at state and district level) are the main reasons for unsatisfactory condition of the roads under the state Government (AITD, 1997).

In the villages located on approach roads, limited public bus or private transport is available and people have to travel to the main road either by their own conveyance or on foot. Generally long route buses do not stop at the places where approach roads merge in the main roads. But there are other private modes of transport available, which greatly facilitate people's mobility. Therefore, the distance of villages from the main road is quite important in determining people's mobility. Straight-line distances were calculated between villages and the nearest main road using the ARC/INFO function 'near'[2].

[2] The 'near' function in ARC/INFO (version 7.2.1) calculates distances between points (villages in this case) in one coverage and the nearest points/lines in another coverage (road in network in our example). See command reference *ARC/INFO Users' Guide*, vol-1 and vol-2.

Plate-8.1: Damaged road (under construction) on Bhiwani-Loharu Road

Plate-9.1: A private three wheeler on Bapora-Bhiwani road

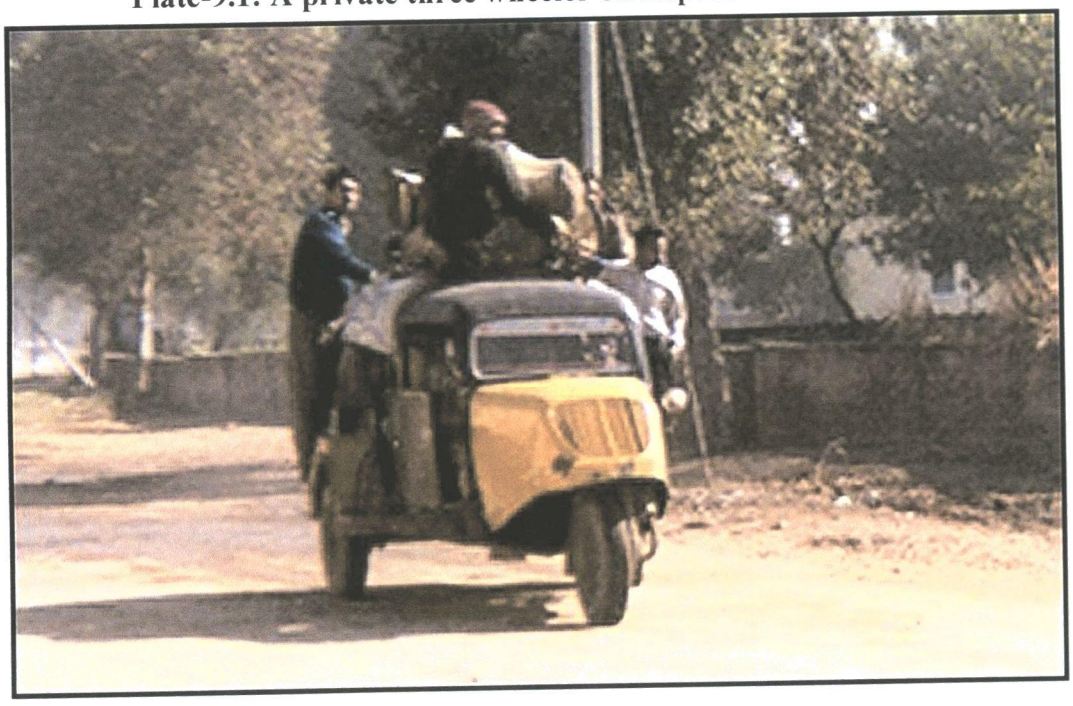


Table-8.2. shows the distance between the villages and the nearest main national, state and district highways. In three-quarters of the total villages people have to travel less than 2.5 kilometres to reach a main road, and in only 5 per cent of villages there is a main road located beyond a distance of 5 kilometres. Inter-district disparities are also noticeable; in Rohtak more than 76 per cent of villages have a road within a distance of 2.5 kilometres, while the figure for Bhiwani District is 72.3 per cent. Although access to bus stations is better in Bhiwani, but the availability of main roads is poor.

Rail is another important mode of transport available in the study area, but this facility is available in a limited number of villages. Moreover, in villages, only ordinary slow passenger trains stop, but tickets are less expensive than on an express. These cheap rail fares can improve poor people's mobility. If a rail facility is not available within a village, people in the neighbouring villages can walk or bicycle to the rail station, but within a limited distance of say 2.5 to 5 kilometres. Therefore, distance from the nearest rail station also plays an important role in people's mobility. In 253 villages (28 per cent) a rail station was available within a distance of 5 kilometres (Table-8.3), showing inaccessibility to a rail facility in more than 70 per cent of the villages in the study area. In Rohtak District, a rail station was available within a distance of 5 kilometres in more than 30 per cent of the villages, while this percentage was only 23.3 for Bhiwani District.

Table-8.2: Distance from the nearest main road

Distance (km)	Number of villages			Percentage of villages		
	Rohtak	Bhiwani	Total	Rohtak	Bhiwani	Total
Below 2.5	363	310	673	76.4	72.3	74.4
2.5 to 5.0	94	92	186	19.8	21.4	20.6
5.0 to 7.5	17	18	35	3.6	4.2	3.9
7.5 to 10.0	1	7	8	0.2	1.6	0.9
Above 10.0	0	2	2	0.0	0.5	0.2
Total	475	429	904	100	100	100

Source: Author's calculation

Villagers' access to a town and/or city helps in establishing and strengthening rural-urban linkages; and the availability of transport services could be considered as a measure of access to town and city, but in most of the villages (particularly those located on approach roads), frequent public transport facilities are not available. Therefore, people have either to walk or travel by their own personal conveyances.

Table-8.3: Distance from the nearest rail station

Distance (km)	Number of villages			Percentage of villages		
	Rohtak	Bhiwani	Total	Rohtak	Bhiwani	Total
Below 5	153	100	253	32.2	23.3	28.0
5 to 10	105	105	210	22.1	24.5	23.2
10 to 15	80	86	166	16.8	20.0	18.4
15 to 20	71	91	162	14.9	21.2	17.9
Above 20	66	47	113	13.9	11.0	12.5
Total	475	429	904	100	100	100

Source: Author's calculation

Distance (which also determines time and cost of travel) has an important relationship with people's access to town and/or city and governs the flow of goods, services, and people. Sometimes, smaller towns do not cater for the needs of villagers in general and farmers in particular and people have to travel to bigger towns. Therefore, in the following analysis we have calculated village distances from the nearest town with a population over 25,000 and over 50,000, separately.

There were only 6 towns with a population of more than 25,000 in the 1991 Census and only three, namely Rohtak, Bhiwani and Bahadurgarh, had more than 50,000 people. These towns are either district or tahsil headquarters, and provide administrative and economic functions. The average distance between villages to the nearest town with a population of over 25,000 is 19.5 kilometres. People in more than one third of the villages have to travel more than 20 kilometres to access the nearest town (Table-8.4). There are apparent inter-district differences. The average distance from the nearest town and/or city is only 13.3 kilometres in Rohtak District, but 28 kilometres in Bhiwani. In more than 57 per cent of the villages in Bhiwani District, the nearest town is beyond a distance of 20 kilometres.

Table-8.4: Distance from the nearest town with more than 25,000 people

Distance (km)	Number of villages			Percentage of villages		
	Rohtak	Bhiwani	Total	Rohtak	Bhiwani	Total
Below 5	36	11	47	7.6	2.6	5.2
5 to 10	112	51	163	23.6	11.9	18.0
10 to 15	150	64	214	31.6	14.9	23.7
15 to 20	113	57	170	23.8	13.3	18.8
Above 20	64	246	310	13.5	57.3	34.3
Total	475	429	904	100	100	100

Source: Author's calculation

8.3 TRANSPORT AND TOWN OR CITY ACCESS, AND EDUCATION LEVEL AND NON-AGRICULTURE EMPLOYMENT

The availability of transport and distance from town/city play an important role in determining social and economic conditions of population. Here an attempt is made to examine their impact on literacy rate and education levels. This section is divided into two parts. In the first part, we will examine the distribution of male and female literacy rates and non-agriculture workers for the Census years 1981 and 1991. In the second part, an attempt will be made to evaluate the impact of independent variables (namely, distance from the Delhi UT Border and the availability of a rail station) on literacy rate and non-agricultural workers.

In 1991, 45 per cent of people were literate and educated in Haryana Sate[3] which is lower than the national literacy rate. Male and female literacy rates were also calculated separately for Rohtak and Bhiwani Districts using 1981 and 1991 Census data. The overall literacy improved for both the districts and both sexes from 1981 to 1991, but clear inter-district disparities were noticeable; male and female literacy rates also differ significantly across Rohtak and Bhiwani Districts (Table-8.5[a] and [b]). In Rohtak, the literacy rate is above the state average, while in Bhiwani it is lower than the state average. Further, rural-urban differences are also noticeable in literacy rates in both districts. A major point to notice is that male-female differences in literacy rates in urban areas are lower than in rural areas, as a large number of educational institutions are available in urban areas (even separately for girls). But in a large number of villages either a school is not available or if available it is not separate for girls that may restrict women's access to education.

Table-8.5(a): Average literacy rate (%)

Year	Rohtak			Bhiwani		
	Male	Female	Total	Male	Female	Total
1981	55.0	25.7	41.3	48.1	16.3	33.0
1991	62.6	37.3	51.0	57.3	28.3	43.6

Source: Census of India, 1981 and 1991

[3] Literacy rates were worked out for whole population including children aged less than 7 years, as age-specific data was not available for the Census year 1981 at the village level. In 1991, population data for the age group less than 7 years was available, but for the comparison between 1981 and 1991 crude literacy rates were used.

Table-8.5(b): Average literacy rates (%)

Year	Rohtak				Bhiwani			
	1981		1991		1981		1991	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
Male	51.8	68.0	60.5	70.4	45.1	61.1	55.7	64.6
Female	20.1	48.6	32.6	54.4	11.9	37.2	24.9	44.3
Total	37.0	59.0	47.7	62.9	29.3	50.1	41.2	54.3

Source: Census of India, 1981 and 1991

Figures-8.2(a) and (b) and 8.3 (a) and (b) show the distribution of male and female literacy rates respectively. The class limits have been kept the same for both Census years for the sake of comparison. An east-west gradient is clearly visible in the distribution of literacy rates for both sexes. The eastern part of the study area (mainly in Rohtak District) shows higher literacy rates as compared to the western parts (mainly Bhiwani District). The villages surrounding the towns and along the major highways also experience higher literacy rates. Overall there was a considerable improvement in literacy rates from 1981 to 1991. In 1981, average male literacy rates were 55 and 48 per cent in Rohtak and Bhiwani Districts respectively, rising to 62 and 57 per cent in 1991. In 1981, 74 villages experienced more than a 60 per cent male literacy rate, while 398 villages were in this category in 1991. In all villages (except two) located on the Delhi border, more than 60 per cent of males were literate and educated.

In 1981, average female literacy rates were 25 and 16 per cent in Rohtak and Bhiwani Districts respectively, increasing to 37 and 28 per cent in 1991. In all the villages (except three), less than 50 per cent of women/girls were literate and educated, for both Census years. In 1981, the female literacy rate was more than 30 per cent in only 49 villages, while this figure increased to 408 by the year 1991, indicating an improvement in female literacy rates especially in the younger generation, but still more than half of the female population was illiterate even in 1991. A sharp contrast can be noticed in the distribution of the literacy rate between Rohtak and Bhiwani Districts. Villages along the national highway and nearer to the Delhi border show higher female literacy rates.

Data on workers[4] were collected to examine how many people were engaged in economically productive activities. The male work force participation rate was less than 50 per cent in both the districts for both the Census years, which shows a higher dependency rate[5]. The female work participation rate was significantly lower than that for males (Table-8.6). This is probably for two reasons: (1) under-reporting of female workers and (2) the limited role of women in economically productive activities. The majority of women are engaged in household duties, which is not considered to be 'work' and hence is under-reported in the Census. Also many agricultural women, who work in their own field, are not reported as workers, as most of them are not paid for these activities and the male respondent generally may not report that 'she works'. Therefore, a large proportion of women workers in the agricultural sector is under-reported. In rural areas, where the majority of workers are engaged in agricultural activities, female participation rates are higher than those for urban areas. This is because women's participation is limited to the agricultural sector only, which is predominantly restricted to rural areas.

Table-8.6: Workforce participation rate (%)

Year	Sex	Rohtak		Bhiwani		Total	
		Rural	Urban	Rural	Urban	Rural	Urban
1981	Male	44.38	45.67	44.77	49.30	44.53	46.97
	Female	9.35	4.23	9.56	3.40	9.43	3.94
	Total	27.98	26.36	27.99	28.22	27.98	27.02
1991	Male	46.49	46.42	44.62	45.73	45.75	46.18
	Female	10.25	5.15	9.63	3.62	10.00	4.62
	Total	29.91	27.09	28.24	25.69	29.25	26.61

Source: Author's calculation

Census data on main workers are classified into nine categories[6]. These data were reclassified here into two categories- (a) agricultural/farm and (b) non-agricultural/non-farm. Village level data on per capita income or other variables directly related to income are not available from any source. As discussed earlier, non-farm employment is positively associated with higher income levels, and this can be considered as an indicator of income. This indicator has many limitations, and it may give a misleading picture of the bigger farmers whose income

[4] A person who has participated in any economically productive activity (mental or physical) for 183 days or more in a year is defined as a main worker. Work involves not only actual work but also effective supervision and administration (Census of India, 1991).

[5] The percentage of non-working population (including children, retired, elderly and unemployed people) is described as the dependency rate.

[6] In 1991, workers' data were available for a nine-fold classification at village level. But the 1981 data is available only for four categories (see Census of India, 1991 for nine-fold workers' classification).

level is very high even by the standards of non-agricultural activities. But for small and marginal farmers and landless labourers, participation in non-farm employment ensures higher income levels (Chadha, 1994).

In 1981, 35 per cent of the total main workers were engaged in the non-agricultural sector. There was not a major increase in the proportion of non-agricultural workers from 1981 to 1991, as the figure for 1991 was only 38 per cent. In both districts rural-urban differences can be observed in the distribution of non-agricultural workers. In urban areas more than 84 per cent of the total workers were engaged in non-agricultural activities for both Census years (Table-8.7). It is obvious that expansion of the built up area and the non-agricultural functions of town and cities reduce the scope for agricultural activities. But the rural economy in the study area remains predominantly agriculture-based and the expansion of the non-agricultural sector has been limited. Therefore, only a small proportion of rural main workers (less than 24 per cent) was in the non-agricultural sector during the Census year 1981. In 1991, 27.5 per cent of workers were in the non-agricultural sector, an increase of about 4 per cent. A large proportion of these workers lives in rural areas but works in the town or city or metropolitan areas. Inter-district differences are also noticeable in the distribution of non-agricultural workers. In Rohtak District, the percentage of non-agricultural workers in rural areas was about 8 per cent more than the Bhiwani District for both Census years.

Table-8.7: Non-agricultural workers (%)

Year	Sex	Rohtak		Bhiwani		Total	
		Rural	Urban	Rural	Urban	Rural	Urban
1981	Male	29.97	89.54	20.74	83.89	26.43	87.41
	Female	10.25	86.27	5.63	86.28	8.43	92.37
	Total	26.88	89.30	18.28	85.13	23.57	87.75
1991	Male	33.57	87.09	26.00	79.52	30.67	84.51
	Female	12.81	87.07	6.78	77.38	10.47	84.47
	Total	30.32	87.09	22.93	79.39	27.48	84.51

Source: Author's calculation

The proportion of females in the non-agricultural sector is relatively low at 6.8 per cent (males 300,353 and females 22,161). Therefore, male and female non-agricultural workers will be grouped into one category. Figures-8.4(a) and 8.4(b) show the distribution of non-agricultural workers in 1981 and 1991 respectively. These maps show clear east-west contrasts in the distribution of non-farm workers; the percentages of non-agricultural workers

decline from east to west. Also villages surrounding larger towns (namely Rohtak, Bhiwani and Bahadurgarh, Jhajjar and Gohana) and those located nearer to Delhi border show higher percentages of non-agricultural workers.

In the following section, the impact of four independent variables (namely distance from the nearest town with a population of more than 25000; distance from Delhi Metropolitan; distance from a main road; and availability of rail and bus transport services) on literacy rates and non-agricultural employment will be examined. All three distances (controlling variables) show a statistically significant inverse relationship with literacy rates and non-farm employment (Table-8.8); this relationship is stronger in the case of female literacy rates. Distance from Delhi UT shows the highest degree of relationship with male and female literacy rates, because people are more literate and educated in the areas nearer to Delhi UT. Distance from the nearest town showed the highest degree of relationship with non-agricultural workers in 1981, but in 1991 it was distance from Delhi UT. However, distance from a road experienced rather a weak relationship with literacy rates and non-agricultural workers, but was still statistically significant.

Table-8.8: Controlling variables and literacy rates and non-agricultural workers

Distance from	Literacy rate						Non-agriculture workers	
	1981			1991				
	Male	Female	Total	Male	Female	Total	1981	1991
Town[ψ]	-0.3873*	-0.4648*	-0.4611*	-0.3765*	-0.5414*	-0.4954*	-0.4645*	-0.4559*
Delhi	-0.5079*	-0.5926*	-0.5910*	-0.4484*	-0.6562*	-0.5881*	-0.4479*	-0.4590*
Nearest Road	-0.1389*	-0.2219*	-0.1922*	-0.1381*	-0.2456*	-0.2051*	-0.2349*	-0.2742*

Source: Author's calculation

There is a (statistically significant) very high positive correlation (0.76) between distance from Delhi and distance from the nearest town. The 1991 literacy rate was regressed separately on both distance from the nearest town and from Delhi, and this explained 5.5 and 43.3 per cent of the variations respectively. But when both variables were kept in the equation the R^2 value explained only 43.7 per cent of variation. This means that the effect of distance from the nearest town is smaller than the distance from Delhi and there is some degree of 'multi-collinearity' between these two variables. Therefore, adding both variables to the equation did not show a significant improvement in the R^2 value. Therefore, in the

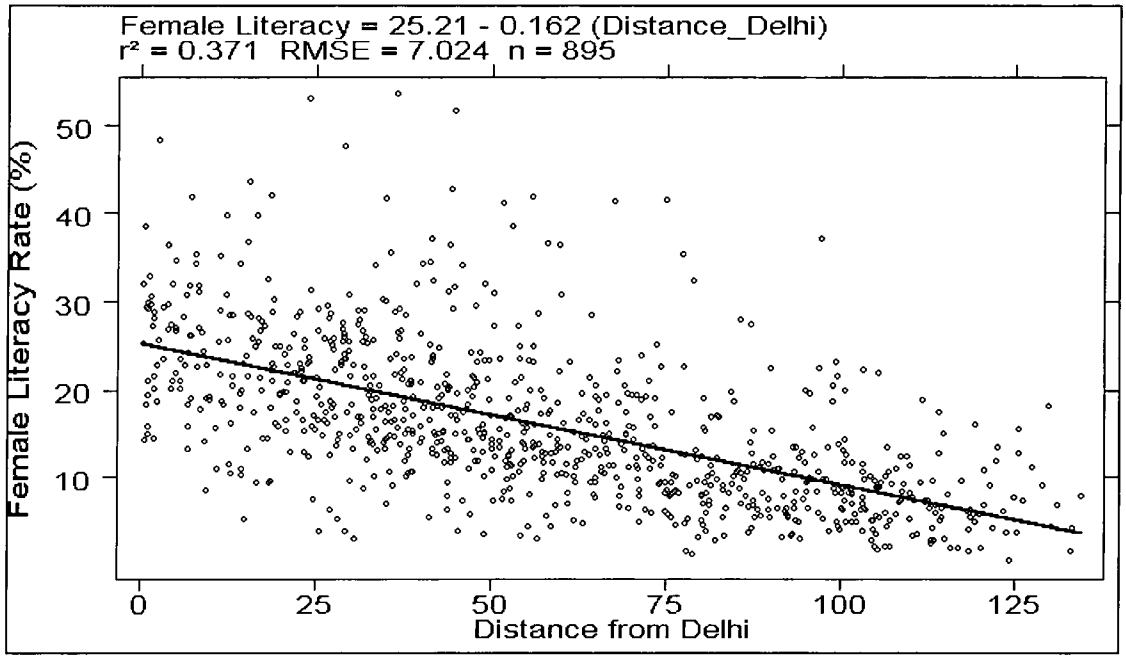
[ψ] This is distance from the nearest town with more than 25,000 people

* Statistically significant at the 1 % level of significance.

following section (on regression analysis) we have chosen only distance from Delhi as an explanatory variable, since this may also represent distance from the nearest town. The availability of a rail station was also included in the case of non-agricultural workers.

Female literacy and distance from Delhi: The distribution of the female literacy rate by village was positively skewed for 1981, but negatively skewed for 1991. Only one extreme value of 70 was observed in Nangali village of Jhajjar tahsil. Exclusion of this value brought down skewness from 1.02 to 0.85. For 1991, only some extreme values were dropped, bringing down the skewness to –0.2. Female literacy rate was regressed[7] on distance from Delhi for both the districts separately and jointly. For both years and both Districts (separately and jointly) distance from Delhi shows a statistically negative impact on female literacy rates (Table-8.9). It is interesting to note that distance from Delhi explains 37 per cent of the variation in female literacy rate. But when the analysis was performed separately for both the districts the R^2 values were smaller.

Figure-8.5(a): Distance from Delhi and female literacy rate, 1981



[7] Unweighted least square regression analysis was used. Dependent variables were weighted with population and were regressed on distance from Delhi. This increased the R^2 value to a greater extent. This happened because of the large population of six towns, and when these towns were excluded from the analysis population weighting did not show any improvement in the R^2 values, rather in some cases R^2 value declined (see Draper and Smith, 1981; Stata, 1999 for least square regression analysis)

Again, inter-district variations can be observed in the R^2 values. In Bhiwani District, distance from Delhi shows a more significant impact on the female literacy rate as compared to Rohtak District. As discussed earlier, women's access to education and their role in society differs across these two districts. These variations become more apparent as distance from Delhi increases (Figure-8.5[a] and [b]), especially in Bhiwani District. The least square line shows a decline in literacy rate with increase in distance from Delhi. If this line was to be extended to 230 kilometres then it will intersect the x-axis, a scenario that would not exist in reality (one of the disadvantages of linear regression analysis). A curved line is also fitted in the last part of this section, which may represent a more realistic picture of the distance decay function.

Figure-8.5(b): Distance from Delhi and female literacy rate, 1991

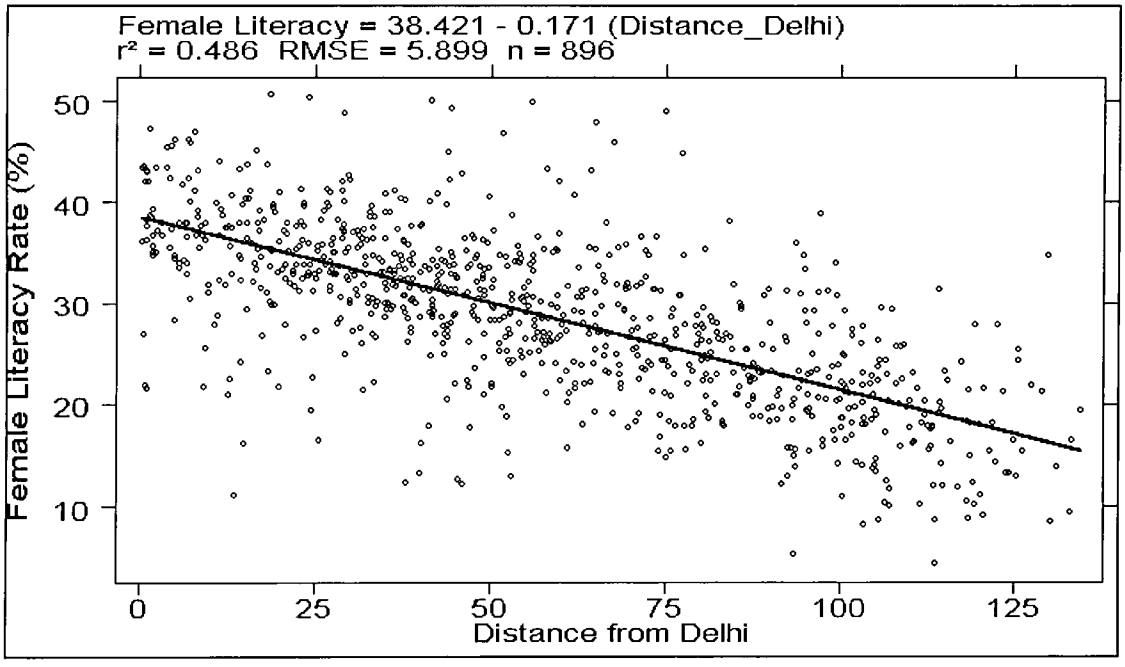


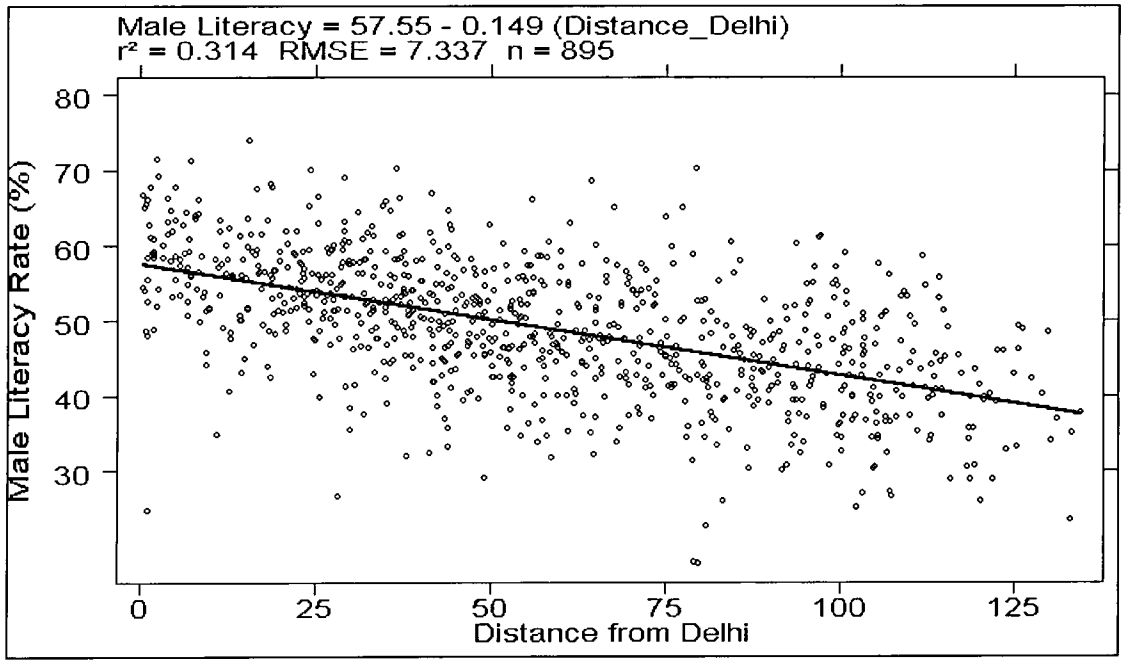
Table-8.9: Female literacy rate and controlling variables

Year	R^2 (n)	Controlling variable	Regression coefficient	Standard Error	t-value	p>t
1981	0.3706 (895)	Distance from Delhi	-0.162	0.007	-22.964	0.000
		Constant	25.214	0.467	54.047	0.000
1991	0.4872 (896)	Distance from Delhi	-0.171	0.006	-29.066	0.000
		Constant	38.421	0.395	97.230	0.000

Source: Author's calculation

Male literacy and distance from Delhi Male literacy rates were negatively skewed for both Census years. Therefore, some extreme values (less than 15 and more than 75 [four observations] for 1981 and less than 25 and more than 80 [six observations] for 1991) were excluded to normalise the distribution. For both districts (separately and jointly) distance from Delhi showed a statistically significant impact on male literacy (Table-8.10). In 1981, this explained 31 per cent of the variation, declining to 29 per cent in 1991 (Figure-8.6 [a] and [b]), and the root mean square error (RMSE) declined from 7.3 in 1981 to 6.3 in 1991. But the R^2 value also dropped from 31.4 to 29.5. Generally, R^2 increases with a decrease in RMSE. But in case of male literacy rate both have dropped. The declining standard deviation for male literacy from 8.8 in 1981 to 7.5 per cent in 1991 may explain the decline in the R^2 even with decline in the RMSE.

Figure-8.6(a): Distance from Delhi and male literacy rate, 1981



It is interesting to note that the impact of distance from Delhi varies for male and female literacy rates. The impact of distance on female literacy is higher than on male literacy. It must be noted that the longer distances from villages to educational institutions restrict women's access to education, because of prevailing social and cultural circumstances.

Figure-8.6(b): Distance from Delhi and male literacy rate, 1991

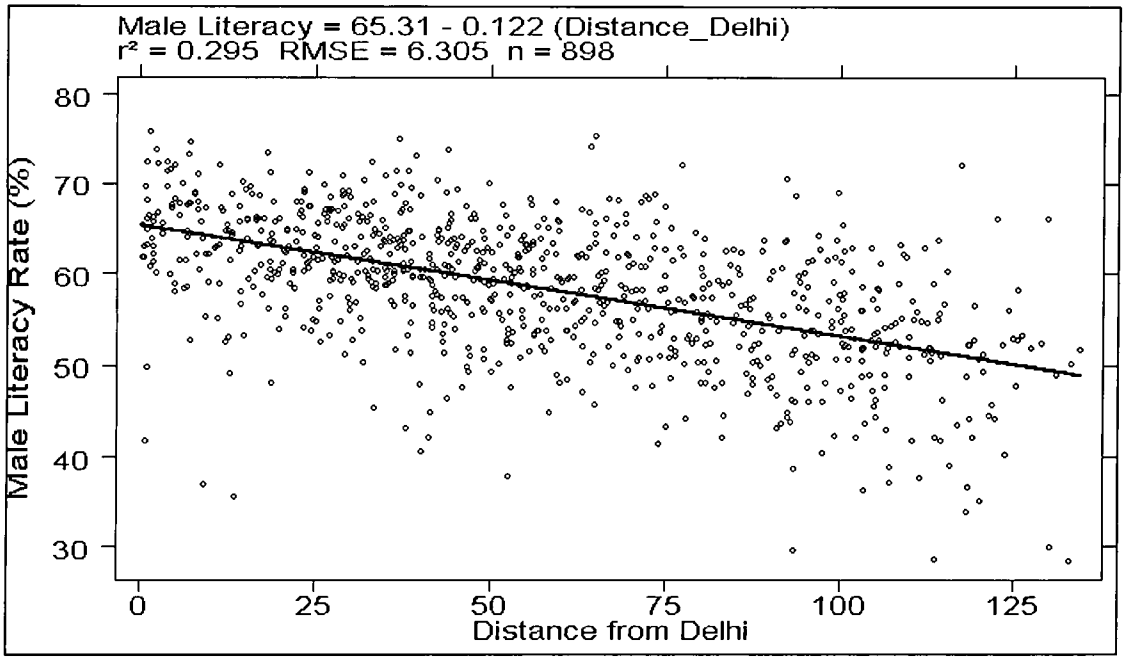


Table-8.10: Male literacy rate and controlling variables

Year	R^2 (n)	Controlling variable	Regression coefficient	Standard Error	t-value	p>t
1981	0.3194	Distance from Delhi	-0.149	0.007	-20.182	0.000
	(895)	Constant	57.553	0.491	116.808	0.000
1991	0.2940	Distance from Delhi	-0.122	0.006	-19.309	0.000
	(898)	Constant	65.310	0.422	154.444	0.000

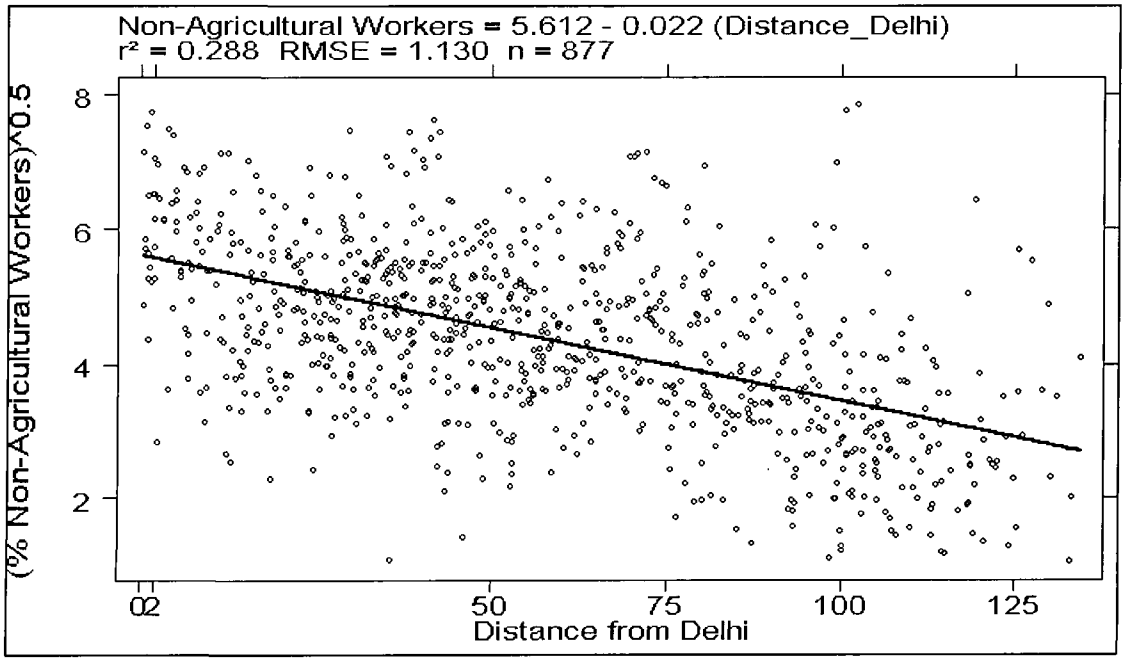
Source: Author's calculation

Non-agricultural employment and controlling variables: Data on non-agricultural workers were positively skewed for both Census years. A square-root transformation worked well to normalise the distribution; and percentages of non-agricultural workers were regressed on two controlling variables: distance from Delhi and the availability of a rail station, for both the districts separately and jointly. It must be remembered that Delhi is the administrative, political and economic centre of the country and it has an enormously large economic base that provides scope for non-farm employment in both the formal and non-formal sectors. The availability of rail and road transport can help villagers to commute to Delhi. In the study area, rail transport is cheaper and faster than road transport, but this facility is available in a limited number of villages. However, in the majority of villages (without a rail facility) direct bus services to Delhi are not available. Therefore, villages with a rail facility have a better opportunity to commute to Delhi.

Another noticeable feature is that from Bhiwani to Delhi (via Rohtak) a direct rail service is available, but the frequency of this service is limited. In Rohtak, however, a frequent rail service is available, which greatly helps people to commute to Delhi. Clearly an increase in distance also results in an increase in transportation cost and travel time. Therefore, people's access to Delhi metropolitan and bigger towns may be a function of distance.

In 1981, distance from Delhi and availability of a rail station accounted for 30 per cent of the total variation in the distribution of non-agricultural workers, while in 1991 this declined to 25 per cent. In both years these two variables explain less than one third of the total variation (Figure-8.7[a] and [b]), indicating that some other variables may account for the remaining variability in non-agricultural workers.

Figure-8.7(a): Distance from Delhi and non-agricultural workers, 1981



Regression coefficients for distance from Delhi are statistically significant for both Census years (Table-8.11) and that means that an increase in distance from Delhi has an inverse impact on non-agricultural workers in the study area. The availability of a railway station (a binary variable) also shows a positive impact on non-agricultural workers.

In 1981, the R^2 values for Rohtak and Bhiwani were 9.5 and 20.7 per cent respectively, showing a higher impact of distance and a rail station on non-agricultural employment in Bhiwani as compared to Rohtak District. Note that Rohtak City also has a big non-agricultural base. Bhadurgarh tahsil of Rohtak District, located nearer to the border of Delhi is highly industrialised and provides opportunities for non-farm employment; and many new industries have developed along the national highway in Rohtak District during the last decade. Therefore, the availability of non-farm employment within Rohtak District may explain lower impact of distance from Delhi. Moreover, the R^2 values for Rohtak was to 15 per cent in 1991 against 15.9 per cent for Bhiwani. If we examine the scatter plot carefully it is clearly visible that there is a sharp decline in the percentages of non-agricultural workers after a distance of 29 kilometres. This may not be clearly visible from the regression line. Therefore, the 'ksm' technique was used to smooth the scatterplot[8] (Figure-8.8[a] and [b]).

Table-8.11: Non-agricultural workers and controlling variables

Year	R^2 (n)	Controlling variable	Regression coefficient	Standard Error	t-value	p>t
1981	0.306 (877)	Distance from Delhi	-0.021	0.001	-18.947	0.000
		Availability of rail station	0.905	0.180	5.016	0.000
		Constant	5.563	0.076	73.187	0.000
1991	0.257 (881)	Distance from Delhi	-0.020	0.001	-16.971	0.000
		Availability of rail station	0.720	0.190	3.785	0.000
		Constant	5.957	0.081	73.699	0.000

Source: Author's calculation

The availability of a bus station, however, does not have a statistically significant impact on non-farm employment. But the availability of a rail station shows a significant positive impact on non-farm employment for both the years. In 1981, 29 per cent of the workers were engaged in the non-agricultural sector in the villages with the availability of a rail station, while it was only 20.83 per cent in the villages without a rail station (Table-8.12). The figures for 1991 were 32 and 24 per cent respectively.

[8] ksm provides locally weighted scatterplot smoothing (lowess). In lowess, the regression is weighted so that the central points get the highest weight and points further away receive less. The estimated regression is then used to predict the smoothed values (y-estimated) (Stata, 1999, p.296-297; also see Cleveland, 1979).

Figure-8.7(b): Distance from Delhi and non-agricultural workers, 1991

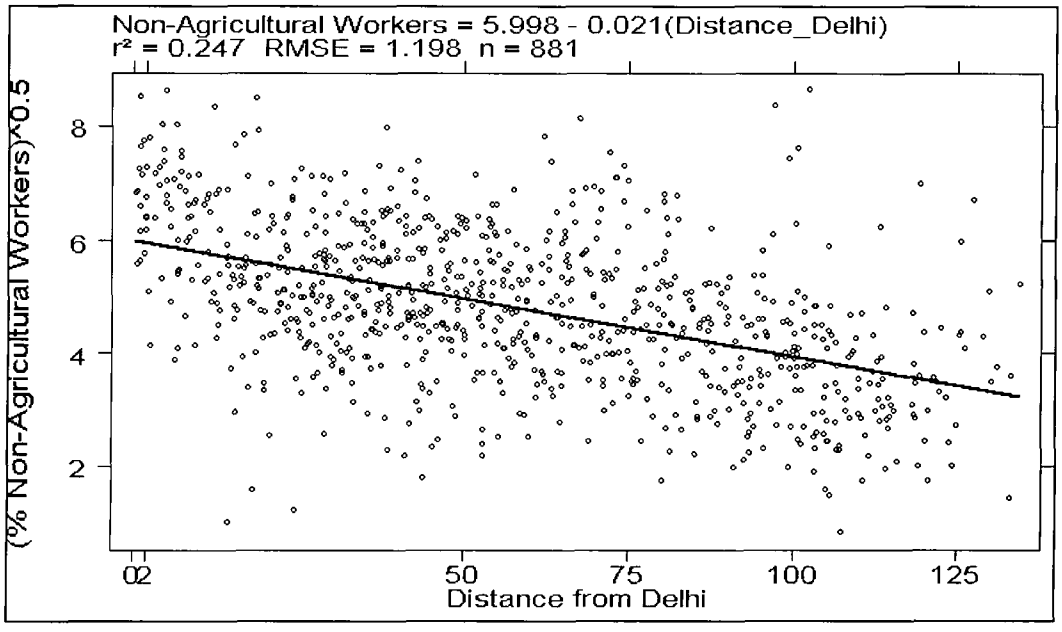


Figure-8.8(a): Distance from Delhi and non-agricultural workers (with lowess),1981

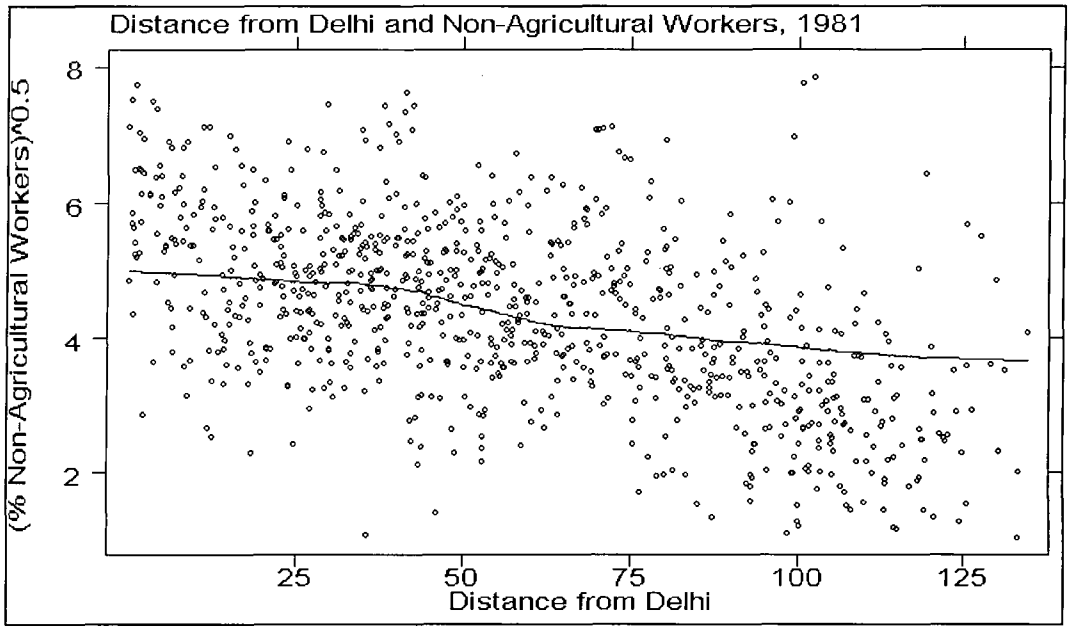
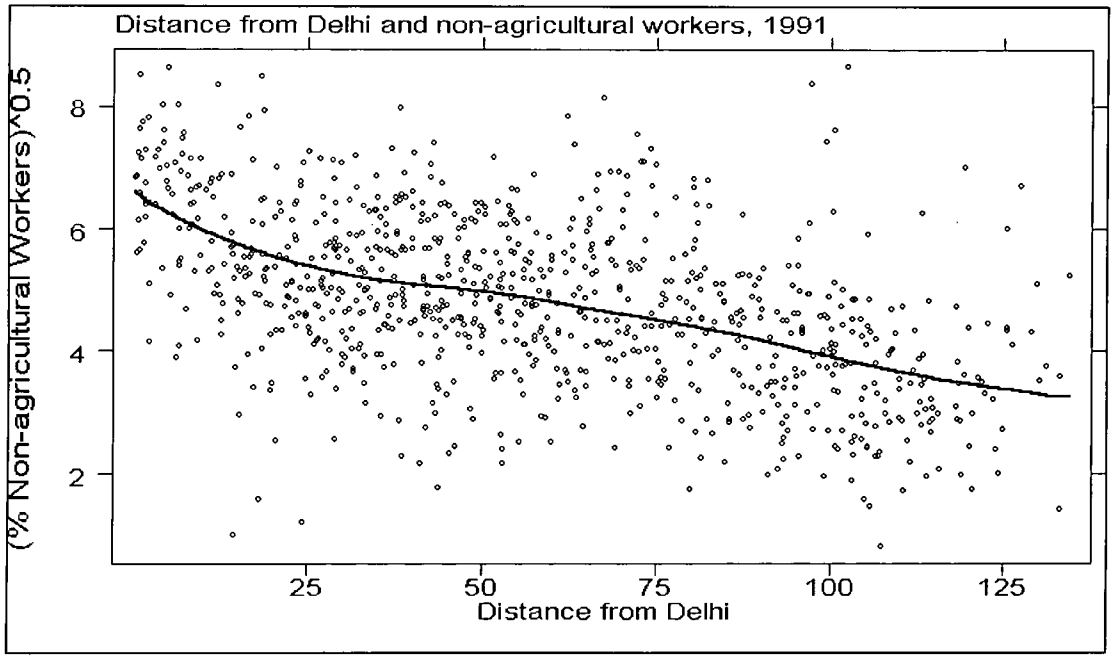


Figure-8.8(b): Distance from Delhi and non-agricultural workers (with lowess), 1991



The impact of rail station availability differs between Rohtak and Bhiwani Districts: higher impact in Rohtak as compared to Bhiwani District for both the Census years under study. In Bhiwani District, the regression coefficient for rail stations was statistically insignificant at the 5 per cent level in 1981, but for Rohtak it was statistically significant at the 1 per cent level for both Census years. As discussed earlier, villages with rail stations in Rohtak Districts have a higher frequency of rail services and these villages have direct rail lines to larger towns (Rohtak and Bahadurgarh) and to Delhi Metropolitan that may explain the high impact of rail facility on non-agricultural employment in Rohtak District.

Table-8.12: Average non-agricultural workers and availability of rail and bus station (Per cent)

Year	District	Rail Station		Bus Station	
		Without	With	Without	With
1981	Rohtak	25.70	32.27	24.19	26.38
	Bhiwani	15.53	23.91	16.53	15.78
	Total	20.83	29.34	22.06	21.08
1991	Rohtak	29.40	37.05	32.29	29.55
	Bhiwani	19.48	25.00	19.29	19.67
	Total	24.83	32.83	29.49	24.61

Source: Author's calculation

8.4 SUMMARY OF RESULTS AND DISCUSSION

8.4.1 Summary of results: After 1966, the Central Government issued a substantial grant to Haryana State for building up a sound infrastructure network. Within a decade, Haryana provided electricity in every village and connected all of them with an all-seasons black-top metalled road. But at present, many of these roads are in a poor condition and need immediate repair. Lack of funds and the poor organisation of Government authorities are widely accepted causes of the poor conditions of these roads.

Although almost all of the villages in Haryana are connected with a metalled road, three-quarters of the total villages are connected with only an approach road and villagers have to travel some distance to reach a main road. It is widely accepted that the availability of public bus and rail services in rural areas greatly facilitates people's mobility. But it was observed in the field that in almost all the villages a frequent bus service is not available. This handicaps villagers' access to city or bigger towns. People in more than one third of villages have to travel more than 20 kilometres to access the nearest town. On the comparison of inter-district variations, it was observed that in Rohtak District, the average distance from the nearest town or city is significantly lower than that for Bhiwani District.

Literacy rates and non-agricultural workers were examined in relation to distance from Delhi metropolitan (which is colinear with the distance from the nearest town) and the availability of bus and rail stations in villages. It was observed that there has been a significant increase in male and female literacy rates from 1981 to 1991, but there was little evidence showing increases in the percentages of non-agricultural workers. In the study area, the percentages of literacy rates and non-agricultural workers gradually decline from east to west (with some exceptions of city and towns, and villages along the major highways and surrounding towns and cities). Significant variations are noticeable in the percentages of literacy rates (for both male and female) and non-agricultural workers across both districts under study. In Rohtak District the male and female literacy rates, and the percentages of non-agricultural workers are significantly higher than in Bhiwani District.

Distance from Delhi showed a statistically significant inverse impact on male and female literacy rates and non-agricultural workers for both districts (separately and jointly). It must

be noticed that the role of distance from Delhi is more important for female than for male literacy. It is interesting to note that the villages with the availability of a rail station show significantly higher percentages of non-agricultural workers as compared to villages without a rail station, showing a positive impact of a rail facility on non-agricultural workers. The availability of a bus station, however, does not reveal any statistically significant positive or negative impact on non-agricultural workers that needs to be investigated further.

8.4.2 Discussion: It is widely accepted that the transport development is a necessary but not a sufficient condition for economic growth; and economic growth in turn increases demand for transport (Bhalla and Singh, 1999). The availability of transport has been one of the most important forms of infrastructure as it improves accessibility to other services such as markets, education, health and other institutions (Rietveld, 1994; World Bank, 1994). The General Manager (GM), Transport, Bhiwani supported this argument and he reported that

> "The availability of bus transport has improved villagers' access to schools and colleges and other higher order infrastructure services available in urban areas" (GM, Bhiwani, 1998).

Researchers claim that transport development (in parallel with irrigation) tends to increase agricultural production by the use of modern inputs, due to declining transportation costs and easy access of farmers to the market and other institutions (Antle, 1983; Ahmed and Hossain, 1990; Binswanger et al, 1987; Cobbs, 1980; Epstein, 1962; Evenson, 1986). The availability of transport in rural areas also strengthens the linkages between town and country and the farm and non-farm sectors (Johnson, 1966 and 1970) and expedites the trickle-down effect in the countryside (Bhalla and Singh, 1999; Ahmed and Donovan, 1992).

The availability of rail services (connecting villages to big urban centres and metropolitan cities) facilitates the expansion of non-farm activities in villages and strengthens rural-urban linkages, which have a significant dent on poverty reduction. One villager amplified this point:

> "This village is located on a National Highway and a rail facility is also available in this village. We have irrigation water facility from two canals. These are of great help in reducing poverty. People in this village can travel any time of day or night. Many poor people (especially the landless) from this and the surrounding villages take vegetable oil, sugarcane, *lashi* (sour milk left after extracting butter), *gur* (made of sugarcane

juice) etc. and sell them in Delhi and earn at least a hundred rupees a day" (Vinod Kumar, Cycle Stand Operator at Railway Station, Kehrawar, 1998 [Plate-1.1]).

Mr. Vinod further reported that :

> "There are about 600 cycles parked here and people from the surrounding villages bicycle to this village to commute to Delhi. The majority of people who are commuting to Delhi are engaged in the private sector such as in factories and shops. About 200-300 people from this village alone are engaged in a third class Government job (particularly clerical, police or transport) in Delhi. Besides, there are many milkmen who commute to Delhi to sell milk. Early in the morning these milkmen go to Delhi at 4.56 AM (by the 2 Delhi-Rohtak train) and come back at 10.30 AM. In the evening, they take milk by the 3.45 PM train and after selling the milk they return at 9.30 PM by the 3 DR train. These milkmen collect milk from the surrounding villages and generally supply milk to the sweets and teashops, and houses in Delhi. They are either small or marginal farmers or landless. Each milkman carries at least 60 kg of milk at a time. So they sell about 120 kg of milk in Delhi every day (Plate-1.1). From one kg they earn a profit of Rs. 3-4 (Vinod Kumar, Cycle Stand Operator at Railway Station, Kehrawar, 1998).

This statement clearly proves that the availability of rail transport not only facilitates villager's access to non-farm employment in city or urban areas, but also strengthens the rural-urban linkages and expands economic activities in rural areas. This in turn may have a multiple effect on poverty reduction and income generation.

Results of this chapter support the argument that the availability of transport, and distance from Delhi Metropolitan and bigger towns, play vital roles in determining both literacy (which improves the skill level) and non-agricultural employment (which ensures higher wage rates and regular employment). However, it was widely observed in the field that there are still many people in the villages (especially the less accessible villages) who are unemployed. One of the labourers reported that:

> "There is severe poverty in the village primarily because of unemployment. I am a manual labour, but I do not get work in the village for more than 5-10 days a month. This restricts my income to a very low level and it is very difficult for me to subsist on this income" (Ram Kishan, Manual Labourer, Chuliana, 1998).

Another villager told me that:

> "There is a severe unemployment problem here. We have neither land to cultivate nor employment opportunities in this village. We are really in a great difficulty. If we cannot be given any agricultural land the Government can at least start some small-

scale industries so that we could get employment and our livelihood become easier (Bheer Bhan, SC Respondent, Patodi, 1998)

Even in some of the most accessible villages, such as Kehrawar (where frequent road and rail transport is available), unemployment problems were reported.

"My son has matriculated, but he is unemployed and he just helps me in pot-making. If many educated children of high class and caste in the village are unemployed then (you can easily imagine) how can we (small people in terms of caste and income) can get employment? We do not have enough land to subsist. Our cattle and we live in the same place. Sometimes, we have approached the Government patwari (who keeps records of the village's land). He assured us that we will get some land. To date, we have not received any land. Influential people in the village are not willing to give us even a single inch of land" (Potmaker, BC Respondent, Kehrawar, 1998).

Therefore, the unemployment problem is not only associated with transport availability, but there are many other factors governing employment opportunities and some important questions are still unanswered. Is non-farm employment limited only to the larger towns or along the major rail and/or road networks? Can the non-agricultural sector be expanded in rural areas? Transport has development potential whether it is in the expansion of non-farm employment or villagers' access to larger towns or metropolitan centres, or in the trickle down effect of urban growth (World Bank, 1994; Ahmed and Donovan, 1992). An effective transport system is also needed for the expansion of small-scale industries in rural areas in order to overcome unemployment problems. One of the unemployed villagers reported that:

"There are not enough employment opportunities in this village, including both agriculture and non-agriculture. We must start more productive activities, such as small industries, and provide more technical education to the younger generation to reduce unemployment" (Suraj Singh, Unemployed Youth, Brahana, 1998).

Currently, the frequency and reliability of Government bus services are very poor. Therefore, people have to depend either on private transport or on their own personal conveyance. Again, private transport is not available in all villages and also it is not reliable, and the poor cannot afford to have their own personal conveyance. Therefore, non-availability of transport greatly hinders poor people's access to the town and/or city and hence constrains their income levels (through depriving them of non-farm job opportunities available in cities or towns). Another important question to be discussed is how transport accessibility can be improved in rural areas. The state Government needs to take initiatives to provide frequent

bus services and villagers could be involved in monitoring these services. Secondly, road conditions are very poor in many villages; action also needs to be taken here. Villagers, with the financial and technical assistance of the Government, might be assigned the job of road maintenance and of monitoring. These measures may improve sustainability of rural roads and hence encourage better frequency of and access to transport.

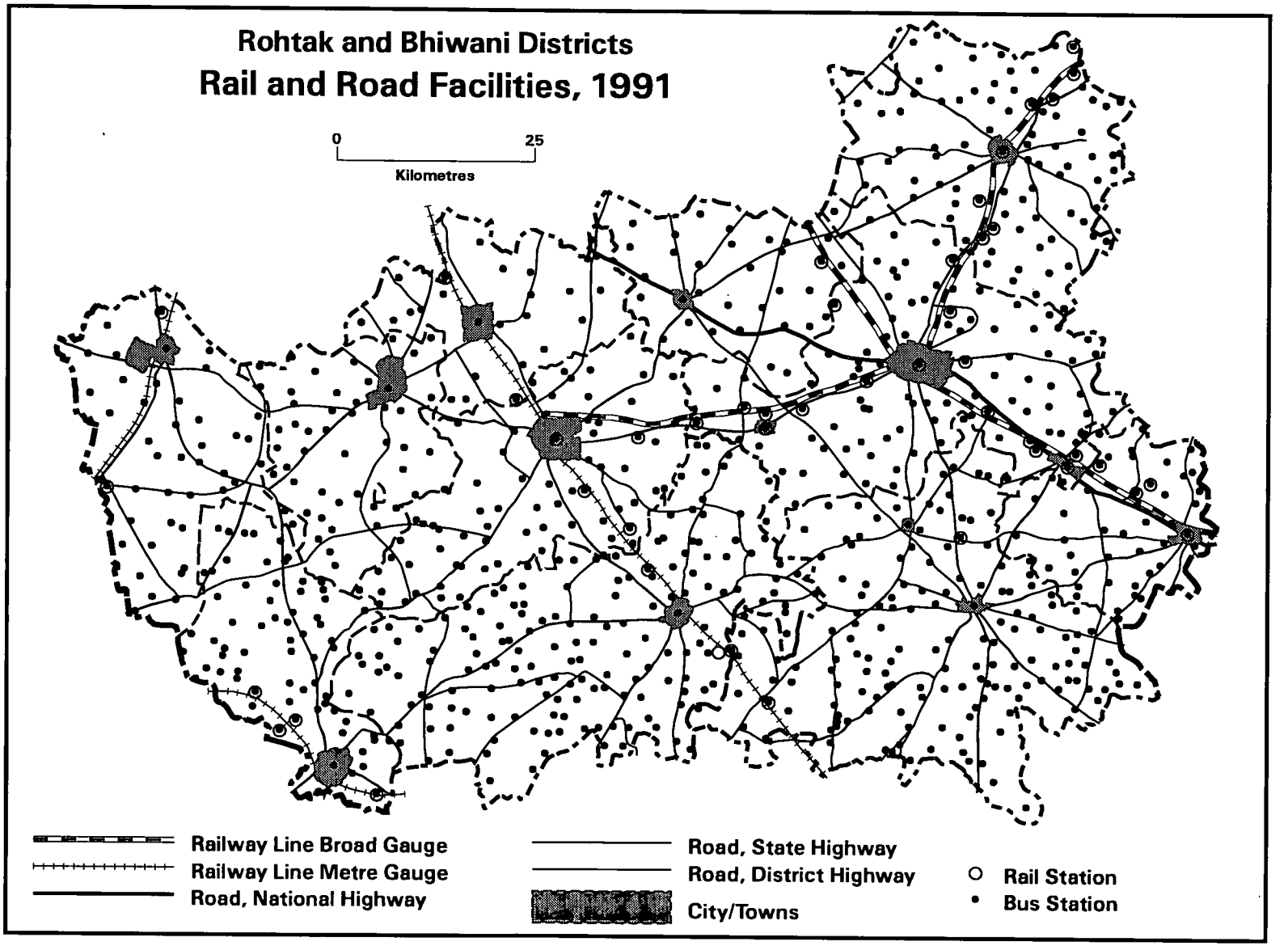

Rohtak and Bhiwani Districts
Rail and Road Facilities, 1991
0
25
Kilometres
Railway Line Broad Gauge
Railway Line Metre Gauge
Road, National Highway
Road, State Highway
Road, District Highway
City/Towns
Rail Station
Bus Station

Figure-8.1

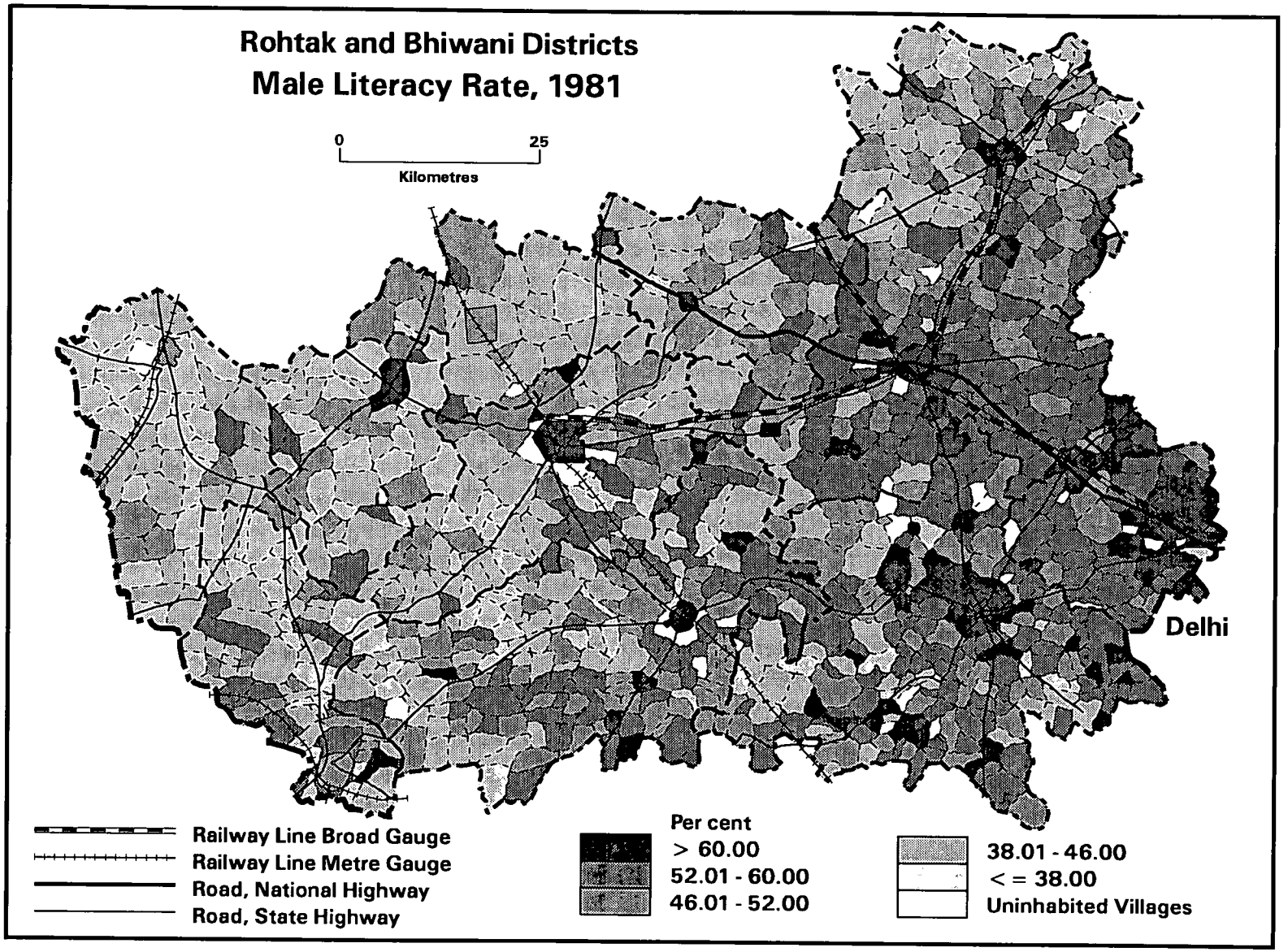

Rohtak and Bhiwani Districts
Male Literacy Rate, 1981
0
25
Kilometres
Delhi
Railway Line Broad Gauge
Railway Line Metre Gauge
Road, National Highway
Road, State Highway
Per cent
> 60.00
52.01 - 60.00
46.01 - 52.00
38.01 - 46.00
< = 38.00
Uninhabited Villages

Figure-8.2(a)

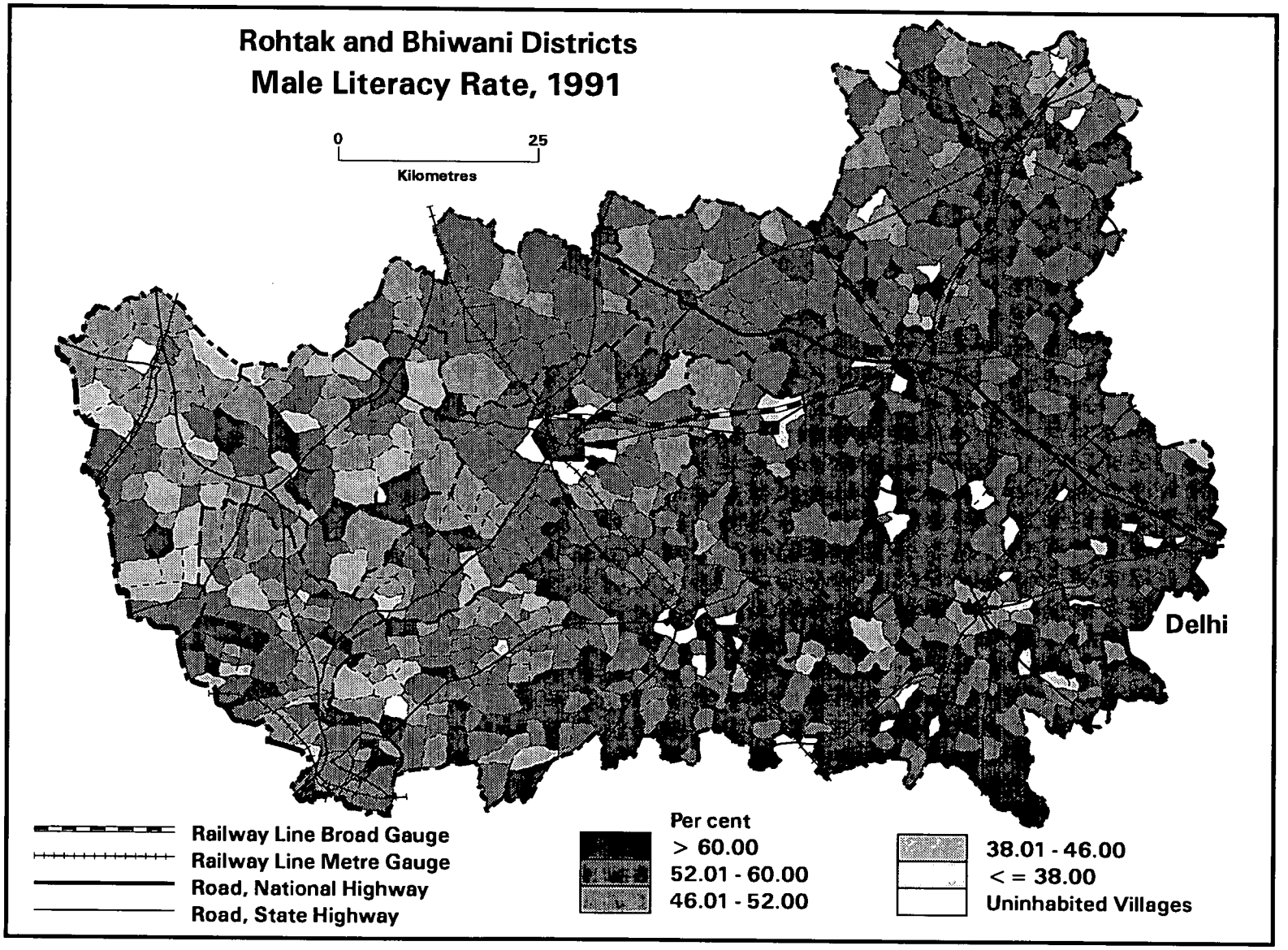

Rohtak and Bhiwani Districts
Male Literacy Rate, 1991
0
25
Kilometres
Delhi
Railway Line Broad Gauge
Railway Line Metre Gauge
Road, National Highway
Road, State Highway
Per cent
> 60.00
52.01 - 60.00
46.01 - 52.00
38.01 - 46.00
< = 38.00
Uninhabited Villages

Figure-8.2(b)

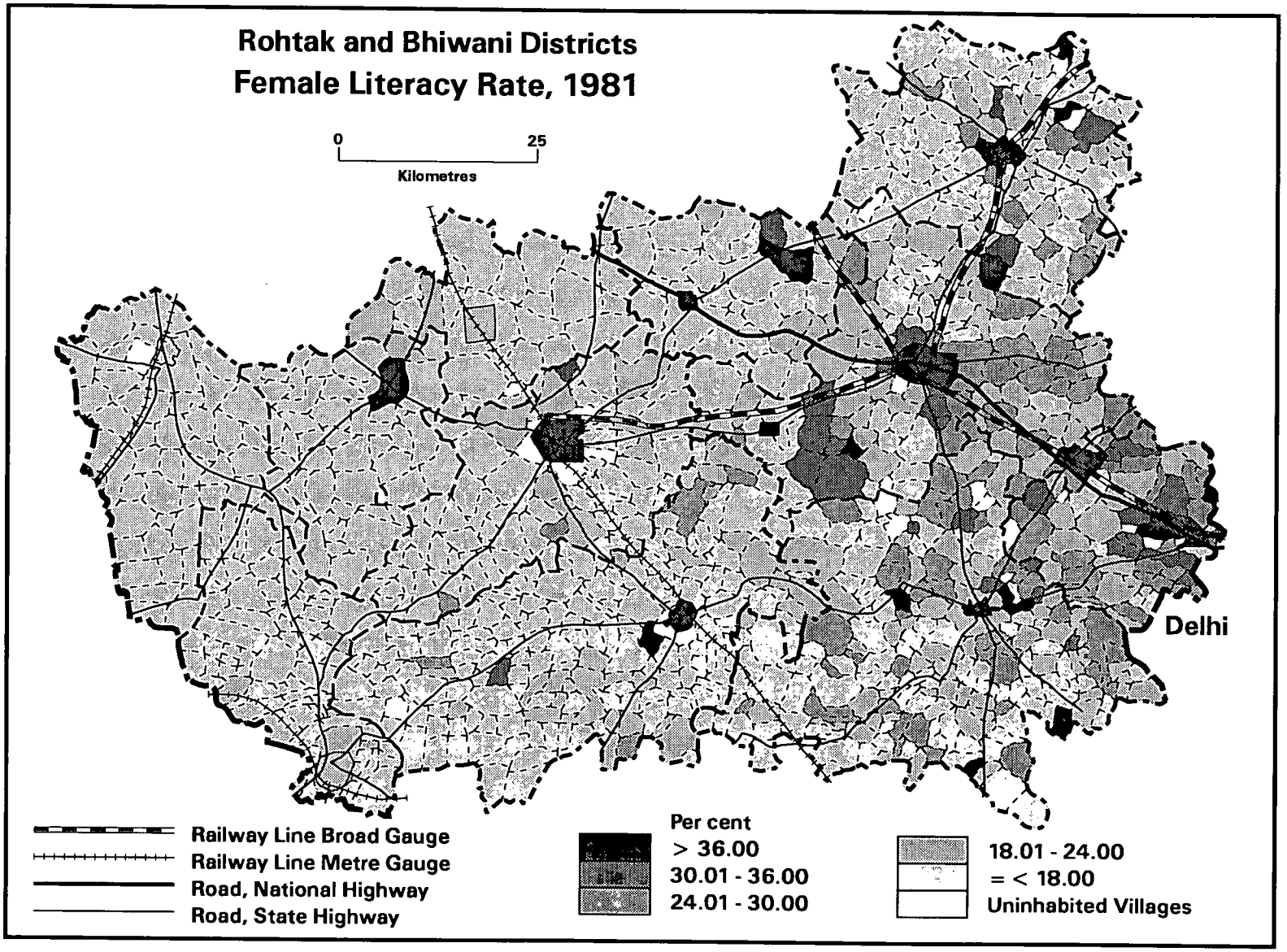

Rohtak and Bhiwani Districts
Female Literacy Rate, 1981
0
25
Kilometres
Delhi
Railway Line Broad Gauge
Railway Line Metre Gauge
Road, National Highway
Road, State Highway
Per cent
> 36.00
30.01 - 36.00
24.01 - 30.00
18.01 - 24.00
= < 18.00
Uninhabited Villages

Figure-8.3(a)

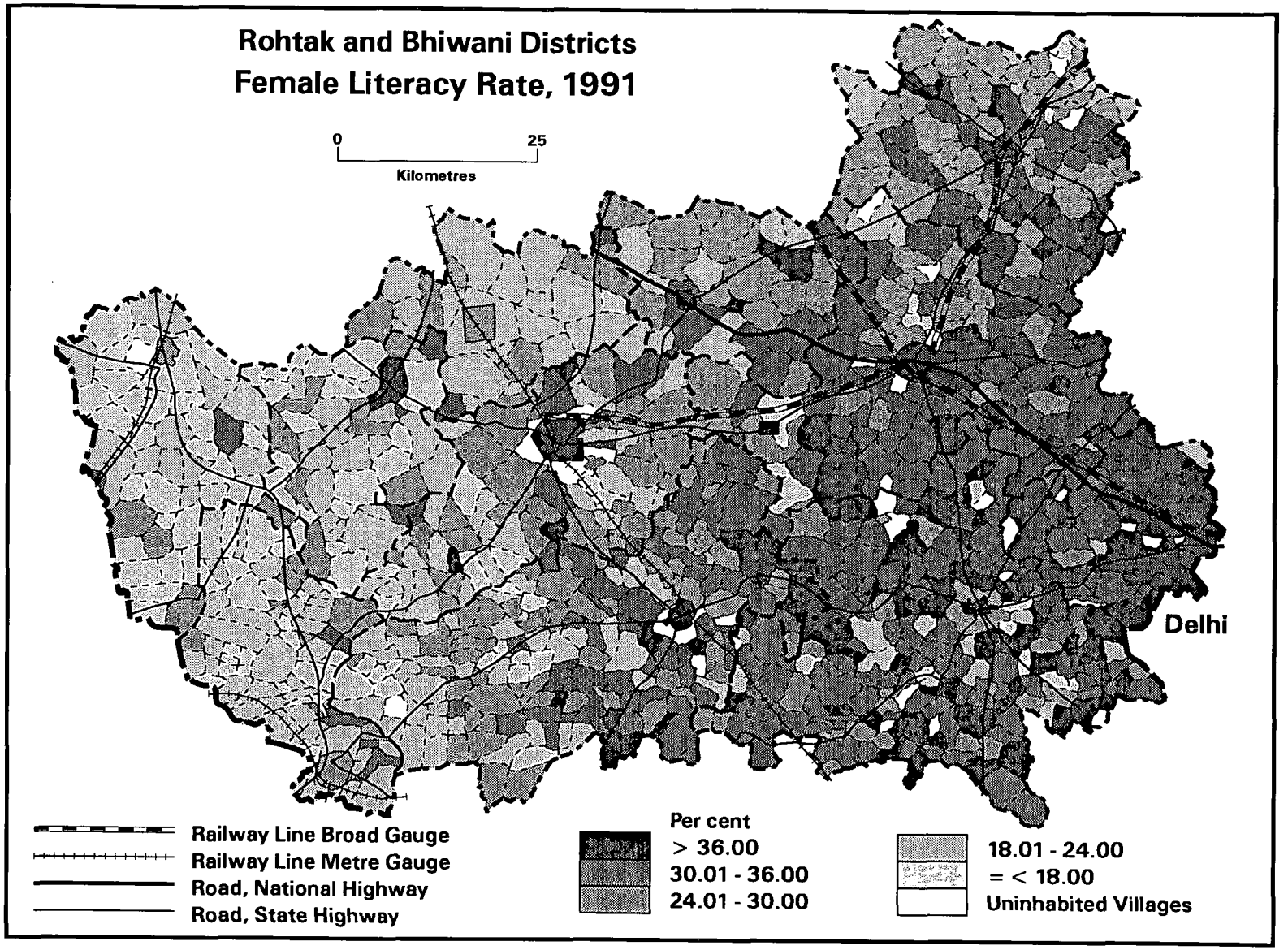

Rohtak and Bhiwani Districts
Female Literacy Rate, 1991
0
25
Kilometres
Delhi
Railway Line Broad Gauge
Railway Line Metre Gauge
Road, National Highway
Road, State Highway
Per cent
> 36.00
30.01 - 36.00
24.01 - 30.00
18.01 - 24.00
= < 18.00
Uninhabited Villages

Figure-8.3(b)

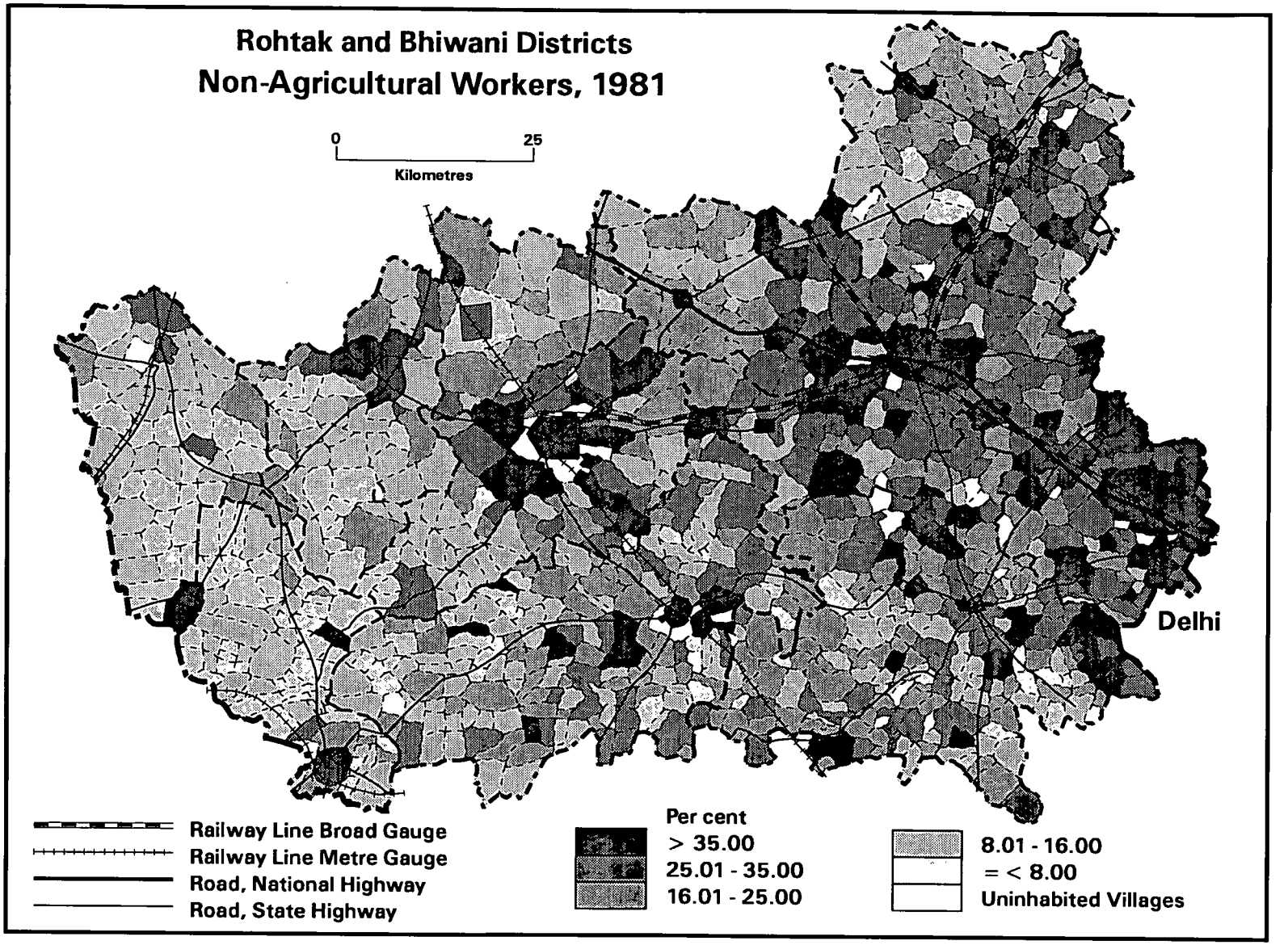

Rohtak and Bhiwani Districts
Non-Agricultural Workers, 1981
0
25
Kilometres
Delhi
Railway Line Broad Gauge
Railway Line Metre Gauge
Road, National Highway
Road, State Highway
Per cent
> 35.00
25.01 - 35.00
16.01 - 25.00
8.01 - 16.00
= < 8.00
Uninhabited Villages

Figure-8.4(a)

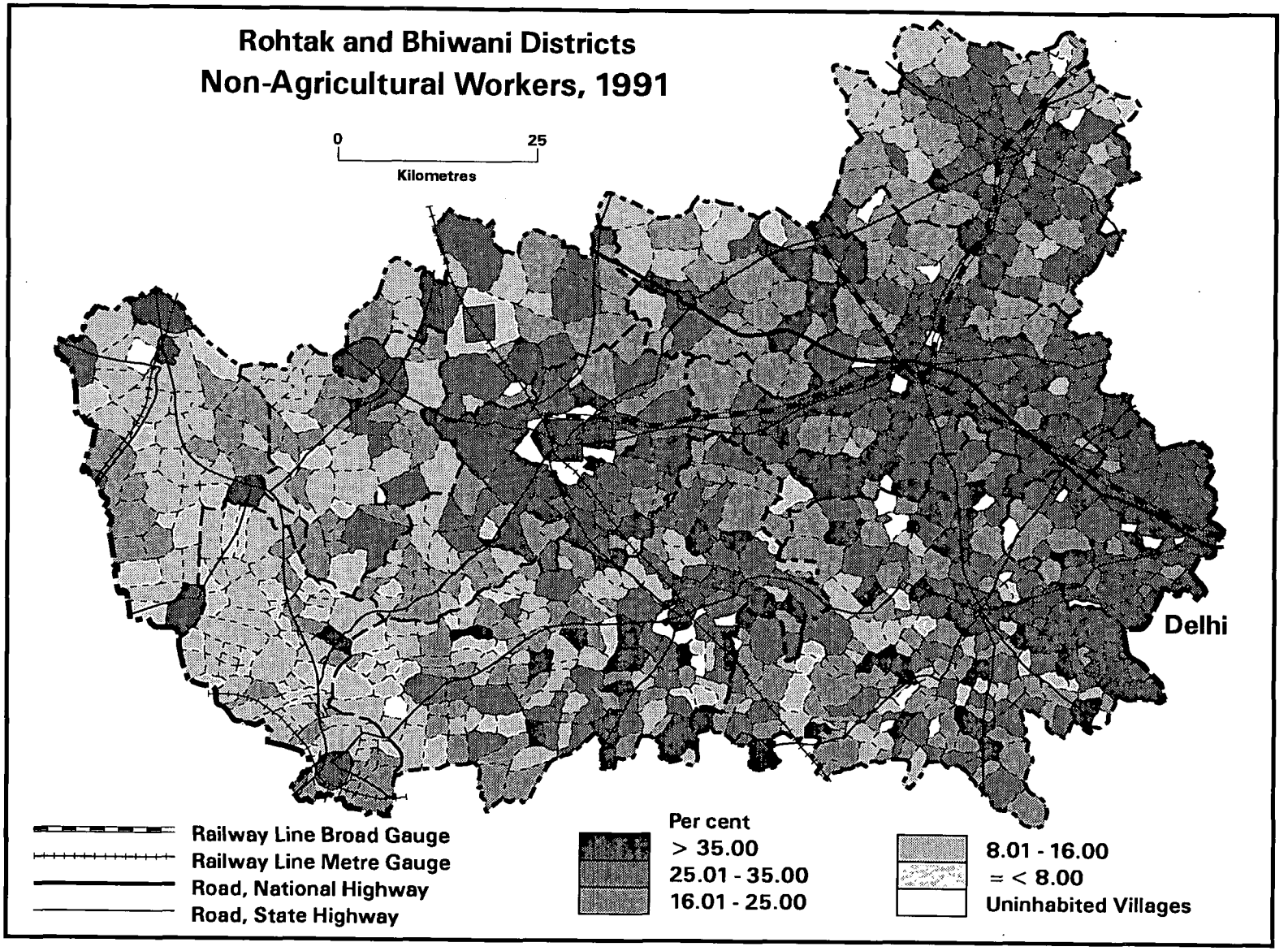

Rohtak and Bhiwani Districts
Non-Agricultural Workers, 1991
0
25
Kilometres
Delhi
Railway Line Broad Gauge
Railway Line Metre Gauge
Road, National Highway
Road, State Highway
Per cent
> 35.00
25.01 - 35.00
16.01 - 25.00
8.01 - 16.00
= < 8.00
Uninhabited Villages

Figure-8.4(b)

Chapter - 9

ACCESS TO AND UTILISATION OF TRANSPORT SERVICES

9.1 INTRODUCTION

Access to transport services is, in one sense, the most important among the three services under study: it helps in accessing education and health and other services if these are located at a distant place. In the majority of villages, three modes of transport are available, such as buses, three wheelers (auto rickshaws) and jeeps. Rail transport, which is under the domain of Central Government, is available only in Kehrawar village. On the basis of governance, these services can be grouped into two categories: Government and private. The state Government owns and operates buses, but recently, the state Government has given permits to private bus operators on specific routes, especially from the city to rural areas. Private jeeps and three-wheelers are the most commonly available and most frequently used modes of transport in the study areas. All the villages under study are connected with a metalled road, but generally transport services are not available in all of them. People in villages where public and private transport services are not available have to rely on their own personal conveyance (bicycle or in some cases a motorcycle).

This chapter is based on household and individual data sets, the major part of which comprise information collected from the people who have made visits out of their village during the 30 days before the date of interview. Data on private conveyances are available only at the household level. Based on these two data sets, the following issues will be dealt within this chapter:

- How many households own a private conveyance? To which caste and income group do they belong?
- How many people have made visits out of their village during the last 30 days and what has been the frequency of their visits? Do controlling variables determine the frequency of visits?
- Generally, which places do people visit and what have been the purposes of their visits?
- Up to what time of the day do people move in and out of their village?
- Which modes of transport do people use?

- How many male and female visitors have been accompanied by someone when they visited out of their village?

9.2 AVAILABILITY OF PRIVATE CONVEYANCES

Availability of a personal conveyance greatly enhances people's mobility especially in villages where adequate modes of transport are not available and the frequency of available transport is low[1]. Data on the availability of transport were collected for the surveyed households. Based on these data, households were grouped into five categories: those without any private conveyance, with a bicycle, bull/camel cart, tractor and any other motor operated vehicle (motor-cycle, scooter, car, jeep or four-wheeler). Camel/bullock cart and tractors are used primarily for agricultural purposes and have little impact on people's mobility. I found that only one out of 113 landless households owned a bullock cart. Secondly, these two modes are used to transport agricultural goods from and to the village.

It was observed that as many as 190 households, more than one third of the total, do not own a private conveyance (Table-9.1[a] and [b]) and 157 (30 per cent) households own a bicycle only. The availability of a bicycle is of great help for short distance mobility and is important for the poor from two points of view. Firstly, it helps the villagers to reach a railway station within short distances. Secondly, it is a cheap mode of transport for landless labourers and marginal farmers, who cannot afford expensive public transport services. But it cannot easily be used for longer distances of say more than 10 kilometres or so. More than 20 per cent of households (predominantly agricultural) own either a camel/bullock cart or tractor; only 10 per cent of households own a motor vehicle.

[1] It is important to report here that men operate all of these modes of transport. Therefore, the availability of a personal conveyance does not necessarily enhance women's access to transport and hence their mobility. This will be examined in another section on frequency of visits out of the villages during the previous 30 days.

Table-9.1(a): Availability of private conveyance[2]

Village Code	Number of households					
	None	Bicycle	Cart	Tractor	Motor	Total
Kehrawar	34	31	14	11	9	99
Chuliana	17	35	8	8	4	72
Diwana	3	6	0	5	3	17
Brahana	43	22	14	8	12	99
Rohtak	**97**	**94**	**36**	**32**	**28**	**287**
Bhera	28	6	11	3	2	50
Patodi	16	6	9	6	3	40
Bapora	33	43	4	9	16	105
Dhani Mansukh	16	5	2	1	1	25
Bhiwani	**93**	**60**	**26**	**19**	**22**	**220**
Total	**190**	**154**	**62**	**51**	**50**	**507**

Source: Author's fieldwork.

Table-9.1(b): Availability of private conveyance

Village Code	Per cent households					
	None	Bicycle	Cart	Tractor	Motor	Total
Kehrawar	34.3	31.3	14.1	11.1	9.1	100
Chuliana	23.6	48.6	11.1	11.1	5.6	100
Diwana	17.7	35.3	0.0	29.4	17.7	100
Brahana	43.4	22.2	14.1	8.1	12.1	100
Rohtak	**33.8**	**32.8**	**12.5**	**11.2**	**9.8**	**100**
Bhera	56.0	12.0	22.0	6.0	4.0	100
Patodi	40.0	15.0	22.5	15.0	7.5	100
Bapora	31.4	41.0	3.8	8.6	15.2	100
Dhani Mansukh	64.0	20.0	8.0	4.0	4.0	100
Bhiwani	**42.3**	**27.3**	**11.8**	**8.6**	**10.0**	**100**
Total	**37.5**	**30.4**	**12.2**	**10.1**	**9.9**	**100**

Source: Author's fieldwork.

Number of vehicles: Out of the 507, 210 households own one vehicle and 107 households (21.1 per cent) own more than one vehicle (Table-9.2[a] and [b]). In Bhiwani District more households are without any vehicle, as compared to Rohtak District. In the other categories, however, percentages are higher for Rohtak District, but these differences are not statistically significant across these two districts.

[2] Bicycle, cart, tractor and motor vehicles are ranked 1,2,3 and 4 respectively. If a household has more than one vehicle then the highest ranked vehicle is counted for that household, for example if a household has a bicycle and a tractor then tractor is counted for this household.

Table-9.2(a): Number of vehicles in each household (Number of households)

Village Code	Number of vehicles					
	None	1	2	3	4	Total
Kehrawar	34	43	13	6	3	99
Chuliana	17	42	8	4	1	72
Diwana	3	7	3	2	2	17
Brahana	43	34	14	7	1	99
Rohtak	**97**	**126**	**38**	**19**	**7**	**287**
Bhera	28	15	3	4	0	50
Patodi	16	15	6	2	1	40
Bapora	33	48	15	8	1	105
Dhani Mansukh	16	6	2	0	1	25
Bhiwani	**93**	**84**	**26**	**14**	**3**	**220**
Total	**190**	**210**	**64**	**33**	**10**	**507**

Source: Author's fieldwork.

Table-9.2(b): Number of vehicles in each household (% households)

Village Code	Number of Vehicle					
	None	1	2	3	4	Total
Kehrawar	34.3	43.4	13.1	6.1	3.0	100
Chuliana	23.6	58.3	11.1	5.6	1.4	100
Diwana	17.7	41.2	17.7	11.8	11.8	100
Brahana	43.4	34.3	14.1	7.1	1.0	100
Rohtak	**33.8**	**43.9**	**13.2**	**6.6**	**2.4**	**100**
Bhera	56.0	30.0	6.0	8.0	0.0	100
Patodi	40.0	37.5	15.0	5.0	2.5	100
Bapora	31.4	45.7	14.3	7.6	1.0	100
Dhani Mansukh	64.0	24.0	8.0	0.0	4.0	100
Bhiwani	**42.3**	**38.2**	**11.8**	**6.4**	**1.4**	**100**
Total	**37.5**	**41.4**	**12.6**	**6.5**	**2.0**	**100**

Source: Author's fieldwork.

Availability of private conveyance and controlling variables: In this section, it is assumed that the availability and type of private conveyance are a function of caste, income and village accessibility (used here as controlling variables). The size of land-holding will also be included in this analysis, as bullock/camel carts and tractors are primarily used for agricultural purposes. In the first section, a descriptive relationship between controlling variables and personal conveyance will be examined. That will be followed by a regression analysis in the second section.

Income and private conveyance: Income has a positive relationship with the availability of a private conveyance. Only 20 per cent of households with a personal conveyance have less than Rs. 1000 gross per capita income (Table-9.3[a]). However, all of the households with an income level of more than Rs. 4000 have at least one mode of personal conveyance. In Rohtak District about one third of households do not have any personal conveyance, while the percentage for Bhiwani is 42 (Table-9.3[b]).

Table-9.3(a): Income and private conveyance (Number of households)

Gross Pre Capita Income (Rs.)	Vehicle owned					
	None	Bicycle	Cart	Tractor	Motor	Total
Rohtak						
Below 250	29	14	1	1	0	45
250 to 500	24	22	6	4	4	60
500 to 1000	30	35	17	8	12	102
1000 to 2000	11	23	8	13	7	62
2000 to 4000	3	0	4	3	4	14
Above 4000	0	0	0	3	1	4
Total	97	94	36	32	28	287
Bhiwani						
Below 250	18	3	2	0	0	23
250 to 500	28	19	5	0	2	54
500 to 1000	27	23	7	4	4	65
1000 to 2000	15	14	10	8	12	59
2000 to 4000	5	1	2	5	4	17
Above 4000	0	0	0	2	0	2
Total	93	60	26	19	22	220
Total						
Below 250	47	17	3	1	0	68
250 to 500	52	41	11	4	6	114
500 to 1000	57	58	24	12	16	167
1000 to 2000	26	37	18	21	19	121
2000 to 4000	8	1	6	8	8	31
Above 4000	0	0	0	5	1	6
Total	190	154	62	51	50	507

Source: Author's fieldwork.

Table-9.3(b): Income and private conveyance (% households)

Gross Pre Capita Income (Rs.)	Vehicle owned					
	None	Bicycle	Cart	Tractor	Motor	Total
Rohtak						
Below 250	64.4	31.1	2.2	2.2	0.0	100
250 to 500	40.0	36.7	10.0	6.7	6.7	100
500 to 1000	29.4	34.3	16.7	7.8	11.8	100
1000 to 2000	17.7	37.1	12.9	21.0	11.3	100
2000 to 4000	21.4	0.0	28.6	21.4	28.6	100
Above 4000	0.0	0.0	0.0	75.0	25.0	100
Total	33.8	32.8	12.5	11.2	9.8	100
Bhiwani						
Below 250	78.3	13.0	8.7	0.0	0.0	100
250 to 500	51.9	35.2	9.3	0.0	3.7	100
500 to 1000	41.5	35.4	10.8	6.2	6.2	100
1000 to 2000	25.4	23.7	17.0	13.6	20.3	100
2000 to 4000	29.4	5.9	11.8	29.4	23.5	100
Above 4000	0.0	0.0	0.0	100.0	0.0	100
Total	42.3	27.3	11.8	8.6	10.0	100
Total						
Below 250	69.1	25.0	4.4	1.5	0.0	100
250 to 500	45.6	36.0	9.7	3.5	5.3	100
500 to 1000	34.1	34.7	14.4	7.2	9.6	100
1000 to 2000	21.5	30.6	14.9	17.4	15.7	100
2000 to 4000	25.8	3.2	19.4	25.8	25.8	100
Above 4000	0.0	0.0	0.0	83.3	16.7	100
Total	37.5	30.4	12.2	10.1	9.9	100

Source: Author's calculation

As noted above, the bicycle is an important mode of transport especially for the poor, who cannot afford costly pubic or private transport, but the availability of bicycles is inversely associated with income levels. Only one quarter of the households with an income of less than Rs. 250 have a bicycle. In the same income group about 69 per cent of households do not have any private conveyance. This highlights the fact that the majority of these households cannot afford to buy even a bicycle. The percentages of households with a bicycle gradually decline after an income level of Rs. 500. It interesting to note that only one household with an income of more than Rs. 2000 has a bicycle, which shows that these households have other vehicles. Many people with lower income levels, especially landless labourers and small and marginal farmers have a bicycle. They commute to nearby villages or towns or cities for employment.

Bullock carts, tractors and motor vehicles, which are expensive to buy, have a positive association with income levels. The percentages of households with a cart gradually increase up to an income level of Rs. 4000, but none of the households with an income of more than Rs. 4000 has a bullock/camel cart, preferring instead to have either a tractor or other motor vehicles.

Size of land holding and private conveyance: Among all three variables, per capita size of land holding has the highest degree of association with the availability and the type of personal conveyance (Table-9.4). It is positively associated with the availability of private conveyance. This relationship is explicit from Tables 9.1.4 (a) and (b). Out of the total as many as 78 households without any personal conveyance are landless (Table-9.5[a]); and more than 95 per cent of landless households either do not have a personal conveyance or they have a bicycle. Percentages of households without any conveyance or with a bicycle are lower for households in the higher income brackets (Table-9.5[b]), while availability of tractor and bullock/carts has a positive association with the size of land holding. Out of the total 51 households with a tractor as many as 43 (more than 84 per cent) have more than one acre of per capita land.

Table-9.4: Private conveyance and controlling variables

Variable	Chi-squared	Probability of significance	Degree of freedom
Income	130.79	0.000	20
Land	152.00	0.000	20
Caste	84.32	0.000	8

Source: Author's fieldwork.

The availability of a motor vehicle (especially a motorbike and scooter) has the greatest impact on people's mobility, but its availability does not show a clear association with the size of land holding. This could be because those people partly engaged in non-agricultural activities whose income is relatively higher might have motor vehicles, but they may only be smaller or marginal farmers.

Table-9.5(a): Land and private conveyance (households)

Per Capita Size of Land (Acres)	Type of conveyance					
	None	Bicycle	Cart	Tractor	Motor	Total
Rohtak						
Landless	51	37	1	0	2	91
Below 0.25	16	20	11	4	8	59
0.25 to 0.5	16	18	7	4	7	52
0.5 to 1	13	15	12	8	4	52
1 to 2.5	1	4	3	12	7	27
Above 2.5	0	0	2	4	0	6
Total	97	94	36	32	28	287
Bhiwani						
Landless	27	13	0	0	3	43
Below 0.25	8	9	0	0	2	19
0.25 to 0.5	15	12	1	0	4	32
0.5 to 1	21	14	11	3	2	51
1 to 2.5	18	11	8	10	10	57
Above 2.5	4	1	6	6	1	18
Total	93	60	26	19	22	220
Total						
Landless	78	50	1	0	5	134
Below 0.25	24	29	11	4	10	78
0.25 to 0.5	31	30	8	4	11	84
0.5 to 1	34	29	23	11	6	103
1 to 2.5	19	15	11	22	17	84
Above 2.5	4	1	8	10	1	24
Total	190	154	62	51	50	507

Source: Author's fieldwork.

Caste and type of conveyance: Caste, which is closely associated with income and the size of land holding, has an important relationship with the availability and type of personal conveyance. In the general castes, 28.3 per cent of the households do not have any vehicle. The percentages for BC and SC households, however, at 55 and 56 respectively, are about two times more than the general castes (Table-9.6[a] and [b]). The pattern of availability of bicycles is not very different to this trend, because more than 80 per cent of the BC households either do not have any private conveyance or they have a bicycle, and the figure is more than 95 per cent for SC households.

Table-9.5(b): Land and private conveyance (% households)

Per Capita Size of Land (Acres)	Type of conveyance					
	None	Bicycle	Cart	Tractor	Motor	Total
Rohtak						
Landless	56.0	40.7	1.1	0.0	2.2	100
Below 0.25	27.1	33.9	18.6	6.8	13.6	100
0.25 to 0.5	30.8	34.6	13.5	7.7	13.5	100
0.5 to 1	25.0	28.9	23.1	15.4	7.7	100
1 to 2.5	3.7	14.8	11.1	44.4	25.9	100
Above 2.5	0.0	0.0	33.3	66.7	0.0	100
Total	33.8	32.8	12.5	11.2	9.8	100
Bhiwani						
Landless	62.8	30.2	0.0	0.0	7.0	100
Below 0.25	42.1	47.4	0.0	0.0	10.5	100
0.25 to 0.5	46.9	37.5	3.1	0.0	12.5	100
0.5 to 1	41.2	27.5	21.6	5.9	3.9	100
1 to 2.5	31.6	19.3	14.0	17.5	17.5	100
Above 2.5	22.2	5.6	33.3	33.3	5.6	100
Total	42.3	27.3	11.8	8.6	10.0	100
Total						
Landless	58.2	37.3	0.8	0.0	3.7	100
Below 0.25	30.8	37.2	14.1	5.1	12.8	100
0.25 to 0.5	36.9	35.7	9.5	4.8	13.1	100
0.5 to 1	33.0	28.2	22.3	10.7	5.8	100
1 to 2.5	22.6	17.9	13.1	26.2	20.2	100
Above 2.5	16.7	4.2	33.3	41.7	4.2	100
Total	37.5	30.4	12.2	10.1	9.9	100

Source: Author's fieldwork.

As many as 48 per cent of general caste households have a vehicle other than a bicycle, while the percentages for BCs and SCs households are 13 and 2 respectively (Table-9.6[b]). The chi-squared value for caste and type of conveyance is 84, which is statistically significant at the 1 per cent level of significance, pointing out that the availability of personal conveyance significantly differs across different caste households.

Availability and type of private conveyance and controlling variables: In this section regression results will be discussed. In the first part, a logit[3] model will be used to examine the impact of income, size of land holding and caste on the availability of private

[3] See Chapter-3 for a detailed discussion on logit (maximum likelihood logistic regression) and mlogit (maximum likelihood multinomial logistic regression) models.

conveyances. In the second part, mlogit will be used to assess the impact of these controlling variables on the types of private conveyance.

Table-9.6(a): Caste and private conveyance (households)

Caste	None	Bicycle	Cart	Tractor	Motor	Total
Rohtak						
General	45	54	33	32	25	189
BCs	20	9	3	0	2	34
SCs	32	31	0	0	1	64
Total	97	94	36	32	28	287
Bhiwani						
General	51	37	22	19	21	150
BCs	16	11	3	0	1	31
SCs	26	12	1	0	0	39
Total	93	60	26	19	22	220
Total						
General	96	91	55	51	46	339
BCs	36	20	6	0	3	65
SCs	58	43	1	0	1	103
Total	190	154	62	51	50	507

Source: Author's calculation.

Table-9.6(b): Caste and private conveyance (% households)

Caste	None	Bicycle	Cart	Tractor	Motor	Total
Rohtak						
General	23.8	28.6	17.5	16.9	13.2	100
BCs	58.8	26.5	8.8	0.0	5.9	100
SCs	50.0	48.4	0.0	0.0	1.6	100
Total	33.8	32.8	12.5	11.2	9.8	100
Bhiwani						
General	34.0	24.7	14.7	12.7	14.0	100
BCs	51.6	35.5	9.7	0.0	3.2	100
SCs	66.7	30.8	2.6	0.0	0.0	100
Total	42.3	27.3	11.8	8.6	10.0	100
Total						
General	28.3	26.8	16.2	15.0	13.6	100
BCs	55.4	30.8	9.2	0.0	4.6	100
SCs	56.3	41.8	1.0	0.0	1.0	100
Total	37.5	30.4	12.2	10.1	9.9	100

Source: Author's fieldwork.

Table-9.7: Private conveyance and controlling variables

Controlling Variables	Regression Coefficient	Standard Error	Z-Value	P>|Z|
Income	0.0004	0.0001	2.5210	0.0120
Size of land	0.1192	0.1604	0.7430	0.4570
Caste	-0.4106	0.1323	-3.1040	0.0020
Constant	0.6645	0.3152	2.1080	0.0350

Source: Author's fieldwork.

In the logistic regression analysis a response variable has binary response. The availability of a private conveyance has two responses: not available (coded as 0) and available (coded as 1). In this model income and caste have statistically significant regression coefficients, which indicate that the probability of the availability of a private conveyance in upper caste and higher income households is significantly higher than that for lower caste and low-income households (Table-9.7).

As discussed earlier, vehicle non-availability and the availability of a bicycle are positively associated. Therefore, in this model, the response variable of vehicle non-availability and having a bicycle are coded as 0 and the other modes of personal conveyance are coded as 1. All three controlling variables, including the size of land holding, have statistically significant regression coefficients, pointing towards the significant effect of income, size of land holding and caste on the availability of cart, tractor and motor vehicles. The regression coefficient for caste is the most significant, followed by size of land holding and income. It can be concluded that the probability that these three modes of transport are available is significantly higher for the upper caste households with a larger size of land holding and higher income levels against the lower castes household with relatively low income.

Table-9.8: Private conveyance and controlling variables (when bicycle is included in non-availability)

Controlling Variables	Regression Coefficient	Standard Error	Z-Value	P>|Z|
Income	0.0003	0.0001	2.3940	0.0170
Size of land	0.5523	0.1614	3.4220	0.0010
Caste	-1.2862	0.2629	-4.8920	0.0000
Constant	0.0994	0.4000	0.2480	0.8040

Source: Author's fieldwork.

Table-9.9: Private conveyance and controlling variables (multinomial logistic regression)

Controlling Variables	Regression Coefficient	Standard Error	Z-Value	P>|Z|
Bicycle				
Income	0.0003	0.0002	1.5210	0.1280
Size of land holding	-0.4933	0.2438	-2.0240	0.0430
Caste	-0.2034	0.1492	-1.3640	0.1730
Constant	0.0963	0.3836	0.2510	0.8020
Cart				
Income	0.0001	0.0002	0.4820	0.6300
Size of land holding	0.5157	0.2126	2.4250	0.0150
Caste	-1.1453	0.3326	-3.4440	0.0010
Constant	-0.0390	0.5437	-0.0720	0.9430
Tractor				
Income	0.0005	0.0002	3.0210	0.0030
Size of land holding	0.5358	0.2147	2.4950	0.0130
Caste	-19.4945	0.3384	-57.6130	0.0000
Constant	17.3195	.	.	.
Motor				
Income	0.0006	0.0002	3.4780	0.0010
Size of land holding	-0.1284	0.2583	-0.4970	0.6190
Caste	-1.3467	0.4134	-3.2570	0.0010
Constant	-0.2747	0.6135	-0.4480	0.6540
Base of comparison is non-availability of personal conveyance				

Source: Author's fieldwork.

A multinomial regression model takes care of multiple response variables. We have five responses to the question about the type of personal conveyance: none (non-availability), bicycle, bullock/camel cart, tractor and motor vehicles. The base of comparison is non-availability of personal conveyance. The first comparison is between non-availability of any vehicle and having a bicycle. The regression coefficients for income and caste are statistically insignificant at the 5 per cent level, but significant for the size of land holding at the 5 per cent level, showing that the probability of the availability of a bicycle only is significantly lower for the households with the larger size of land holding and vice-versa, which can be explained by two reasons. Firstly, in this data set, only the biggest mode of transport is reported. For example if one household has a tractor and bicycle, the tractor is reported against the type of personal conveyance available. Secondly, households with a bigger size of land holding may not need a bicycle because of the availability of bigger and faster modes of transportation such as a tractor or a motor vehicle.

Caste and size of land holding are two important variables which determine the availability of a bullock/camel cart. In upper caste households with a larger farm size the probability of the availability of a cart is significantly higher than for lower caste households with a smaller size of land holding. Interestingly, income level of the household does not show any statistically significant impact on the availability of bullock/camel carts.

All three controlling variables register a statistically significant impact on the availability of a tractor. Among these three, caste has the highest impact, followed by income and size of land holding. Based on regression analysis, it can be concluded that in upper caste households with higher income levels and a bigger size of land holding, the probability of the availability of a tractor is significantly higher than the non-availability of any personal conveyance. It is further interesting to note that income and caste also significantly determine the availability of a motor vehicle. However, the size of land holding does not show a significant impact on the availability of a motor vehicle, perhaps because households having motor vehicles may be engaged in non-agricultural activities and may have only a small land holding.

9.3 NUMBER OF VEHICLES AVAILABLE IN THE HOUSEHOLD

The previous section dealt with the type of conveyance available in the household, but it did not give an idea of how many vehicles are available in the household. Therefore, another set of data was compiled on the total number of vehicles available in each household. Households with more than one vehicle have better mobility. In the first section the number of vehicles in each household will be tabulated for all eight villages, followed by an examination of the impact of income and caste on the number of vehicles.

Out of the total, as many as 107 (about 21%) households have more than one vehicle (Table-9.10[a] and [b]). In Rohtak 22 per cent of households have more than one vehicle, while in Bhiwani it is 20 per cent. In two villages of Bhiwani District (namely Bhera and Dhani Mansukh) less than 15 per cent of households have more than two vehicles. These villages are relatively less accessible. It is interesting to note that in Diwana village, which is less accessible geographically, more than 40 per cent of households have more than one vehicle. This could be because of the small number of households or because of a sample error.

Table-9.10(a): Number of vehicles (households)

Code	None	One	Two	Three	Four	Total
Kehrawar	34	43	13	6	3	99
Chuliana	17	42	8	4	1	72
Diwana	3	7	3	2	2	17
Brahana	43	34	14	7	1	99
Rohtak	**97**	**126**	**38**	**19**	**7**	**287**
Bhera	28	15	3	4	0	50
Patodi	16	15	6	2	1	40
Bapora	33	48	15	8	1	105
Dhani Mansukh	16	6	2	0	1	25
Bhiwani	**93**	**84**	**26**	**14**	**3**	**220**
Total	**190**	**210**	**64**	**33**	**10**	**507**

Source: Author's fieldwork.

Table-9.10(b): Number of vehicles (% households)

Code	None	One	Two	Three	Four	Total
Kehrawar	34.3	43.4	13.1	6.1	3.0	100
Chuliana	23.6	58.3	11.1	5.6	1.4	100
Diwana	17.7	41.2	17.7	11.8	11.8	100
Brahana	43.4	34.3	14.1	7.1	1.0	100
Rohtak	**33.8**	**43.9**	**13.2**	**6.6**	**2.4**	**100**
Bhera	56.0	30.0	6.0	8.0	0.0	100
Patodi	40.0	37.5	15.0	5.0	2.5	100
Bapora	31.4	45.7	14.3	7.6	1.0	100
Dhani Mansukh	64.0	24.0	8.0	0.0	4.0	100
Bhiwani	**42.3**	**38.2**	**11.8**	**6.4**	**1.4**	**100**
Total	**37.5**	**41.4**	**12.6**	**6.5**	**2.0**	**100**

Source: Author's fieldwork.

Number of vehicles and controlling variables: In the following section the number of vehicles in each household will be examined in relation to caste and income. Out of the total, as many as 210 households (41.4 per cent) have only one vehicle. The number of vehicle varies across income level of households: 69 per cent of the households with an income of less than Rs. 250 did not have any vehicle, while all households with an income level of more Rs. 4000 have two or more than two vehicles (Table-9.11[a] and [b]).

The chi-squared value for income and number of vehicles is 134.94 (statistically significant at the 1 per cent level), showing significant differences in the distribution of the number of vehicles in households with different income levels. Income does not show an explicit trend with the availability of one vehicle. This could be because the majority of these households

have only a bicycle and the availability of a bicycle does not have a significant association with income. But this association is positive for two vehicles per households and it is further accentuated for three and four vehicles per household.

Table-9.11(a): Income and number of vehicles

Income level (Rupees)	Number of vehicles (households)					
	None	One	Two	Three	Four	Total
Below 250	47	19	1	1	0	68
250 to 500	52	49	12	1	0	114
500 to 1000	57	78	21	11	0	167
1000 to 2000	26	58	21	11	5	121
2000 to 4000	8	6	7	7	3	31
Above 4000	0	0	2	2	2	6
Total	190	210	64	33	10	507

Source: Author's fieldwork.

Table-9.11(b): Income and number of vehicles

Income level (Rupees)	Number of vehicles (% households)					
	None	One	Two	Three	Four	Total
Below 250	69.1	27.9	1.5	1.5	0.0	100
250 to 500	45.6	43.0	10.5	0.9	0.0	100
500 to 1000	34.1	46.7	12.6	6.6	0.0	100
1000 to 2000	21.5	47.9	17.4	9.1	4.1	100
2000 to 4000	25.8	19.4	22.6	22.6	9.7	100
Above 4000	0.0	0.0	33.3	33.3	33.3	100
Total	37.5	41.4	12.6	6.5	2.0	100

Source: Author's fieldwork.

Caste and number of vehicles per household: Caste shows some degree of association with the number of vehicles. The chi-squared value for caste and number of vehicles is 61.2, which is statistically significant at the 0.01 per cent level of significance. This points out that the availability of the number of vehicles differs significantly across households of different castes. In the upper castes, more than 29 per cent of households have more than one vehicle. But it is interesting to note that in lower castes (BCs and SCs), none of the households has more than two vehicles (Table-9.12[a] and [b]).

Table-9.12(a): Caste and number of vehicles per household

Caste	Number of vehicles (households)					
	None	One	Two	Three	Four	Total
General	96	143	57	33	10	339
BCs	36	23	6	0	0	65
SCs	58	44	1	0	0	103
Total	190	210	64	33	10	507

Source: Author's fieldwork.

Table-9.12(b): Caste and number of vehicle per household

Caste	Number of vehicles (% households)					
	None	One	Two	Three	Four	Total
General	28.3	42.2	16.8	9.7	3.0	100
BCs	55.4	35.4	9.2	0.0	0.0	100
SCs	56.3	42.7	1.0	0.0	0.0	100
Total	37.5	41.4	12.6	6.5	2.0	100

Source: Author's fieldwork.

Number of vehicles and controlling variables: The number of vehicles per household was regressed on income and caste using a maximum likelihood ordered logistic model (ologit). This model is used when a response variable can be arranged on an ordinal scale and here it is arranged as the non-availability of a vehicle (0), or the availability of one, two, three and four vehicles (Table-9.13).

The regression coefficients for both the controlling variables, income and caste, are statistically significant, but income has a larger effect than caste. Both of these variables have a positive impact on the number of vehicles available in the household.

Table-9.13: Number of vehicles and controlling variables (regression results)

Controlling Variable	Regression Coefficient	Standard Error	Z-Value	P>|Z|
Caste	-0.5383	0.1145	-4.7000	0.0000
Income	0.0005	0.0001	6.3120	0.0000

Source: Author's fieldwork.

9.4 VISITS DURING THE LAST 30 DAYS

Before the data on frequency of visits are analysed it is necessary to answer the question 'why is a visit out of the village (people's mobility) important'? Most goods and services that

villagers need are not available within their village; rather they have to visit a city or town or neighbouring villages. The most common purposes of their visits are:

1. To access educational and health services if adequate health and educational facilities are not available within the village.
2. To Shop for household items.
3. To buy agriculturally-related inputs (such as fertiliser, pesticide or insecticide, seeds etc.) and implements and to sell agricultural products.
4. For employment.
5. Social and cultural visits.

One of the important objectives of this study is to examine access to transport. The frequency of visits out of the village may determine people's access to transport (in normal circumstances only). It can be assumed that the people who travel more frequently are those who have better access to transport and vice-versa. This also represents people's access to other services such as education, health and markets. Respondents were asked: 'how many people in the household have visited out of the village during the last 30 days (before the date of interview)'? This was followed by other questions such as the number of times people have gone out of their village, the places visited, the purpose of visits and whether they were accompanied by someone or went alone. In the first part, data on frequency of visits will be analysed. This will be examined in relation to caste, income, availability of personal conveyance, gender and village accessibility.

Visits out of the village: Data on the frequency of visits were compiled only for the people aged 15 years and above for two reasons. Firstly, more than 92 per cent of people less than 15 years of age had not visited any place during the last month (Table-9.14). Secondly, children do not have independent mobility; children going to school located out of their village have to depend on someone else to take them to school. But, in villages the majority of children in this age group go to schools located within the village and their visits out of the village are limited. Therefore, it was not important to include children less than 15 years of age in this analysis.

Table-9.14: Age and frequency of visits (% people)

	Age (years)			
Number of visits	Below 15	15 to 60	Above 60	Total
None	92.3	50.5	67.2	66.3
1 to 2	2.1	19.8	16.0	13.3
3 to 5	0.7	10.4	8.2	6.8
6 to 10	0.1	4.5	4.3	2.9
More than 10	4.9	14.8	4.3	10.6
Total	100	100	100	100

Source: Author's fieldwork.

People aged 60 years and above are included in the analysis. People in this age group are quite mobile and about one third had travelled outside their village (during the pervious 30 days from the interview date). The numbers of visits have been grouped into five categories: none (no visit), 2, 5, 10 and more than 10 (Table-9.15[a] and [b]). People who have not been out of the village in the last 30 days even once are kept in the category of 'non-visitor' (none). People who have visited less than three times in the last 30 days are labelled 'occasional visitors'. These people generally go for shopping or for social visits. This also includes people who are working at distant locations and visit their family 1 to 2 times a month. A majority of farmers, who are not engaged in permanent employment out of village, generally travel 5 to 10 times; their purpose could be to buy and/or sell agricultural products and implements and they are labelled as 'casual visitors'. People who are either students or are permanently working out of the village are daily commuters; they are in the category of more than 10 visits and are labelled as 'regular visitors'.

Table-9.15(a): Frequency of visits during the last 30 days (number of people)

Village/District	None	1 to 2	3 to 10	> 10	Total
Kehrawar	210	90	66	71	437
Chuliana	223	44	34	46	347
Diwana	47	17	20	11	95
Brahana	286	77	53	48	464
Rohtak	**766**	**228**	**173**	**176**	**1343**
Bhera	120	53	32	16	221
Patodi	99	41	25	27	192
Bapora	198	97	83	65	443
Dhani Mansukh	43	18	13	32	106
Bhiwani	**460**	**209**	**153**	**140**	**962**
Total	**1226**	**437**	**326**	**316**	**2305**

Source: Author's fieldwork.

Out of the total 2305 people surveyed (aged 15 years and above), as many as 1226 (53.2 %) did not travel out of village during the previous 30 days (Table-9.15[a] and [b]). The percentages of non-visitors are significantly lower for villages, such as Bapora, Dhani Mansukh and Kehrawar, located near to towns. The percentages of non-visitors are higher in Rohtak as compared to Bhiwani District, which is surprising since Rohtak is more developed and frequency of visits in this district was expected to be more than in Bhiwani District. About 19 per cent of the people are occasional visitors, more than 14 per cent of people have visited more than twice but less than 10 times, and 13.7 per cent are regular visitors.

Table-9.15(b): Frequency of visits during the last 30 days (% of people)

Village/District	None	1 to 2	3 to 10	> 10	Total
Kehrawar	48.1	20.6	15.1	16.3	100
Chuliana	64.3	12.7	9.8	13.3	100
Diwana	49.5	17.9	21.1	11.6	100
Brahana	61.6	16.6	11.4	10.3	100
Rohtak	**57.0**	**17.0**	**12.9**	**13.1**	**100**
Bhera	54.3	24.0	14.5	7.2	100
Patodi	51.6	21.4	13.0	14.1	100
Bapora	44.7	21.9	18.7	14.7	100
Dhani Mansukh	40.6	17.0	12.3	30.2	100
Bhiwani	**47.8**	**21.7**	**15.9**	**14.6**	**100**
Total	**53.2**	**19.0**	**14.1**	**13.7**	**100**

Source: Author's fieldwork.

It is further interesting to note that the frequency of people's visits varies between Rohtak and Bhiwani Districts, with a chi-squared value of 20.1, which is statistically significant at the 1 per cent level. The largest differences are in non-visitors and occasional visitors, while the differences are lowest between commuters in two districts. It was observed in the field that the low order goods and services such as retail shopping, fertiliser and seeds provision were available in the villages of Rohtak District and that purchasers may need therefore not to go to town or city for these goods. This would help to explain the lower percentages of visitors in Rohtak District.

The frequency of visits and controlling variables: Based on data for the 2305 individuals, relationships were explored between the frequency of trips and six controlling variables: gender, income level, caste, village accessibility, level of education and the availability of

private transport. Out of these six variables, four have an important association with the frequency of visits (Table-9.16). From the chi-squared values it is clear that gender has the highest degree of association with the number of visits, followed by education, village accessibility and income level.

Table-9.16: Frequency of visits and its association with Gender, education level, village accessibility and income

Variable	Chi-squared	Probability of Significance	Degree of Freedom
Sex	309.9	0.000	3
Education level	211.2	0.000	12
Village Accessibility	27.39	0.000	3
Income	40.4	0.000	12

Source: Author's fieldwork.

It was expected that the availability of a personal vehicle would have a positive association with the frequency of visits. But this relationship is not statistically significant, which can be explained by two reasons. Firstly, the availability of private transport also includes camel/bullock cart and tractors, which are primarily used in the fields and are not necessarily used for trips outside the village. Secondly, motor vehicles also include lorries/trucks, which are not used for common travelling purposes and only a small fraction of households have other personal vehicles such as a motorcycle, scooter, car, jeep etc., which are used for normal travelling purposes. Besides, the majority of people rely on state or private transport services available in the village. Caste also does not show any significant association with the frequency of visits and that needs to be investigated further.

Sex and the frequency of visits: As discussed above, sex has the highest degree of association with the number of visits. The frequency of visits varies significantly for males and females. Out of the total male population, as many as 40 per cent are non-visitors, while for females it is 69.3 per cent (Table-9.17[a] and [b]). The lowest gap is observed among the male and female occasional visitors and is wider for casual travellers and commuters, which indicates that women are more occasional visitors. Interestingly, inter-district variations can also be observed for males and females. The numbers of non-visitors is more in Rohtak as compared to Bhiwani District for both sexes; and inter-district differences are lowest for the regular visitors for both sexes.

Table-9.17(a): Gender and frequency of visits (number of persons)

Sex	None	1 to 2	3 to 10	>10	Total
Rohtak					
Male	353	121	136	158	768
Female	413	107	37	18	575
Total	766	228	173	176	1343
Bhiwani					
Male	177	103	128	124	532
Female	283	106	25	16	430
Total	460	209	153	140	962
Total					
Male	530	224	264	282	1300
Female	696	213	62	34	1005
Total	1226	437	326	316	2305

Source: Author's fieldwork.

Table-9.17(b): Gender and frequency of visits (% of persons)

Sex	None	1 to 2	3 to 10	>10	Total
Rohtak					
Male	46.0	15.8	17.7	20.6	100
Female	71.8	18.6	6.4	3.1	100
Total	57.0	17.0	12.9	13.1	100
Bhiwani					
Male	33.3	19.4	24.1	23.3	100
Female	65.8	24.7	5.8	3.7	100
Total	47.8	21.7	15.9	14.6	100
Total					
Male	40.8	17.2	20.3	21.7	100
Female	69.3	21.2	6.2	3.4	100
Total	53.2	19.0	14.1	13.7	100

Source: Author's fieldwork.

Frequency of visits and education level: Educational level shows the second highest degree of association with the frequency of visits, but it has an inverse relationship with the percentage of non-visitors (Table-9.18[a] and [b]). More than two thirds of the total illiterates did not travel, against one third for the people who have completed a post high school education. This clearly shows a strong negative relationship between education level and the percentages of non-visitors. Education level does not show a clear trend with occasional visitors. There are more occasional visitors (one or two visits) with a low level of educational attainment. The lower level of educational attainment may restrict the chances for non-agricultural employment in town or city and hence may lead to a lower frequency of visits.

Table-9.18(a): Education levels and frequency of visits (Number of people)

Education Level	Frequency of visits				
	None	1 to 2	3 to 10	>10	Total
Rohtak					
Illiterate	312	74	38	17	441
Primary	140	53	33	31	257
Middle	129	30	31	37	227
High Schooling	127	46	51	54	278
Post High Schooling	58	25	20	37	140
Total	766	228	173	176	1343
Bhiwani					
Illiterate	213	90	35	10	348
Primary	85	43	36	24	188
Middle	71	22	25	26	144
High Schooling	58	33	26	45	162
Post High Schooling	33	21	31	35	120
Total	460	209	153	140	962
Total					
Illiterate	525	164	73	27	789
Primary	225	96	69	55	445
Middle	200	52	56	63	371
High Schooling	185	79	77	99	440
Post High Schooling	91	46	51	72	260
Total	1226	437	326	316	2305

Source: Author's fieldwork.

A positive relationship can be observed between education level and casual visitors. The percentages of casual and regular visitors are higher for people with the higher levels of educational attainment and vice-versa. Regular visitors have a stronger association with education levels. It is interesting to note that only 3.4 per cent of the illiterates are regular visitors, while more than 27 per cent of people with post-high schooling are regular visitors, showing that education level plays a vital role in determining trip frequency. This could be because educated people have better chances for employment in a town or city, which will in turn increase the frequency of their visits. If so, this works against the uneducated and people with lower levels of educational attainment. The impact of education on the frequency of visits is also examined in the next section on regression.

Table-9.18(b): Education levels and frequency of visits (% of people)

Education Level	Frequency of visits				
	None	1 to 2	3 to 10	>10	Total
Rohtak					
Illiterate	70.8	16.8	8.6	3.9	100
Primary	54.5	20.6	12.8	12.1	100
Middle	56.8	13.2	13.7	16.3	100
High Schooling	45.7	16.6	18.4	19.4	100
Post High Schooling	41.4	17.9	14.3	26.4	100
Total	57.0	17.0	12.9	13.1	100
Bhiwani					
Illiterate	61.2	25.9	10.1	2.9	100
Primary	45.2	22.9	19.2	12.8	100
Middle	49.3	15.3	17.4	18.1	100
High Schooling	35.8	20.4	16.1	27.8	100
Post High Schooling	27.5	17.5	25.8	29.2	100
Total	47.8	21.7	15.9	14.6	100
Total					
Illiterate	66.5	20.8	9.3	3.4	100
Primary	50.6	21.6	15.5	12.4	100
Middle	53.9	14.0	15.1	17.0	100
High Schooling	42.1	18.0	17.5	22.5	100
Post High Schooling	35.0	17.7	19.6	27.7	100
Total	53.2	19.0	14.1	13.7	100

Source: Author's fieldwork.

Frequency of visits and village accessibility: Village accessibility shows the third highest degree of association with frequency of trips. The latter varies significantly across the villages with different levels of accessibility. The highest degree of difference is noticed in the percentages of non-visitors between less and more accessible villages; this is 57 in less accessible villages, 10 per cent more than for more accessible villages (Table-9.19[a] and [b]).

In all categories of visits the percentages are lower for the less accessible villages, clearly indicating that village accessibility has a positive association with the frequency of visits. The availability of better transport facilities and geographical access can explain the greater frequency of visits in more accessible villages.

Table-9.19(a): Village accessibility and frequency of visits (Number of people)

Accessibility index	Number of visits				
	None	1 to 2	3 to 10	>10	Total
Less Accessible	818	250	177	180	1425
More Accessible	408	187	149	136	880
Total	1226	437	326	316	2305

Source: Author's fieldwork

Table-9.19(b): Village accessibility and frequency of visits (% of people)

Accessibility index	Number of visits				
	None	1 to 2	3 to 10	>10	Total
Less Accessible	57.4	17.5	12.4	12.6	100
More Accessible	46.4	21.3	16.9	15.5	100
Total	53.2	19.0	14.1	13.7	100

Source: Author's fieldwork.

Frequency of visits and income level: The chi-squared value for income and frequency of visits is 40.38, which is statistically significant at the 0.1 per cent level of significance. This establishes the fact that the number of visits varies significantly with income levels. In the Table-9.20(a) an inverse relationship can be noticed between income levels and non-visitors: 58 per cent of the people with an income level of less than Rs. 500 did not travel even once during the previous 30 days (Table-9.20[a] and [b]).

Table-9.20(a): Income level and frequency of visits (number of people)

Gross per capita income (Rupees)	Number of visits				
	None	1 to 2	3 to 10	>10	Total
Below 250	152	56	31	22	261
250 to 500	298	87	71	54	510
500 to 1000	423	150	103	112	788
1000 to 2000	279	109	93	92	573
2000 to 4000	68	30	23	27	148
Above 4000	6	5	5	9	25
Total	1226	437	326	316	2305

Source: Author's fieldwork.

Table-9.20(b): Income level and frequency of visits (% of people)

Gross per capita income (Rupees)	Number of visits				
	None	<=2	<=10	>10	Total
Below 250	58.2	21.5	11.9	8.4	100
250 to 500	58.4	17.1	13.9	10.6	100
500 to 1000	53.7	19.0	13.1	14.2	100
1000 to 2000	48.7	19.0	16.2	16.1	100
2000 to 4000	46.0	20.3	15.5	18.2	100
Above 4000	24.0	20.0	20.0	36.0	100
Total	53.2	19.0	14.1	13.7	100

Source: Author's fieldwork.

The percentages of non-visitors are lower for people with the higher income levels and vice-versa: only one fifth of the people with an income level of more than Rs. 4000 are non-visitors. However, for other than non-visitors (i.e. visitors) there is a positive association between income level and the frequency of visits. The percentages of casual and regular visitors increase with income. In the case of occasional visitors also, the relationship is the same except for the people with an income level of less than Rs. 250. There is a sharp contrast in the frequency of the richest income group commuters (over 4000 Rupees per month) and the rest: 36 per cent people with the highest income level have made more than 10 visits (over the previous 30 days), while the figure for other groups is less then 19 per cent. Comments made to me by villagers further support the argument that income determines frequency of visits.

> "Year after year the Government is raising bus fares and this is followed by an increase in the fares of private transport. We are poor and we have to think twice before travelling due to high transport costs" (Villagers, Patodi, 1998).

> "We are unable visit the district headquarters Rohtak as transportation costs are high, which we are unable to afford. Therefore, it is more viable to consult a private doctor and a retailer in the village itself saving both time as well as money" (Jagbir Singh, Brahana, 1997).

The above discussion reveals that income plays a vital role in determining the frequency of visits. People with higher incomes have a greater spending capacity both for transportation and for the items they buy from the town and/or city.

Frequency of visits and controlling variables (regression analysis): It has already been shown that the frequency of visits is a function of four important variables: gender, education level, village accessibility and income level. The frequency of visits is regressed on these four variables using a maximum-likelihood ordered logistic model, which is used when the response variable is on an ordinal scale (Table-9.21). The frequency of visits has been ordered as 0, 1, 2, and 3, representing non-visitors, occasional (one or two visits), casual (3 to 10 visits), and regular visitors (more than ten visits) respectively.

Table-9.21: Frequency of visits and controlling variables

Controlling variables	Regression Coefficient	Standard Error	Z-Value	P>|Z|
Sex	-1.2220	0.0915	-13.3620	0.0000
Education level	0.1437	0.0230	6.2590	0.0000
Village accessibility	0.4218	0.0836	5.0420	0.0000
Income level	0.0001	0.0000	3.5040	0.0000
Dependent variable = frequency of visits				

Source: Author's fieldwork.

Among the four variables, the regression coefficient for sex is the most important, showing that for males the frequency of visits is significantly higher than for females. Education level is the second most important variable and has a positive impact on the frequency of visits; people with higher levels of educational attainment visit more frequently than illiterates and people with lower levels of educational attainment. Village accessibility and income levels also have a statistically significant positive impact on the frequency of visits; the probability of visits is significantly higher for people with higher income levels and vice-versa. People visit more frequently in those villages with better geographical accessibility as compared to less accessible villages.

9.5 PLACES VISITED

Places visited have been grouped into five categories: rural, small town, city or district headquarters, metropolitan city and states other than Haryana. Out of the total, as many as 21.8 per cent of visitors travelled to rural areas, and just more than 20 per cent to smaller towns (Table-9.22[a] and [b]). The largest number of people (more than 42 per cent) travelled to the district headquarters, because that serves many purposes such as administrative works (e.g. land record, land and irrigation tax payment, loan etc.), shopping for household and agricultural items, education, health services etc. Moreover, colleges and good nursing homes

and Government health services are also available in both district headquarters; and about 11.5 per cent of people have also visited a metropolitan city (Delhi).

Table-9.22(a): Place visited (number of visitors)

Village/District	Rural	Urban				Total
		Town	District Headquarter	Metropolitan City	Other States	
Kehrawar	31	21	127	46	3	228
Chuliana	30	13	54	25	2	124
Diwana	9	3	25	10	2	49
Brahana	41	43	70	24	5	183
Rohtak	**111**	**80**	**276**	**105**	**12**	**584**
Bhera	29	46	25	1	1	102
Patodi	25	48	16	2	3	94
Bapora	64	7	148	17	18	254
Dhani Mansukh	10	45	3	1	5	64
Bhiwani	**128**	**146**	**192**	**21**	**27**	**514**
Total	**239**	**226**	**468**	**126**	**39**	**1098**

Source: Author's fieldwork.

Table-9.22(b): Place visited (% of visitors)

Village/District	Rural	Urban				Total
		Town	District Headquarter	Metropolitan City	Other States	
Kehrawar	13.6	9.2	55.7	20.2	1.3	100
Chuliana	24.2	10.5	43.6	20.2	1.6	100
Diwana	18.4	6.1	51.0	20.4	4.1	100
Brahana	22.4	23.5	38.3	13.1	2.7	100
Rohtak	**19.0**	**13.7**	**47.3**	**18.0**	**2.1**	**100**
Bhera	28.4	45.1	24.5	1.0	1.0	100
Patodi	26.6	51.1	17.0	2.1	3.2	100
Bapora	25.2	2.8	58.3	6.7	7.1	100
Dhani Mansukh	15.6	70.3	4.7	1.6	7.8	100
Bhiwani	**24.9**	**28.4**	**37.4**	**4.1**	**5.3**	**100**
Total	**21.8**	**20.6**	**42.6**	**11.5**	**3.6**	**100**

Source: Author's fieldwork.

There are apparent inter-district variations in the places of visit. In Rohtak District, 14 and 47 per cent of people visited towns and the district headquarters respectively as against 28 and 37 per cent in Bhiwani District. The chi-squared value is 113.6, which is statistically significant at the 0.01 per cent level with 4 degrees of freedom. In both the districts, the

largest percentage of visitors have made visits to the district headquarters, but the figure for Rohtak is significantly higher than for Bhiwani District. It is interesting to report here that in Rohtak District as many as 18 per cent of visitors also travelled to Delhi metropolitan against only 4.1 per cent from Bhiwani District. Inter-state visits are less than 6 per cent in both the districts, but the percentage is more in Bhiwani than in Rohtak.

It was observed in the previous section that the frequency of women's visits is significantly lower than that of men's. Also significant variations in the places visited by men and women can be observed. The chi-squared value for sex and places visited is 115.6, which is statistically significant at the 0.01 per cent level with 4 degrees of freedom. The study area experiences exogamous marriages: after her marriage the bride moves to the bridegroom's village. Therefore, a large number of married women visit their parents occasionally, the majority of them in the rural areas. This may help in interpreting the results given in Table-9.23.

Table-9.23: Gender and place visited (% of visitors)

Sex	Rural	Urban				Total
		Town	District Headquarter	Metropolitan City	Other States	
Rohtak						
Male	13.3	15.6	46.5	21.8	2.8	100
Female	34.0	8.6	49.4	8.0	0.0	100
Total	19.0	13.7	47.3	18.0	2.1	100
Bhiwani						
Male	14.4	31.1	42.8	5.2	6.5	100
Female	51.0	21.8	23.8	1.4	2.0	100
Total	24.9	28.4	37.4	4.1	5.3	100
Total						
Male	13.8	22.8	44.7	14.1	4.6	100
Female	42.1	14.9	37.2	4.9	1.0	100
Total	21.8	20.6	42.6	11.5	3.6	100

Source: Author's fieldwork.

More than 42 per cent of women visited rural areas only against 14 per cent of men. More than 50 per cent of women visited rural areas in Bhiwani District (Table-9.23). It is interesting to note that in Rohtak District there is no significant gender variation in visits to district headquarters, but the percentage visiting a Metropolitan City or other states is significantly lower for women than for men.

9.6 PURPOSE OF VISIT

Respondents were asked 'what was the purpose of their visit for each household member who has travelled at least once during the last 30 days (before the date of interview)'? There were 13 types of response to this question, which were grouped into seven categories. These categories are: social (which includes visits to parents, marriage, cremation and other cultural events such as visit to a festival etc.), study, agriculture (repairing, selling and buying agriculturally related items), economic (commuting to work, searching for a job, business, to draw a pension, etc.), medical treatment, shopping or some other household work, and others (unclassified).

The largest numbers of male visits are for economic reasons, representing productive activities. Shopping for household items is another important reason for men's visits (Table-9.24[a] and [b]) as are the buying and selling of agricultural items and social visits. More than 22 per cent of men cited these latter two reasons for their visits. In Bhiwani District more than 17 per cent of people visited for agricultural purposes, but in Rohtak District only 6 per cent did so. This could be because some of the agricultural inputs such as seeds, fertiliser, pests and insecticide are available in Kehrawar and Brahana villages in Rohtak District (Plate-1.4) and farmers therefore need not go out of the village to buy these items. Another important thing to observe is the significant difference in economic reasons between Rohtak and Bhiwani Districts. Economic reasons are predominantly associated with non-agricultural activities, and in Rohtak District there are more people engaged in non-agricultural activities out of the village.

Table-9.24(a): Gender and purpose of visits (number of visitors)

Purpose of visit	Male			Female		
	Rohtak	Bhiwani	Total	Rohtak	Bhiwani	Total
Social	42	45	87	62	80	142
Study	25	24	49	5	17	22
Agriculture	29	64	93	1	1	2
Economic	207	155	362	18	2	20
Others	12	14	26	1	4	5
Health	43	17	60	44	25	69
Household Work	64	48	112	31	18	49
Total	422	367	789	162	147	309

Source: Author's fieldwork.

Table-9.24(b): Gender and purpose of visits (% of visitors)

Purpose of visit	Male			Female		
	Rohtak	Bhiwani	Total	Rohtak	Bhiwani	Total
Social	10.0	12.3	11.0	38.3	54.4	46.0
Study	5.9	6.5	6.2	3.1	11.6	7.1
Agriculture	6.9	17.4	11.8	0.6	0.7	0.7
Economic	49.1	42.2	45.9	11.1	1.4	6.5
Others	2.8	3.8	3.3	0.6	2.7	1.6
Health	10.2	4.6	7.6	27.2	17.0	22.3
Household Work	15.2	13.1	14.2	19.1	12.2	15.9
Total	100	100	100	100	100	100

Source: Author's fieldwork.

The largest numbers of women's visits are for social purposes, followed by health and household work. In Bhiwani District, more than 54 per cent of women's visits were for social purposes, but the figure in Rohtak District were less than 40 per cent. It is further interesting to observe that in Rohtak District about 27 per cent of female visitors travelled out of their village for health reasons, 10 per cent more than Bhiwani District. In other words it can be said that in Rohtak more female patients have used health services located away from their village. The percentages of females' visits for economic reasons and household work are also significantly higher in Rohtak District. It can be concluded that women's access to market and non-farm activities is better in Rohtak as compared to Bhiwani District. Although the percentage of females' visits for health reasons is much greater than the percentage of males; this could be because of the much smaller number of females making visits outside their village. As expressed, the number of males and females making visits for health reasons are almost similar (Table-9.24[a]).

Place and purpose of visit: The Tables - 9.25[a] and [b]) help in understanding the association between purpose and place visited. More than 69 per cent of people travelled from one village to another for social purposes. This establishes the fact that most of the social visits are rural-based. Another important reason for visits from one village to another is education. Visits to town and district headquarters serve the majority of villagers' purposes such as study, agriculture, economic, health and household work. More than 20 per cent of people have visited Delhi Metropolitan area for economic reasons. Their visit is primarily for non-agricultural activities such as employment or selling dairy products and other perishable goods. The most important reason to visit other states is for employment.

Table-9.25(a): Purpose and place of visit (Number of visitors)

Purpose of visit	Rural	Urban				Total
		Town	District Headquarter	Metropol-itan City	Other States	
Social	158	20	28	20	3	229
Study	10	28	30	2	1	71
Agriculture	4	45	44	2	0	95
Economic	40	69	151	88	34	382
Others	2	6	17	5	1	31
Health	16	27	83	3	0	129
Household Work	9	31	115	6	0	161
Total	239	226	468	126	39	1098

Source: Author's fieldwork.

Table-9.25(b): Purpose and place of visit (% of visitors)

Purpose of visit	Rural	Urban				Total
		Town	District Headquarter	Metropol-itan City	Other States	
Social	69.0	8.7	12.2	8.7	1.3	100
Study	14.1	39.4	42.3	2.8	1.4	100
Agriculture	4.2	47.4	46.3	2.1	0.0	100
Economic	10.5	18.1	39.5	23.0	8.9	100
Others	6.5	19.4	54.8	16.1	3.2	100
Health	12.4	20.9	64.3	2.3	0.0	100
Household Work	5.6	19.3	71.4	3.7	0.0	100
Total	21.8	20.6	42.6	11.5	3.6	100

Source: Author's fieldwork.

Frequency and purpose of visit: Tables 9.26[a] and [b] show some degree of association between frequency and purpose of trips. More than 85 per cent of social journeys are occasional (one or two during the 30 days period), more than 48 per cent of visitors have consulted a doctor 1-2 times outside their village and 59 per cent of the sample made 3 to 10 visits for agricultural reasons. However, students and non-agricultural workers are regular travellers.

Table-9.26(a): Frequency and purpose of visit (Number of visitors)

Purpose of visit	Number of visits			
	1 to 2	3 to 10	>10	Total
Social	196	30	3	229
Study	3	8	60	71
Agriculture	21	56	18	95
Economic	101	87	194	382
Others	5	10	16	31
Health	62	58	9	129
Household Work	68	77	16	161
Total	456	326	316	1098

Source: Author's fieldwork.

Table-9.26(b): Frequency and purpose of visit (% of visitors)

Purpose of visit	Number of visits			
	1 to 2	3 to 10	>10	Total
Social	85.6	13.1	1.3	100
Study	4.2	11.3	84.5	100
Agriculture	22.1	59.0	19.0	100
Economic	26.4	22.8	50.8	100
Others	16.1	32.3	51.6	100
Health	48.1	45.0	7.0	100
Household Work	42.2	47.8	9.9	100
Total	41.5	29.7	28.8	100

Source: Author's fieldwork.

9.7 DISTANCE TRAVELLED

The distance travelled has been grouped into four categories: below 25 kilometres, 25 to 50, 50 to 100 and more than 100 kilometres. A small town is available within a radius of 25 kilometres from all the surveyed villages, and a distance of less than 100 kilometres covers the district headquarters. Out of the total, as many as 685 people (more than 60 per cent of those travellers) have visited places located within a distance of 25 kilometres (Table-9.27[a] and [28]); only 24 per cent of travellers have visited places located beyond a distance of 50 kilometres, which includes Delhi and other states. In Rohtak District, more than 23 per cent of travellers had made visits to places located within a distance of 50 to 100 kilometres, which is more than 10 per cent higher than for Bhiwani District. It is quite probable that people in this category might have travelled to Delhi metropolitan for employment and/or non-agricultural activities. The percentage of visitors who travelled a distance of more than 100 kilometres is significantly higher in Bhiwani as compared to Rohtak District: 65 people

compared with 22. This may seem out of line with other results, but in the villages of Bhiwani District it was reported that some people work in other states in transport companies and this may account for the higher percentages of people travelling longer distances in Bhiwani District.

Table-9.27(a): Distance travelled (number of visitors)

Village/District	Distance travelled				
	<=25	>25 & <=50	>50 & <=100	>100	Total
Kehrawar	140	21	60	7	228
Chuliana	69	17	32	6	124
Diwana	29	5	11	4	49
Brahana	127	18	33	5	183
Rohtak	**365**	**61**	**136**	**22**	**584**
Bhera	55	23	19	5	102
Patodi	53	27	8	6	94
Bapora	160	25	21	48	254
Dhani Mansukh	52	3	3	6	64
Bhiwani	**320**	**78**	**51**	**65**	**514**
Total	**685**	**139**	**187**	**87**	**1098**

Source: Author's fieldwork.

Table-9.27(b): Distance travelled (Number of visitors)

Village/District	Distance travelled				
	<=25	>25 & <=50	>50 & <=100	>100	Total
Kehrawar	61.4	9.21	26.32	3.07	100
Chuliana	55.65	13.71	25.81	4.84	100
Diwana	59.18	10.2	22.45	8.16	100
Brahana	69.4	9.84	18.03	2.73	100
Rohtak	**62.5**	**10.45**	**23.29**	**3.77**	**100**
Bhera	53.92	22.55	18.63	4.9	100
Patodi	56.38	28.72	8.51	6.38	100
Bapora	62.99	9.84	8.27	18.9	100
Dhani Mansukh	81.25	4.69	4.69	9.38	100
Bhiwani	**62.26**	**15.18**	**9.92**	**12.65**	**100**
Total	**62.39**	**12.66**	**17.03**	**7.92**	**100**

Source: Author's fieldwork.

A regression analysis was performed to examine the impact of gender, education levels, village accessibility, caste and income levels on travel distance. None of these variables shows any significant impact, but when non-visitors are analysed, sex, education and income

levels are significant. The physical location of villages also determines the distance travelled to a town or city and district headquarters. For example if the nearest town is located 27 kilometres away from a village then the majority of people's visits will fall in the category of distance of between 25 and 50 kilometres.

9.8 MODE OF TRANSPORTATION USED

Data on modes of transportation were also collected in order to investigate 'which modes of transport people generally use'. This has been classified into five categories: rail, Government bus, private, personal and others (Table-9.28[a] and [b]). 'Private' includes private-owned publicly available buses, jeeps and three wheelers. The first section will deal with the village-wise distribution of the modes of transport used. This will be followed by an examination of the impact of controlling variables on the utilisation of different modes of transportation.

Tables 9.28(a) and (b) provide a contrasting picture of the different modes of transportation used. Out of the total, 425 visitors (i.e. more than 38 per cent) have used only private transport and about one third of the people have relied on Government bus services. In Rohtak District alone, 344 of the visitors (59 per cent) travelled by a private form of transport, while the figure for Bhiwani is only 81 (16 per cent); and more than 13 per cent of the visitors have used their own personal conveyance and only 11 per have visited by rail. The utilisation of different modes of transport differs significantly for Rohtak and Bhiwani Districts. More than two thirds of the total visitors have used a Government bus service in Bhiwani District, while in Rohtak only 7 per cent have visited by a Government bus.

The non-availability or lower frequency of private transport might compel people to rely on limited Government bus services in the villages of Bhiwani District. However, in Rohtak District the largest number of travellers (i.e. more than 58 per cent) have visited by private modes of transportation. Frequency and the availability of private transport are relatively better in Rohtak District especially in Kehrawar village, which is located on the national highway. It must be noticed that the availability of private transport does not mean that villagers are happy with that (Plate-1.6 and 9.1). A villager reported that:

> "In this village, we have to primarily to rely on private transport as Government bus services are hardly available on this route. There are many problems associated with private transport. Firstly, private three-wheelers are very old and they will not start

unless they are overloaded with the passengers. Secondly the entire Brahana road is in a poor state. Therefore, they drive slowly. Sometimes, we have gone to the Deputy Commissioner to complain about this, but no action has been taken so far. No politician or bureaucrat uses this road, so why will they be bothered to get this road repaired? Sometimes, local politicians have promised to get this road repaired, but that is only a false promise" (Parsotam Das, Brahana, 1997).

Table-9.28(a): Mode of transportation used (Number of visitors)

Village/District	Mode of Transport					
	Rail	Govern-ment Bus	Private	Personal	Others	Total
Kehrawar	97	8	107	16	0	228
Chuliana	26	9	71	14	4	124
Diwana	5	5	30	9	0	49
Brahana	1	20	136	26	0	183
Rohtak	**129**	**42**	**344**	**65**	**4**	**584**
Bhera	0	91	2	7	2	102
Patodi	1	61	20	12	0	94
Bapora	0	146	55	53	0	254
Dhani Ma	0	43	4	13	4	64
Bhiwani	**1**	**341**	**81**	**85**	**6**	**514**
Total	**130**	**383**	**425**	**150**	**10**	**1098**

Source: Author's fieldwork.

One of the clearest things to observe from the Table-9.28(b) is that the utilisation of rail services declines as distance from railway stations increases. A rail service is located in Kehrawar and in this village more than 42 per cent of the visitors have used it. In Chuliana, which is three kilometres from Kehrawar, only 21 per cent and in Diwana, a further two kilometres away, only 10 per cent of visitors used rail. In Brahana, which is farthest from a rail service, a negligible number of people (less than 1 per cent) had travelled by rail. In other words it can again be stated that geographical distance has a great impact on service utilisation.

The availability of transport in a village also greatly facilities its utilisation. This can further be confirmed from the example given above. It should be appreciated that accessibility to rail services has significant economic impacts. Mr. Kanwar's comment supports this argument:

> "Because of the vicinity to railway station the poor, especially small and marginal farmers and agricultural labourer are able to commute and make both ends meet by selling milk, *lashi*, vegetable oil etc. in Delhi" (Raj Kanwar, Diwana, 1998 [Plate-1.1]).

Table-9.28(b): Mode of transportation used (% of visitors)

Village/District	Mode of Transport					
	Rail	Govern-ment Bus	Private	Personal	Others	Total
Kehrawar	42.5	3.5	46.9	7.0	0.0	100
Chuliana	21.0	7.3	57.3	11.3	3.2	100
Diwana	10.2	10.2	61.2	18.4	0.0	100
Brahana	0.6	10.9	74.3	14.2	0.0	100
Rohtak	**22.1**	**7.2**	**58.9**	**11.1**	**0.7**	**100**
Bhera	0.0	89.2	2.0	6.9	2.0	100
Patodi	1.1	64.9	21.3	12.8	0.0	100
Bapora	0.0	57.5	21.7	20.9	0.0	100
Dhani Ma	0.0	67.2	6.3	20.3	6.3	100
Bhiwani	**0.2**	**66.3**	**15.8**	**16.5**	**1.2**	**100**
Total	**11.8**	**34.9**	**38.7**	**13.7**	**0.9**	**100**

Source: Author's fieldwork.

In Bhiwani District people visiting by personal conveyance is 5 per cent more than for Rohtak District. People probably do use their personal conveyance when better public transport facilities are available. Therefore, more Rohtak people rely on public transport facilities.

9.9 TIME OF DEPARTURE AND ARRIVAL

If people are able to arrive and depart from their village at unusual hours, say early in the morning and late in the evening, they have good access to transport. Non-availability of transport during the off peak hours has a great impact on villagers' mobility. Some villagers reported that:

> "No public transport facility is available in this village in the late hours say after 5 pm. Therefore, we generally cannot visit in the off-peak hours. In the case of an emergency we have to rely on four wheelers (jeeps and cars) available privately in this village, but these are very expensive" (Villagers, Patodi, 1998).

Keeping this in mind, data on time of departure and arrival were collected, which were classified into normal and off-peak hours. Before 700 and after 1700 hours are considered as off-peak periods and 700 to 1700 hours as normal time. There are two reasons behind this classification. Firstly, because in less accessible villages public transport is not available during unusual time and the majority of regular employees have to leave before 700 hours

and return generally after 1700 hours. Secondly, it has been observed that women's access to transport during the off-peak hours is relatively poor. If they need to visit out of village during the unusual hours, they are accompanied by another family member. In Rohtak District more than one quarter of travellers depart from their village before 700 hours, and 19 per cent in Bhiwani District (Table-29[a] and [b]). There is a similar discrepancy for time of return. More than 34 per cent of people have returned to their villages after 1700 hours, while for Bhiwani it is only 25 per cent. This clearly indicates that in Rohtak District more people have access to transport (whether personal or public) during the off-peak hour

Table-9.29(a): Time of departure and arrival (number of visitors)

Village/District	Departure (hours)				Arrival (hours)			
	Before 7	7-17	After 17	Total	Before 7	7-17	After 17	Total
Kehrawar	48	179	1	228	7	147	74	228
Chuliana	45	78	1	124	6	70	48	124
Diwana	5	44	0	49	1	27	21	49
Brahana	51	132	0	183	3	120	60	183
Rohtak	149	433	2	584	17	364	203	584
Bhera	19	83	0	102	2	76	24	102
Patodi	16	78	0	94	0	66	28	94
Bapora	42	208	4	254	3	183	68	254
Dhani Mansukh	21	42	1	64	1	50	13	64
Bhiwani	98	411	5	514	6	375	133	514
Total	247	844	7	1098	23	739	336	1098

Source: Author's fieldwork.

Table-9.29 (b): Time of departure and arrival (% of visitors)

Village/District	Departure (hours)				Arrival (hours)			
	Before 7	7-17	After 17	Total	Before 7	7-17	After 17	Total
Kehrawar	21.1	78.5	0.4	100	3.1	64.5	32.5	100
Chuliana	36.3	62.9	0.8	100	4.8	56.5	38.7	100
Diwana	10.2	89.8	0.0	100	2.0	55.1	42.9	100
Brahana	27.9	72.1	0.0	100	1.6	65.6	32.8	100
Rohtak	**25.5**	**74.1**	**0.3**	**100**	**2.9**	**62.3**	**34.8**	**100**
Bhera	18.6	81.4	0.0	100	2.0	74.5	23.5	100
Patodi	17.0	83.0	0.0	100	0.0	70.2	29.8	100
Bapora	16.5	81.9	1.6	100	1.2	72.1	26.8	100
Dhani Mansukh	32.8	65.6	1.6	100	1.6	78.1	20.3	100
Bhiwani	**19.1**	**80.0**	**1.0**	**100**	**1.2**	**73.0**	**25.9**	**100**
Total	**22.5**	**76.9**	**0.6**	**100**	**2.1**	**67.3**	**30.6**	**100**

Source: Author's fieldwork.

Gender and time of arrival and departure: The chi-squared values between sex and time of departure and return are 15.5 and 26.9 respectively, both statistically significant at the 0.01 per cent level with 2 degrees of freedom. This means that the time of departure and arrival differs significantly for males and females. The percentages of men departing and arriving during the off-peak hours are significantly higher than those for women (Table-30).

Table-9.30: Gender and time of departure and arrival (% of visitors)

Sex	Departure (hours)				Arrival (hours)			
	Before 7	7-17	After 17	Total	Before 7	7-17	After 17	Total
Rohtak								
Male	30.1	69.4	0.5	100	3.1	55.7	41.2	100
Female	13.6	86.4	0.0	100	2.5	79.6	17.9	100
Total	25.5	74.1	0.3	100	2.9	62.3	34.8	100
Bhiwani								
Male	20.4	78.8	0.8	100	0.8	71.1	28.1	100
Female	15.7	83.0	1.4	100	2.0	77.6	20.4	100
Total	19.1	80.0	1.0	100	1.2	73.0	25.9	100
Total								
Male	25.6	73.8	0.6	100	2.0	62.9	35.1	100
Female	14.6	84.8	0.7	100	2.3	78.6	19.1	100
Total	22.5	76.9	0.6	100	2.1	67.3	30.6	100

Source: Author's fieldwork.

9.10 ACCOMPANIED BY SOMEONE

Respondents were also asked 'whether a person travelling out of the village was accompanied by someone or not'. This question was asked primarily from a gender point of view. In the study area, generally, women do not travel alone out of the village. They are accompanied by another family member, preferably a male, which may restrict women's mobility on the one hand and their access to transport on the other. Not only this, it also makes them dependent on someone else. If the person who is supposed to accompany a woman is not available, she cannot travel.

About three-quarters of women were accompanied by someone, but only 12 per cent of men were (Table-9.31). Significant inter-district variations can also be observed in the percentages of women accompanied (when they visited out of village). In Bhiwani District more than 88 per cent of the women were accompanied, about 27 per more than in Rohtak District, while in the case of men there are no apparent inter-district differences.

Table-9.31: Gender and company during the visit (% of visitors)

Sex	Rohtak			Bhiwani			Total		
	No	Yes	Total	No	Yes	Total	No	Yes	Total
Male	87.2	12.8	100	88.3	11.7	100	87.7	12.3	100
Female	38.9	61.1	100	11.6	88.4	100	25.9	74.1	100
Total	73.8	26.2	100	66.3	33.7	100	70.3	29.7	100

Source: Author's calculation

9.11 SUMMARY OF RESULTS AND DISCUSSION

9.11.1 Summary of results: In the earlier parts of this chapter people's access to transport services and its controlling variables were analysed. The main findings of this analysis are summarised here.

It is widely observed that the availability of a personal conveyance greatly enhances people's mobility, but in the study area only one third of the households owned a private conveyance (other than a bicycle). Income, size of land holding and caste have a statistically significant positive impact on the availability and number of personal vehicles in the household. Among these variables, income has a larger effect on the number of vehicles available in the household than caste and size of land holding. Based on regression analysis it can be concluded that upper caste households with higher income levels and a bigger size of land holding enjoy better availability and more personal vehicles as compared to lower caste households with lower income. It must be noticed that the availability of a bicycle (an important mode of transport especially for the poor who cannot afford costly state or private transport) is inversely related to income and caste. Lower income households may not afford any other mode of personal conveyance, while higher income households may not need a bicycle as they may have other, better modes of conveyance. Another interesting observation is that the households in the villages of Rohtak District have better availability and more vehicles as compared to the households in the villages of Bhiwani District.

Frequency of visits can be considered as a measure of access to transport (only in normal circumstances). It was observed that sex, education level, income and village accessibility govern frequency of visits. In the study area, frequency of male visits is higher than that of females; educated people visit more frequently than less educated and illiterates; rich people travel more than the poor; and people in more accessible villages travel more frequently than

people in less accessible villages. It is further interesting to note that the percentages of non-visitors are higher in the villages of Rohtak as compared to Bhiwani District, which is surprising since Rohtak is more developed, and the availability of low order goods and services (such as retail shopping, fertiliser and seed provision available in the villages) can explain the lower percentages of visitors in Rohtak District (Plate-1.4).

Variations can be observed in the places visited by males and females. A larger proportion of female travellers visited only rural areas, while for men it was urban areas, district headquarters or cities. The percentage of people visiting a Metropolitan City or other states is significantly lower for females than for males. Moreover, a large number of male visits are associated with economic activities, while there are more female visits for social purposes. Further, the analysis reveals that overall (in the study area) women have relatively poor access to a market or town or city as compared to men, but women in Rohtak District enjoy better access against women's access in Bhiwani District. Another interesting thing to observe is that a substantial proportion of visitors in Rohtak District commute to Delhi Metropolitan for non-agricultural activities such as employment or selling dairy products and other perishable goods, which is considered to have significant impact on their income.

The utilisation of different modes of transport varies between Rohtak and Bhiwani Districts. In the latter more than two thirds of the total visitors used a Government bus, while in Rohtak a majority of visitors relied on either private transport or on rail services. Interestingly, the utilisation of rail services in the study area proved to be a function of distance from railway stations: the percentage of visitors using a rail service declines gradually from Kehrawar to Brahana village (a distance of 8 kilometres). In other words it can again be concluded that geographical distance has a great impact on service utilisation.

Analysis of visitors' time of arrival and departure reveals that a significantly large number of visitors in Rohtak District have been able to depart and arrive during off-peak hours, showing their better access to transport services (whether personal or private). A majority of women's visits were reported during normal hours hence indicating their poor access to transport services. It is further interesting to note that in the study area generally women do not travel out of their village unless they are accompanied by a family member(s). The analysis further confirms that in Bhiwani District more than 88 per cent of women were required to be

accompanied when they travelled out of their village, but the figure for Rohtak District was only 61 per cent. This clearly establishes that women from Rohtak District can travel more freely than those from Bhiwani District.

9.11.2 Discussion:

The literature on the utilisation of transport services is rather limited, but there are many studies (discussed in the previous chapter) which examine the impact of transport availability on economic conditions of villagers in general and farmers in particular. The results of this analysis further support the argument that the availability of transport (public and personal) has a positive effect on income level. Regression analysis showed that the number of vehicles available in the household has a statistically significant effect on the income level of the household[4].

Except in Kehrawar and Brahana, a reliable public transport service was not available to villagers, especially during the off-peak hours. Therefore, the problem of availability of public transport has to be given due importance. Another interesting thing to report here is that a majority of passengers in the study area rely on private transport, as public bus services are not frequently available to villagers and do not effectively cater for their needs. Recently, there has been a move to privatise the public transport system, but it is really doubted that whether private transport services will effectively cater for the needs of villagers. The ADC's comments are relevant here:

> "Recently, some routes have been allotted to the private bus operators and Government bus services have stopped plying on these routes. In fact, private bus operators do not run on many of these routes, as it is not earning them a good profit. Therefore, they operate on some other routes (which earn them more profit) and Government buses are also plying on those routes. Therefore, privatisation is not the solution. Wherever a private agency fails to intervene the Government must intervene and provide facilities to public. For example there are plenty of private vehicles available on the Rohtak-Bahadurgarh route (i.e. National Highway 10), so why should the Government vehicles ply on this route"? (ADC, Rohtak, 1998).

The availability of effective transport (whether it is Government-owned or privately-owned) is essential in order to improve accessibility to transport, because such access also improves

[4] The number of vehicles in the household explained 31 per cent of the variation in the distribution of household income. This means the greater the vehicle availability the higher the income level of the household.

access to other essential higher order services located in towns or cities or at other distant places. Besides availability, it is also essential to address the issue of transport accessibility. In normal circumstances, the frequency of visits could be considered as a measure of access to transport services[5]. It was also observed in the field that the availability of transport services greatly improves the frequency of visits. But previous discussion clearly revealed that besides availability, sex, education, income, caste and village accessibility have a significant control on the frequency of visits and hence access to transport. Two variables, caste and income, are closely associated with each other, but income has the more substantial effect on access to transport. Therefore, it is important to address the question 'how can the poor's access to transport services be improved'? This is a policy matter and has to be addressed in detail. The poor could be allowed to travel free of charge or they might be allowed a subsidised fare, or their income level could also be improved through other schemes so that they can afford to access these services as and when they need them.

Prevailing social conditions in the study area greatly restrict women's access to transport. This problem can be overcome through the expansion of education and frequent availability of effective transport facilities in villages. Access to transport is also closely associated with economically productive activities and then in turn to income level. In the study area (particularly in Bhiwani District), it was observed that females' role has been limited in economically productive activities. Raising their education level may enhance their role in economically productive activities and hence their income and access to transport.

[5] Visits in normal circumstances are when people make spontaneous visits for their routine work, such as study, employment, purchasing and selling agricultural goods, social visits etc. But, sometimes, people have to make visits under emergency conditions, and these visits may not express (in reality) their access to transport services.

Chapter - 10

SUMMARY AND DISCUSSION

10. 1 INTRODUCTION

It is evident from the existing literature that the provision of basic infrastructure services is not only important but also an essential precondition for social and economic development (Ahmed and Donovan, 1992; Bhalla and Singh, 1999; Esteva, 1993; Johnston, et al; Lall, 1999; Phillips, 1990; Sen, 1996; Sills, 1968; World Bank, 1980b, 1990 and 1994; Zakaria, 1974). The importance of infrastructure provision was realised after the Second World War and investment in it was considered to be a vital basis for the development process, especially in the Developing Countries. Ambitious 'Development Plans' were formulated and implemented; and a huge proportion of total investment was spent on the development of infrastructure services such as multi-purpose hydroelectric projects, transportation networks, education and health services. The consensus is that these have had both positive and negative effects.

At present, many of the infrastructure projects in the Developing World are either in a dilapidated condition or are not serving the targeted groups effectively. Recently, researchers have started to question the sustainability of these projects. Some argue that the investment in many of the infrastructure projects has failed and has produced some grossly inappropriate facilities which have benefited only a limited section of society (Bhambhri, 1998; Ostrom, et al, 1993). In this research, an attempt was made to examine the provision of infrastructure services in Rohtak and Bhiwani Districts, Haryana, India using both secondary (time scale) and primary data. A number of issues were addressed related to the success and failure of infrastructure provision in the study area:

- Whether public services are available and accessible to needy people; and
- Whether the available services are functioning optimally or sub-optimally and are effectively catering for the needs of people.

This chapter is divided into three sections. In the first two sections two issues (raised above) will be taken in turn. In each section, the major findings will be summarised and discussed. The final section is reserved for an overview and commentary on policy implications.

10.2 AVAILABILITY AND ACCESSIBILITY TO SERVICES

The Indian Government started a planned development process in 1951. There is no doubt that considerable achievements have since been made in building up education, health, transport and other infrastructure services. Informal discussions with both service users (clients) and service providers, and also the analysis of primary and secondary data, support the argument that education, health and transport services have expanded in the study area. It was also observed that some areas, especially towns and cities and developed areas, enjoy better availability of infrastructure services.

The availability of schools (middle, high and senior secondary), health centres (Sub-Centres, PHC and CHC) and transport services has improved in the study area[1]; and the average distance people have to travel to access these services has declined dramatically, especially for higher levels of services such as a senior secondary school, a CHC etc. Decline in the average geographical distance is because of an increase in the number of service points, but there is little improvement in the geographical efficiency[2] level of these services. It was widely observed in the field that geographical distance and demand are hardly taken into account by planners for the location of a new service or upgrading an existing one. This has resulted in regional disparities in the distribution of Government (public) services. In the study area political interventions play a vital role in the location of public services. Officers in Rohtak and Bhiwani both admitted that certain norms should be followed for the location of a new school, but most of the time, they are unable to follow these norms due to political pressure and interference from higher authorities. Some senior secondary schools were located in villages where there was no demand at all for these schools, which is a sheer waste of resources. Economic criteria (i.e. profit maximisation), geographical accessibility and frequency of availability of transport services have a considerable effect on the location of private services, which has resulted in maldistribution of these services in the study area.

It was noted earlier that the non-availability of services in villages greatly hinders access by

[1] Improvement in the availability of education and health is based on 1981 to 1991 and 1991 to 1996 data, while transport availability is based on the period 1981 to 1991.

[2] Geographical efficiency was measured by comparing the actual average population. weighted distance with the modelled distance. Population was considered as a proxy of demand. The higher the gap between actual and modelled distances, the lower the efficiency and vice-versa.

villagers. However, the availability of reliable transport facilitates access to services not available in the village; access to effective transport also has multiple effects on social and economic conditions of villagers. Results in Chapter-8 confirm that the availability of transport (especially rail) and distance from Delhi UT have significant impact on male and female literacy and non-agricultural employment, which are indirectly associated with social and economic conditions of people, respectively.

In the study area, inter-regional disparities in the availability of and geographical access to services are noticeable. Rohtak is relatively developed and located just to the west of Delhi UT. This district enjoys better availability and geographical accessibility to the three services under study as compared to Bhiwani District, which is further to the west.

Availability of a service implies its physical existence and its ready availability to people for use. But many people have not been able to take advantage of the available services. Social, economic and political factors are at work, which govern the access to and/or utilisation of services. In the present study, an attempt was also made to examine the impact of income, caste, sex and village accessibility on access to the type of services used and frequency of their utilisation.

The analysis reveals that income, caste and sex significantly determine access to educational institutions. Chapter-5 revealed that Government schools cater for the needs of more than 80 per cent of students. Further, it was noticed that the percentages of girls and children from lower income groups going to private school are significantly lower than those of boys and higher income groups. Income and sex (in association with caste) significantly determine the duration of access to educational institutions[3]. Another important observation was that distance, non-availability of a school in the village, work in the household and marriage account for 85 per cent of the total drop out rates of girls from school. Moreover, social and cultural factors also constrain women's access to education. In Rohtak women's access and duration of access to education is significantly better than that in Bhiwani District, which can be attributed to variations in the prevailing socio-cultural conditions across these two

[3] Education level was considered as a measure of duration of access to educational institutions. The higher the education levels the greater the duration of access, but this is appropriate only for a certain number of years, say to age 20 i.e. until the completion of senior secondary school.

districts.

The utilisation of health services is erratic and somewhat different from the utilisation of education and transport services. More than 70 per cent of the patients in the 507-surveyed households consulted private sources of treatment, out of which more than 50 per cent relied on private village-based Registered Medical Practitioners (RMPs). Villagers and district officers in the field reported that a majority of these practitioners are not fully qualified to diagnose major illnesses. But access to RMPs is easy due to their availability in villages, the reasonable treatment cost, and time and transport cost saved by not travelling out of the village. Income, caste, sex and geographical accessibility do not show a statistically significant impact on access to and/or utilisation of different types of health services. As discussed earlier, when illness is life-threatening one is compelled to consult a doctor irrespective of caste, income and sex. On the examination of some cases it was evident that health services are less accessible to the poor and to women.

Upper caste households with a higher income level have a relatively better availability of personal conveyances. Analysis in Chaper-9 revealed that income, caste, education level, sex and village accessibility have a significant impact on the frequency of visits, which is considered as access to transport (in normal circumstances) in the present analysis. It is further interesting to note that people's involvement in economically productive activities increases their frequency of visits. Men's visits out of their village are more frequent than women's visits; and most of the men's visits are for economic purposes, while for women more are for social purposes. The availability of private transport is better in Rohtak as compared to Bhiwani District; in Rohtak more than 50 per cent of the travellers depended on private transport, while in Bhiwani more than three-quarters went by Government bus.

Inter-regional disparities in the availability of and inter-personal disparities in the accessibility to and/or utilisation of basic services have been observed in the study area, which shows that some regions (particularly those less accessible and less developed) and some sections of society (particularly the poor, women and the lower castes) are deprived of the basic services under study.

Over a period of 15 years (1981 to 1996) there has been a significant expansion of education

and health services, but a majority of service users remain unsatisfied with the quality of available services (public services in particular). Therefore, special attention must be paid to improving the quality of available services, instead of their further extension. Economically it may not be viable to extend services in all villages. But the availability of reliable transport services can help in accessing services not available in the village. Surprisingly, there was no coordination among different public services; there is an urgent need to develop linkages among different services, for example linking education and transport can greatly improve children's access to schools if schools are not available in their village. There is also a need to coordinate between government and private health services in rural areas. In a majority of villages general public health services were not available, but RMPs were catering for the needs of more than 50 per cent of patients. From the people's point of view general public health services can be delivered more effectively if RMPs are hired and trained by the government.

A State's commitment to the public is reflected in the provision of basic services such as education, health, transport, police, social security etc. (Lipsky, 1980). India will complete five decades of planned development in 2001. Even then, in Haryana (one of the economically more developed states of the country) a large number of villages and considerable sections of society are effectively excluded from basic infrastructure services, which shows a lack of proper State commitment to the public. Bhambhri (1998) argues that if State institutions cannot provide minimum basic services to its citizens and defend them against famines, floods and diseases, the citizens will not consider such a State as their own. Bhambhri further extends his argument by asserting that serious distortions created by the Indian model of development have led to the exclusion of the absolute majority of the population from sharing the fruits of social and economic development. The absolute majority of landless labourers, marginal farmers and unskilled manual labourers are struggling for survival. India is witnessing many social exclusions of the large majority of rural and urban working classes (Bhambhi, 1998, 134); a large proportion of population is still living below the poverty line and is either deprived of or have access to sub-standard education, health and social security (Sen, 1996).

The universal provision of basic minimum services is taken as a sign of social progress and it is the State's responsibility to provide basic minimum services to the poor who cannot afford

to pay for private services. Lipsky (1980) argues that not only is it the Government's responsibility to provide basic services to the poor, but the poor must seek these services from Government if they are to receive them at all. In fact, people experience Government through 'street level bureaucrats' who deliver public goods and services. Therefore, street-level bureaucrats implicitly mediate aspects of the constitutional relationship of the state (Lipsky, 1980). People must raise their voices and must pressurise these street level bureaucrats (and local politicians) to provide them with minimum basic services. Provision of services in itself is not adequate if the available services are not satisfying service users, and not resulting in the desired outcomes. These issues are discussed in the next section.

10.3 FUNCTIONING OF INFRASTRUCTURE SERVICES

It is necessary to have appropriate and sustainable infrastructure for sustainable development (Ostrom et al, 1993). The most important question here is 'do we really have sustainable public infrastructure in the Developing Countries'? Inadequate provision and sub-optimal functioning of public services attracts researchers' attention to examine the sustainability of these services, particularly in rural areas. Some other key issues are: (a) resources are chronically inadequate relative to the effective functioning of public services, and (b) the demand for services tends to increase to meet the supply. Sustainability of services can be examined by their appropriateness (from the demand point of view) and functioning.

What if educational institutions are producing educated but unemployed youths; what if doctors and essential medicines and drugs are not available in the pubic health centres and people are compelled to rely on some other kind of expensive services; and what if the poor, who cannot afford these services, helplessly see the patient die? Can this be said to be sustainable provision and functioning of public services? Two key issues need to be examined for the evaluation of effectiveness of available services: (a) whether the available services are effectively catering for clients' needs and satisfying them, and (b) whether people have access to the appropriate type of services and are these services fulfilling people's expectations.

Qualitative aspects of services are very important, as poor quality of services contributes to ineffectiveness and ultimate irrelevance of social services even though they may be available (Lipsky, 1980). In India, a majority of public services (especially in rural areas) are

functioning sub-optimally (Government of India, 1997) and their quality has deteriorated in recent years below the expected level. Non-availability and declining standards of Government services have compelled many clients to rely on private services. Data analysis reveals that a majority of curative health and transport services are delivered by the private sector in the villages of the study area; and more than 20 per cent of students go to private schools. An attempt has been made in this thesis to evaluate the reason behind the declining standards of Government service and their sub-optimal functioning. Informal discussion with the services users and providers (street-level-bureaucrats) reveals the following reasons for sub-optimal functioning of public services:

a. Budgetary constraints;
b. Lack of accountability, job over-security, and non-cooperation;
c. Institution of governance failure;
d. Inappropriate type of services ;
e. Lack of public cooperation and pressure.

a. Budgetary constraints: Public services are the focus of the society and people realise and feel Government through the provision of public services. Moreover, a significant proportion of public expenditure is absorbed by public services. Time series data reveal that there has been a phenomenal increase in expenditure on public services, but the quality of services has declined instead of improving over time. The most important reason behind this is the increase in wages and salaries of street-level-bureaucrats, which does not leave adequate resources available to serve clients, or for the proper maintenance and functioning of public services (Bhambhri, 1998; Lipsky, 1980). In both districts more than 85 per cent of the total budget on education and health services was spent on the salary payment of teachers, doctors and other support staff, showing inadequate availability of funds for the maintenance of these public services. Some schoolteachers reported that they are paid only a basic salary and for the rest "we have to spend all money from our pocket to make teaching arrangements" (Teachers, Government High School, Chuliana, 1998). Further, the CMO of Bhiwani admitted that the 'health budget is sanctioned and imposed from higher authorities. We are not sanctioned the amount of money we need for the proper management and functioning of existing health services' (CMO, Bhiwani, 1998). Others argue that the limited budget allocation to public services is because a huge proportion of public funds is utilised for the

interests of the ruling class. Bhambhri (1998) points out that public functionaries in a democracy do not have their own private resources to maintain their power and they depend on public expenditure for getting votes and securing the support of interest groups for an electoral victory. This consumes a large proportion of public funds.

It is obvious from the above description that the non-availability of adequate funds is one of the important reasons for the ineffective functioning of public services. Although adequate funding provision is essential, there are other reasons which contribute to the problem.

b. Lack of accountability and job over-security, and non-cooperation: Accountability is the link between bureaucracy and democracy (Lipsky, 1980). Lipsky argues that the limited scope for scrutiny of street-level bureaucrats results in a lack of accountability. Bhambhri explains the lack of accountability in the capitalist mode of production, which creates a new social and political milieu where the distinction between legitimacy and illegitimacy, accountability and unaccountability of the institutions of the State gets blurred (1998, 134). How far is this correct needs to be investigated further. My field observation clearly reveals that service providers do not feel accountable, which has contributed to the declining standards of public services. The Additional Deputy Commissioner, Rohtak admitted to me that

> "Once you get a Government job you become 'over-secure' and this is the most probable reason for government employees' negligence towards their duties. Political intervention is another important reason for the lack of accountability" (ADC, Rohtak, 1998).

Further, some teachers in a Government school (themselves) admitted that:

> "In the Government school teachers are not accountable to any one...and there is no strict regulation for those who are not sincere towards their duties...we have over-security of job; whether somebody works or not will be paid at the end of month" (Teachers, Government High School, Brahana, 1998).

The District Education Officer, Bhiwani reported that:

> "Government services are less efficient and effective because of job over-security. Whether somebody works or not will be paid and his or her services cannot be terminated easily. In private services, however, if some-body does not work will be kicked out of his/her job very next day. Therefore, it is necessary that Government adopts a hire and fire policy" (DEO, Bhiwani, 1998).

A large number of the respondents in the field prefer a Government job, because Government employees are paid well and once they get a job they have life long security. In fact, Government has failed to develop strong linkages between service providers and service users. Within Government departments there is a bureaucratic hierarchy. High level bureaucrats are placed at the district headquarters and they have not been able to monitor services regularly. Moreover, people working in the same department favour their colleagues. Therefore, it is essential that villagers must be assigned the role of monitoring the village services. For example, it is easier for villagers to observe a village teacher's shirking than by the District Education Officer sitting a hundred kilometres away from the village. If the concerned residents are able to organise and have means of putting pressure on the village teachers and health workers, their vigilance could be an effective disciplining device (Drèze and Gazdar, 1996, 94).

Sometimes, service providers withhold co-operation within their organisation including not working (excessive absenteeism, quitting), aggression towards the organisation (stealing, deliberate wasting of time and resources) and a negative attitude, with implications for work (alienation apathy). These workers may take advantage of collective resources to act non-cooperatively by forming trade unions or by exercising rights under collective bargaining agreements or civil service regulations. These collective strategies for non-cooperation contribute to workers' willingness to display lack of motivation and to perform at only a minimal level (Argyris, 1964). These forms of non-cooperation hamper public services' ability to attain their objective because workers perform at less than their full capacity (Nordlinger, 1972; Savas and Ginsburg, 1973). Not only this, within street-level-bureaucracy there is a lack of cooperation. The CMO's comment further supports this argument:

> "If I want to implement one scheme which is good for the people, instead of supporting me, my own colleagues will spend 99 per cent of their energy to ruin my scheme. We are just wasting much of our time on subsidiary things. There is a complete mismatch between *'material, money and mind'*. These three are available at three different places. It is essential to polarise these three for the effective functioning of public services" (CMO, Bhiwani, 1999).

c. Institutional failure: The impulse to provide public services fully, openly and responsively needs institutions of governance to restrict, control, monitor and rationalise service inadequacies or limitations and effectively to cater for the needs of people. It can be

argued that the institutions of governance of public services have not kept up with the development process. In the Low Income Countries, development efforts have been designed especially to strengthen the capacity and authority of national Governments at the expense of sub-national public agencies and private sector institutions (Ostrom et al, 1993). Moreover, development planners have not taken into account the centuries-old structure which governed traditional public services, which Ostrom et al call the 'institutional infrastructure'. The modern development process completely destroyed the social institutions that were essential for productive social order (Ostrom, 1990) and the effective functioning of public services. In India, leaders have been the enemies of institutions because they tend to constrain the personal power of those who attain positions of power due to their personality traits; and they show little interest in institutional development, or, worse, they actively seek to weaken existing institutions (Kohli, 1991, 402).

Bhambhri argues that the Indian State is overstretched and has taken on a task which it is not capable of performing. Therefore, it should retreat from large segments of social life. Otherwise, it will collapse under the burden of its own weight (Bhambhri, 1998, 130). Client control over service bureaucracies is not separable from considerations of large scale social changes or changes in the organisation of public services (Lipsky, 1980). Extending citizen's control over complex systems and facilities should be encouraged for the effective provision and smooth operation and maintenance of public services.

d. Inappropriate types of services: Many of the facilities provided in the villages were designed and implemented to help and benefit the rural people. But some of these facilities do not effectively meet villagers' demands. For example, people need more curative and clinical health services, but public services are more devoted towards preventive health in rural areas. Moreover, the type of education in villages does not ensure employment for the majority of people and hence the present type of education system is producing educated unemployed youths, particularly in the villages of the study area. Some other public services have rather negative effects, such as the tap water supply. In almost all the villages, this facility has resulted in mud in the streets and poor sanitation as people let water flow uninterruptedly even when they are not using it. This has multiple effects: (1) degraded streets, (2) the spread of mud and poor sanitation because of poor sewerage, (3) the spread of mosquitoes and (4) an increase in water-borne diseases. The ADC, Rohtak reported that:

"We do not have a proper micro level planning, rather our plan priorities are misplaced, due to political interventions. Many of the facilities are not provided according to felt needs. Sometimes, such facilities are provided which villagers rarely needed. Services which are highly demanded function smoothly. The provision of public services according to the felt needs can help in sustaining the efficiency and effectiveness of services" (ADC, Rohtak, 1998).

Even villagers are aware of the misplacement of plan priorities. A villager in Dhani Mansuk reported that:

"Planners and politicians do not feel bothered about what we need in the village. Let us take an example. Mr. Bansi Lal is CM, Haryana and he has nominated one man in each village and whatever these nominees will say he will act accordingly. Let me report here who are these nominees. They are selected influential persons in the village associated with some political party and they are never bothered about the village's problem. They always think of their own interests. In fact, public opinion is not taken into consideration while dealing with the village's problems. Recently, the Government has constructed one 'harijan chopal' (a building for social/political gathering in the village for SC (lower caste households). About Rs. 80,000 were spent on it, but there is hardly any use of this building throughout the year. Only sheep and goats are kept there during the night. Had this money been spent on some other productive activities, such as a common tube well on the community land, it might have benefited economically many people in the village. Not only this but common village land could have been irrigated to raise agricultural production and village's earnings might have been increased. This money further could have been invested on some other infrastructure services in the village such as streets (Plate-1.14) and this could have been consistently one source of income. Spending money on say a 'harijan chopal' or similar types of activities is a political stunt (for vote capturing) and just a sheer wastage of public money. It does not help the village in any respect, but it does help politicians to secure their vote bank" (Singhram, Dhani Mansukh, 1998).

The General Manager (GM) of Haryana Roadways told me that:

"Each plan has three stages: plan formulation, implementation and evaluation. For a realistic plan people's involvement at grass root level is essential in extending from plan formulation to evaluation. In fact, we had idealistic plans, which have failed in their objectives. Most of the plans are imposed on the people and hence have resulted in a great failure. Let me cite an example of a 'gobar (dung) gas' project. The Government has provided considerable subsidies for setting up 'gobar gas' plants in villages. A huge budget has been allocated to this project, but I have never come across even a single plant working successfully" (GM, Haryana Roadways, Bhiwani, 1998).

The services which people do not often use, or which they do not need become, abandoned. Therefore, adequate demand is essential for effective functioning of a service. The need of the hour is to realise 'what villagers need most' to improve their social and economic conditions. In the field it was observed that good quality of education and health (including technical

education), regular supply of electricity and canal water, and frequent public transport are highly demanded by the villagers.

e. Lack of public cooperation and pressure: One important question to be investigated is 'who has been responsible for the declining standards of public services'? Is it the service providers or the service users? As discussed earlier, street-level-bureaucrats have been responsible for the deteriorating standards of public services, but the public is also responsible to some extent. Services users (villagers) have not been able to exert pressure on street-level-bureaucrats and local politicians about the quality of services. Some respondents argue that villagers do not co-operate with each other. Raj reported that:

> "The village's progress is associated with mutual co-operation, but co-operation among the villagers here is vanishing like anything. Deep-rooted politics is solely responsible for that. There are two or three rival political groups in each village. These groups keep opposing each other and spoil any of the constructive works in the village. People helplessly mourn the village's common problem. Moreover, inter-personal jealously is soaring, and even farmers do not cooperate with each other at all. I give you one example, during the last '*rabi*' season I asked my neighbours for their co-operation in constructing a '*dhanna*' (small canal), which was supposed to benefit 4 farmers' fields. My fellow farmers thought that I am in great need to irrigate my fields and I would get this done by myself, and why should they bother to co-operate with me. I asked them 4-5 times and they did not help me in any respect with this *'dhanna'*. At last after waiting for ten days, I had to construct it on my own. Now they also use the same '*dhanna*' to irrigate their fields without paying me any share of the construction cost. Next time when they have such a need or are in any other difficulty, why should I help them?" (Raj Kanwar, Diwana, 1998).

Another farmer reported that:

> "Interpersonal fraternity in the village has almost vanished. Earlier there was love and co-operation among the villagers. If I am in difficulty people will not come to help me, rather they will pray that my problem is further aggravated. The main problem is deep rooted petty politics" (Singhram, Dhani Mansukh, 1998).

This lack of cooperation among villagers is further supported by the comments of some schoolteachers:

> "Earlier, there were community or group problems, and now we have individual problems. People who are not affected will hardly bother to resolve these problems. For example, some people are using the village pond and some are not. The people who do not need the pond are encroaching and filling it up with soil instead of maintaining its clean water. The reality is that these days villagers cannot provide and manage any facility. Moreover they cannot use and maintain any facilities provided by the

Government. This is the result of a lack of co-operation and increasing inter-personal jealousy among the villagers" (Teachers, Government High School Chuliana, 1998).

Without cooperation, it is difficult if not impossible to mobilise the masses and exert pressure upon the local politicians and street-level-bureaucrats. But the fundamental question is how to build up such cooperation among the villagers. Poverty alleviation, access to high quality education, and the availability of information and knowledge to the masses may help in developing an understanding about village problems. Some researchers argue that the main problem is lack of awareness. A majority of people is either illiterate or does not have access to appropriate information and knowledge about their rights and the functional arrangement of public services. If users of local services are aware of their entitlements and resolved to defend them, it is much harder for a Government doctor to appropriate the furniture of a village health centre, for the ration-shop manger to sell their supplies on the black market, for the headman to sell the village trees for his own benefit, or for anyone to steal the electric wires (Drèze, and Gazdar, 1996). People's cooperation and the expansion of knowledge (which the *World Development Report-1999* claims is the key to power) can build up public opinion and the demand for better quality public services.

10.4 DISCUSSION AND POLICY IMPLICATIONS

The above account reveals that both the state and the private agencies have failed to ensure the universal provision of basic services (especially for the rural poor). Public services are available in a limited number of villages and a majority of these services are in a dilapidated condition and functioning far below their potential. Consequently, these services are neither sustainable nor effectively catering for people' needs, particularly in rural areas. The present state of public services is like an 'orphan child'. Bureaucrats in both districts admitted that "neither we (the service providers) nor the clients (the service users) have been responsible for the 'operation, maintenance and monitoring' of public services" (District Officers, Rohtak and Bhiwani District, 1998).

The universal provision of basic services (education, health, transport, drinking water, social security etc) is not only important, but is also necessary for the social and economic development of society. A basic question here is 'who must be held responsible for the sustainable provision of these services'? There is a universal agreement that the 'State must have strong commitment to provide basic minimum services to her citizens (the poor in

particular)' (Bhambhri, 1998; Noor, 1981; Sen, 1996).

Universal provision of basic infrastructure services requires huge funding, but recently, Governments in most of the Developing Countries have been passing through a phase of financial crisis and the social area of development (including basic services) in these countries remains under-financed (Boutros Boutros-Ghali, UN Secretary General, May 1994). To cope with this there is a need to evaluate 'whether the State has adequate funds to provide these services'. If not, then how can the funds be mobilised? Governments often have the capacity to mobilise adequate funds for the 'universal provision of basic services', but lack the political will (Green, 1991; Griffin, 1991; Noor, 1981; Sen, 1996).

Most of the public services in India are subsidised and many of them are free for the public, irrespective of income level of household. Lipsky (1980) argues that in the area of health (as in every other area) there is no imaginable limit to the amount of health care that the population would seek and absorb if it were truly a 'free good', available without significant explicit and implicit costs. Therefore, there is a need to ration public services through fixing a cost of utilisation. In the bureaucrats' opinion, the standards of public services must be raised and the clients must pay for the cost of their utilisation. This will not only raise funds, but people will take these services seriously if they have to pay the cost of utilisation. In this situation, many poor people would not be able to afford these services. Therefore, the issue of poverty has to be addressed before the cost of utilisation is fixed; or the cost of utilisation may be fixed in proportion to an individual's income level (including some free for elderly and children).

Governance of public services is another important issue. So far, people's (clients') involvement has been negligible, extending from location to operation, maintenance and monitoring of public services. Bhambhri has rightly pointed out that Government is overburdened with the task it has taken and must vacate some social spaces for private agencies and NGOs. But clients' involvement is more important than the involvement of NGOs and private agencies for the effective functioning of public services. Lipsky (1980) argues strongly that there is a need to provide a balance of power between the street-level workers and their clients. One district bureaucrat reported that:

> "Earlier villagers themselves used to maintain and monitor village services such as wells, *chopal* (place used for social, political and cultural gathering in the village) and many other facilities. These services used to function effectively, as people used to volunteer their labour and help for the successful operation of these services. There was inter-personal co-operation among villagers. Now, people do not consider Government property as their own. If it is being damaged they think let it be damaged and they are not bothered about that at all" (District Officer, Rohtak, 1998).

For the effective operation of public services both clients and street-level-bureaucrats must be assigned an active role and be held responsible. There is no doubt that local service users (or a team of responsible members in the village, such as the village headman and other representatives) will be more effective in the operation, maintenance and monitoring of local public services than the district level bureaucrats who are sitting at a distance. If the Government is really committed to its citizens, then it will devolve authority to the masses. Government has initiated the process of devolution through building Panchayati Raj Institutions (PRI) in rural areas[4]. After a great deal of effort the 73rd and 74th Amendments to the Constitution have been passed which provide Constitutional status to the PRIs and Urban Local Bodies (ULBs). As per the 73rd Amendment, the PRIs are the local level institutions comprising elected representatives entrusted with the responsibility of identifying, formulating, implementing and monitoring the local level developmental and welfare programmes (Government of India, 1997). PRIs are considered to be 'the warp and weft of rural development and governance' (Mathew, 1995). In some of the states the process of building PRIs has already started, but it can be said that this is only a beginning and while the constitutional formalities are complete, real implementation is a distant dream.

After the economic reforms in 1991, the role of the private sector was encouraged in most social and economic areas. But if basic services are privatised one needs to evaluate 'whether the private sector can effectively meet the demands of masses, especially that of the poor'?

---

[4] India has a long history of village panchayats. The framers of the Constitution were aware of this Indian heritage, the village panchayat system. Accordingly, they provided for Village Panchayats under the Directive Principles of the Constitution. Thus, Article 40 of the Constitution requires that "the State shall take steps to organise village panchayats and endow them with such power and authority as may be necessary to enable them to function as units of self-Government". Many State Governments attempted to translate this Directive Principle into practice by enacting necessary legislation and creating PRIs but with limited success; such efforts were confined to a few States. The Constitutional provisions expect the State Governments to enact necessary legislation not only to create PRIs but also to endow them with such financial powers and functional responsibilities as they may deem appropriate. They are also required to appoint a State Finance Commission to recommend adequate devolution from the State Governments to PRIs and ULBs. The State Governments are also expected to create District Planning Committees in each district to formulate local level development plans for both rural and urban areas (Government of India, 1997).

Can private services be made available and accessible universally? The role of the private sector for provision of basic services in inaccessible areas is doubted, as it may not accrue any profit and without any profit the existence of the private sector is almost impossible. Not only this, it may further create disparities in the type of services available. In the study area it was widely observed that private services are available only in developed and more accessible areas and that they cater only for the needs of those who can afford to pay. Therefore, the private sector cannot be relied on at least for the provision of basic services. Rather, the state Government must carry on this task with the active involvement of service users for the effective operation, maintenance and monitoring of public services if universal access to basic services is to be made possible. This is the most desirable task in a democratic country like India.

India is the largest democracy in the world, but a wide survey reveals that the 'criminalisation of Indian politics' and erosion of 'democratic institutions' have become apparent. Bhambhri (1998) argues that the crisis of governance is a built-in feature of the Indian democratic state and that the existing structure of governance serves the interests of the elite and ruling classes. It would be appropriate to quote one ADC's comments that 'plan priorities are misplaced' (ADC, Rohtak, 1998). For example, after structural adjustment in India every important car manufacturer has been collaborating with the Indian corporate sector for producing luxurious cars. Some of them are planning to develop 'model-cities' in India. Bhambhri raises a question: 'do we really need foreign collaboration for developing 'model-cities' and 'luxurious cars' or do we need to eliminate poverty, illiteracy, disease and hunger'? If we carry on with this type of collaboration, we will be creating many Indias on the basis of the life style of 'model-cities' on the one hand and an underdeveloped rural and urban India on the other hand (Bhambhri, 1998, 135). In a real democratic country[5], the first task for the Government is that each and every citizen is ensured 'universal accessibility to basic services, namely education, health, transport, drinking water, social security etc.' Once citizens' basic needs are satisfied only then one can think of building model cities and manufacturing luxury cars.

[5] In a really democratic state, a substantial proportion of citizens directly and indirectly participates in ruling the state, in what Pt. Jawaharlal Nehru called the 'institution of self-governance'. The process has already begun, but still this is a distant dream for the rural masses.

Appendix-1

FIELD SURVEY PROGRAMME

Date	Details
Questionnaire Testing	
01.08.97 to 04.08.97	Surveyed 14 households in four villages of Rohtak District
15.08.97 to 18.08.97	Surveyed 14 households in four villages of Bhiwani District
Secondary Data Collection	
01.09.97 to 30.09.97	Census data collection
08.10.97 to 09.10.97	Collection of Electoral roll for the selected villages of Rohtak and Bhiwani Districts
09.07.98 to 20.08.98	Expenditure data collection at Bhiwani, Rohtak and Chandigarh and meeting with the district officers
Scheduled Questionnaire (Rohtak)	
13.10.97 to 21.10.97	Surveyed 94 households of Kehrawar, Rohtak
22.10.97 to 29.10.97	Surveyed 72 households of Chuliana, Rohtak
01.11.97 to 04.11.97	Surveyed 17 households of Diwana, Rohtak
07.11.97 to 10.11.97	Surveyed 26 households of Brahana, Rohtak
14.11.97 to 17.11.97	Surveyed 28 households of Brahana, Rohtak
21.11.97 to 27.11.97	Surveyed 42 households of Brahana, Rohtak
Scheduled Questionnaire (Bhiwani)	
08.12.97 to 14.12.97	Surveyed 51 households of Bhera, Bhiwani
15.12.97 to 17.12.97	Surveyed 15 households of Patodi, Bhiwani
22.12.97 to 26.12.97	Surveyed 25 households of Patodi, Bhiwani
09.01.98 to 12.01.98	Surveyed 27 households of Bapora, Bhiwani
17.01.98 to 21.01.98	Surveyed 25 households of Bapora, Bhiwani
06.02.98 to 09.02.98	Surveyed 25 households of Bapora, Bhiwani
13.02.98 to 17.02.98	Surveyed 25 households of Bapora, Bhiwani
Meeting With District Officers	
18.12.97	Meeting with the district officers at Rohtak
08.01.98	Meeting with the district officers at Rohtak
01.01.98 to 02.01.98	Meeting with the district officers at Bhiwani
Informal Discussion With The Villagers	
13.01.98 to 17.04.98	Informal meeting with the villagers in Rohtak and Bhiwani Districts

HOUSEHOLD QUESTIONNAIRE

Availability of and Accessibility to Infrastructure Services in Rural Areas of Haryana, 1997

Name of the Household-Head : _____ Social Group : SC / ST / OBC / GEN

Name of the Respondent : _____ Caste / Title : _____

Village : _____ Tahsil : _____ District : _____

Size of land holding (Operational) : _____

1.1 **HOUSEHOLD PARTICULARS (Male)**

S.No	Name	Rel. with HOH[1]	Year of birth	Edu. Level[2]	The Last Edu. Inst. Attended (year)	Distance from Edu. Institute	Reason of dropout[3]	Marital status[4]	Last residence with distance	Main work	Time spent on study household work (hours)

[1]**Relation with head of household:** H=husband, W=wife, F=father, M=mother, S=son, D=daughter, DIL=daughter-in-law, SIL=son-in-law, GS=grand son, GD=grand daughter, O=other

[2]**Education:** 0=illiterate,1=literate, 2=primary, 3=middle, 4=matric, 5=senior secondary, 6=graduate, 7=postgraduate, 8=technical education, 9=other

[3]**Reason for dropout:** 1=No school in village, 2=could not go out of village, 3=quite far from village, 4=work in household, 5=work in field, 6=poor economic condition, 7=marriage, 8=not interested in study, 9=failed, 10=got employment, 11=started searching for job, 12=others

[4]**Marital Status:** 1=unmarried, 2=married, 3=widow, 4=divorced, 5=separated

2. **EDUCATION IN AGE 5-20 YEARS**

2.1 **Girls:**

2.1.1 What are your expectations of sending girls to school and college? [5]_____

2.1.2 Which school do you prefer for girls: public or private?_____

Why[6]_____

2.1.3. Do you prefer to send girls for college education out of village?_____

If no why[7]_____

2.1.4 Would you prefer paid job for women_____

If yes type of job to be preferred_____

2.2. **Boys:**

2.2.1 What are your expectations of sending your boys to school and college?[5]_____

2.2.2 Which school do you prefer for boys: public or private?_____

Why[6]_____

2.2.3. Do you prefer to send boys for college education out of village?_____

If no why[7]_____

2.2.4 Which job would you prefer for boys_____

[5] 1=better human being, 2=will become independent,3=will get a job, 4=to pass time, 5=will become broad minded, 6=for outside exposure, 7=none, 8=others

[6] 1=studious environment, 2=no fee, 3=separate girls school, 4=close to home, 5=English medium, 6=no other school available, 7=get stipend, clothes, stationary etc., 8=others

[7] 1=long distance from village, 2=too expensive, 3=social insecurity, 4=poor transport facility, 5=poor economic conditions, 6=others

3. HEALTH

3.1. Which health service do you use for minor illness? _____

Reason_____

—

3.2. Illness during the last six months:

S. No. as in page 1 and name	Disease/ Symptoms	Source	Distance	Reason for Source[8]	No of Visits / Consultation	Accompanied by	Total Expenses	Out-come	Remark if any

[8] 1=family doctor, 2=knew doctor, 3=charges reasonable, 4=emergency, 5=no other source, 6=better care and treatment, 8=home service, 9=specialist doctor, 10=no other source available, 11=trained MBBS doctors, 12=others

4. FERTILITY AND MORTALITY

4.1. Has there been any birth in the household during the last one year? _____

1=yes, 2=no

If 1 furnish the following information:

S. No.	Date of birth	Name of mother	Place of birth	Birth order	Birth attendant

4.2. Has there been any death in the household during the last one year? _____

1=yes, 2=no

If 1 furnish the following information:

S.No.	Name	Age	Sex	Relation with head of household	Date of death	Cause of death

5. **DRINKING WATER**

5.1. Source of drinking water_____

(1) Inside house (2) outside house

5.2. If source is 2 who fetch drinking water_____

Number of times fetching drinking water in a day_____

Time spent on fetching drinking water_____

6. **TRANSPORT:**

6.1. Do you have your own conveyance? _____

1= Yes 2=No

If yes type of conveyance and since when (year) do you have that_____

6.2 Do women or girls use this?_____

6.3. Transportation used during the last one month

S No.	Name	No of visits[9]	Place visited	Distance Travelled	Purpose of visit	Time		Mode of transport[10]	Accompanied by someone
						Departure	Arrival		

[9] during the last one month

[10] **Mode of transportation**: 1=rail, 2=governmnet bus, 3=private bus, 4=jeep, 5=three wheeler, 6=private conveyance, 7=others

7. **OTHER ISSUES**:

7.1. What do you think are the most serious problems of this village?

1_____ 2_____ 3_____

7.2. What do you think is most needed in the village in terms of services?

8. **ECONOMIC BASE OF HOUSEHOLD**

8.1. Which are the main sources of income of household?_____

8.2. How many people contribute towards income of household?_____

8.3. Job description

S.No. as on page 1	Main work	Subsidiary work	Working Place	Distance from Vill.	No. of working days		Income (monthly)		Income total Rs. (monthly)
					Main	Subsidiary	Main	Subsidiary	

8.4 Income from agriculture over the last year (in *Rabi* and *Kharif* seasons):

Crop	Production (kgs)	Prevailing Price (Rs)	Total Production (Rs)
1.			
2.			
3.			
4.			
5.			
6.			
7. Income from land leasing out (Rs.)			
8. Total Income (Rs.)			
9. Cost of rented in or leased in land			
10. Net Income (8-9)			

9. HOUSEHOLD INFORMATION:

9.1. Household goods:

Item	1=yes, 2=no	No.
1. Radio		
2. Television		
3. Tractor		
4. Sewing machine		
5. Bicycle		
6. Scooter / Motorcycle		
7. Car or other Vehicle		
8. Wheat grinder and fodder cutter		
9. Bullock Cart		
10. Refrigerator		
11. Cooler		
12. Others		
13. Others		

9.2. Livestock Information:

S.No.	Animal	Number	Expenditure per day (Rs)	Output Type	Output Qty.	Output (Rs.)	Place of output to be sold (with distance in Km)
1.	Cow Milch						
2.	Cow Non-Milch						
3.	Buffalo Milch						
4.	Buffalo Non-Milch						
5.	Calves						
6.	Ox / Bullock						
7.	Goats						
8.	Sheep						
9.	Mule/Donkey/Horse						
10.	Poultry						
11.	Others						

Appendix - 3

CODES FOR QUESTIONNAIRE SCHEDULE

Village	Code
ROHTAK	08
Kehrawar	1
Chuliana	2
Diwana	3
Brahana	4
BHIWANI	13
Bhera	5
Patodi	6
Bapora	7
Dhani Mansukh	8

Caste	Code
Brahmin	1
Jat	2
BC	3
SC	4
Vaish (Business community)	5
Rajputs (warrior)	6
Others	7

CODE USED FOR INDIVIDUAL DATABASE

Code	Description
Household Particulars	
Educational Institution	
0	Not studying at present
1	Government institution (public)
2	Private institution
Education Level	
0	illiterate
1	literate
2	Primary
3	Middle
4	Matriculation
5	Senior secondary
6	Graduate
7	Postgraduate
8	Technical education
9	Others
Reasons for Dropout	
0	No reason
1	No school in the village
2	Could not go out of village
3	School quite far from village
4	Work in the household
5	Work in the field
6	Poor economic conditions
7	Got married
8	Not interested in study
9	Failed in the examination
10	Got employment/started business or training or driving
11	Started searching for job
12	Others
13	Father or mother's death
14	Dispute with teacher (beating, compelling to do something etc)
15	Education completed
16	No tradition to educate girls more
Marital Status	
1	Unmarried
2	Married
3	Widow
4	Divorced
5	Others
Last Residence	
1	Rural
2	Urban

Main Work	
0	No work
1	Studying
2	Agriculture (cultivator)
3	Cattle rearing (buffaloes and cows) and sheep and goats
4	Labour within the village (agriculture and non-agriculture)
5	Private job out of village
6	Government job within and out of village
7	Small scale business/shop etc.
8	Household work
9	Unemployed
10	Milkman
11	Others
12	Craftsman such black smith, carpenter, gold smith, *pandatia* etc. or any kind of traditional work
Subsidiary Work	
0	No work
1	Agriculture (cultivator and labour)
2	Cattle rearing (buffaloes and cows)
3	Labour non-agriculture
4	Household work
5	Others
Fertility	
Birth during the last one year	
0	no birth
1	birth during the last one year
Birth Order	
0	none
1	first birth
2	second
n	n^{th} birth
Birth Attendant	
1	Local dia
2	Trained doctor within the village
3	Nursing home

Health code for individual database

Health	
Disease	
0	None
1	Fever
2	Influenza and cold
3	Respiratory disease
4	Phenomena
5	Typhoid
6	Abdominal pain
7	Gynaecological
8	Other
9	Blood pressure
10	Physical injury or accident
11	Dental problem
12	Cough or other chest problem
13	Skin disease
14	Nausea/vomiting/diarrhoea
15	ENT related problem
16	Tuberculosis
Source	
0	No source
1	Government
2	Private
Reason for source	
0	None
1	Family doctor
2	Knew doctor
3	Charges reasonable or free
4	Emergency
5	No other source available
6	Effective medicine and treatment and better care
7	Was not controlled by previous doctor
8	Home service
9	Specialist doctor
10	Can treat even if we do not have cash
11	Trained MBBS doctor
12	Others
13	Was not diagnosed by the private doctor
14	Was not diagnosed by the government doctor
15	Medicines not available in the government hospital
16	Time and cost effective (transportation cost and costly treatment if go out of village)
17	Can go alone in the village
18	Not a major illness and can be diagnosed by the doctor in the village
19	Doctor was referred by some one or the previous doctor

Accompanied by	
0	Not related to this
1	Alone
2	Male
3	Female
4	Home service
5	Parents
Outcome	
0	Not related to this
1	Cured
2	Still under treatment
3	Not cured, but stopped treatment

Transport and work code for individual database

Transport	
Place Visited	
0	None
1	Rural
2	Small urban town /tahsil headquarters
3	Bigger town/district headquarters
4	Metropolitan city
5	Other state
Purpose of visit	
0	None
1	Social (home visit, marriage, cremation etc.)
2	Study
3	Agriculture (repairing, selling and buying items related to agriculture)
4	Service or employment
5	In search for job
6	Political
7	Others
8	Dairy farming related activities
9	Business (small and large scale)
10	Health e.g. treatment accompanying for treatment
11	Shopping or some other household work
12	Agriculture and shopping and household work
13	To get pension
Accompanied by	
0	Not related to this
1	Alone
2	Male
3	Female
4	Group
5	Other school children
6	Parents

Note:

1. If a person has visited more than one place then the longest distance is reported.

2. If the time of arrival and departure is 12.00 or difference between the arrival and departure time is zero then there is no fix time of arrival and departure.

CODE USED FOR HOUSEHOLD DATABASE

Education	
Expectation from sending girls to school	
0	None
1	Become better human being
2	Become independent
3	Get a job
4	To pass time
5	Become broad minded
6	Others
7	Manage agriculture properly and do not remain illiterate like us
8	Educate her children and manage her household properly
9	For matrimonial purposes (especially for finding a better groom)
Educational institution preferred for girls	
0	Not studying at present
1	Government institution (public)
2	Private institution
Reason for the preference for educational institution	
0	None
1	Better care and study
2	No fee/reasonable or affordable fee
3	Separate for girls/boys
4	Close to home
5	English Medium
6	No other school available
7	Get stipend
8	Others
9	Too small to be admitted in govt. school (min age for admission in govt school is 6 years)
10	Can not afford a private school, it is too costly
11	Trained and experienced staff
College education for boy/girls	
0	None
1	Yes, would like to educate in the college
2	Do not prefer girls' college education
Reasons for not preferring boys/girls' college education	
0	None (means prefer college education)
1	Long distance from the village
2	Too Expensive
3	Social insecurity
4	Poor or no transport facilities
5	Poor economic condition
6	Others
7	Will be married after the school education
8	Will start searching for a job after the school education

Preference for men/women's job	
0	None
1	Yes
2	No
Type of job preferred for boys/girls	
0	None
1	Any government job
2	High reputed government job
3	Any private job
4	Teacher/nurse/bank clerk
5	Others
6	Armed forces/central/state police
7	Will depend on child's fate/ability/education
8	Women specific job such as teacher/nurse/*anganwari* worker/ nurse/secretarial work/clerk etc.
9	Will depend on groom and his family
Health	
Source	
0	No source
1	Government within the village
2	Government out of the village
3	Private within the village
4	Private out of the village
Reason for source	
0	None
1	Family doctor
2	Knew doctor
3	Charges reasonable or free
4	Emergency
5	No other source available (especially within the village)
6	Effective medicine and treatment and better care
7	Was not controlled by previous doctor
8	Home service
9	Specialist doctor
10	Can treat even if we do not have cash
11	Trained MBBS doctor
12	Others
13	Was not diagnosed by the private doctor
14	Was not diagnosed by the government doctor
15	Medicines not available in the government hospital
16	Time and cost effective (transportation cost and costly treatment if go out of village)
17	Can go alone in the village
18	Not a major illness and can be diagnosed by the doctor in the village
19	Doctor was referred by some one or the previous doctor
20	Can not afford a private doctor

Source of drinking water	
1	Inside of house
2	Outside of house
Who fetch drinking water	
0	Drinking water inside household
1	Daughters/Girls (Unmarried)
2	Women (married)
3	1 and 2
4	Men/Boys
5	Male and female members
Transport	
Own a private Conveyance	
1	Yes
2	No
Type of Conveyance	
0	No conveyance
1	Cycle
2	Bull/camel cart
3	Tractor
4	Scooter/motor cycle
5	Other four wheeler
6	Others
Cattle related	
Utility of buffalo and cow's output	
0	None
1	Household consumption
2	Milk sold
3	Ghee (Refined butter) sold
4	Both milk and ghee sold
5	Non-lactation period
Mortality	
Death during the last one year	
0	No
1	Yes, there has been a death during the last one year
Cause of death	
0	None
1	Natural
2	Other than natural
Sex of Dead	
1	Male
2	Female

Main source of income of household	
0	None
1	Agriculture (cultivator)
2	Cattle rearing (buffaloes and cows)
3	Labour within the village (agriculture and non-agriculture)
4	Private job out of village
5	Government job within and out of village
6	Small scale business/shop etc.
7	Others
Subsidiary source of income of household	
0	None
1	Agriculture (cultivator)
2	Cattle rearing (buffaloes and cows)
3	Labour within the village (agriculture and non-agriculture)
4	Private job out of village
5	Government job within and out of village
6	Small scale business/shop etc.
7	Others

Appendix – 4

Out Globe File

Variable	Type	Description
RECNUM	4,5,B,0	Record number
DATE	32,32,C	Date of location allocation implementation
COVER	128,60,C	Coverage used for location allocation
FEATURE_TYPE	8,8,C	Feature type of the coverage used (point, line, poly)
OUT_ALLOC_FILE	128,60,C	Name of the output allocation file produced
OUT_CENTERS_FILE	128,60,C	Name of the output Centers file produced
NUM_CENTERS	4,5,B,0	Number of center location
CRITERIA	12,12,C,	Location allocation criteria used
MAX_DIST	4,12,F,3	Maximum distance value, if specified
DES_DIST	4,12,F,3	Desired distance value, if specified
DIST_DECAY	4,12,F,3	Distance decay value, if specified
DIST_EXPON	4,12,F,3	Distance exponent value, if specified
TOTDIST	4,12,F,3	Total distance traveled by demand
AVGDIST	4,12,F,3	Average distance
TOTAL_WGHDIST	4,12,F,3	Total weighted distance
TOTDEMAND	4,12,F,3	Amount of assigned demand
ALT_DEMAND	4,12,F,3	Demand served by a second center
UNASSIGNED	4,5,B,0	Number of demand points beyond the maximum distance, if specified
UNASSIGNED_DEMAN	4,12,F,3	Demand outside the maximum distance
FURTHEST	4,5,B,0	Cover# of the furthest demand feature
FURTHDIST	4,12,F,3	Distance traveled by the furthest demand feature

Out Centre File

Item Name	Type	Description
COVER-ID	4,5,B,0	Identification number of the chosen center
COVER#	4,5,B,0	Coverage of the chosen center
TOTFEATURES	4,5,B,0	Number of demand features assigned to the center
TOTDEMAND	4,12,F,3	Amount of assigned demand
TOTDIST	4,12,F,3	Total distance traveled by the assigned demand
TOTWDIST	4,12,F,3	Total weighted distance of assigned demand
AVGDIST	4,12,F,3	Average distance of assigned demand
AVGWDIST	4,12,F,3	Average weighted distanced of assigned demand
FURTHDIST	4,12,F,3	Distance from the furthest demand feature assigned
FURTHEST	4,5,B,0	User# of furthest demand feature assigned
ALL_TOTDIST	4,12,F,3	Total distance from all features to the center
ALL_AVGDIST	4,12,F,3	Average distance from the all features to the center
ALT_DEMAND	4,12,F,3	Total amount of demand served by a second center
ALT_TOTWDIST	4,12,F,3	Total weighted distance traveled to the second closest center
SUPPLY	4,12,F,3	Amount of supply at the center

Out Allocation File

Item Name	Type	Description
COVER#	4,5,B,0	The cover# of the demand feature (from PAT)
SITE1	4,5,B,0	The closest center the demand feature is assigned to
DISTANCE1	4,10,F,3	The distance between the demand feature and SITE1
DEMAND	4,10,F,3	The amount of demand
WDISTANCE1	4,12,F,3	Weighted distance from SITE1
SITE2	4,5,B,0	The second closest center to the demand feature
DISTANCE2	4,10,F,3	The distance between the demand feature and SITE2

Bibliography and References

Agresti, A. (1996), *An Introduction to Categorical Data Analysis*, John Wiley and Sons.

Ahmed, R. (1987), 'A Structural Perspective of Farm and Non-Farm Households in Bangladesh', *Bangladesh Development Studies*, 15 June, 87-112.

----- and N. Rustagi (1987), Marketing and Price Incentive in African and Asian Countries: A Comparison', In D. Elz. (ed.) *Agricultural Marketing Strategy and Pricing Policy*, Washington DC: World Bank.

----- and M. Hossain (1990), *Development Impact of Rural Infrastructure in Bangladesh*, Research Report-83, Washington DC: International Food Policy Research Institute.

----- and C. Donovan (1992), *Issues of Infrastructural Development : A Synthesis of The Literature*, Washington, DC: International Food Policy Research Institute.

Ahulwalia, M. S. (1988), 'India's Economic Performance Policies and Prospects', in E.B. Lucas and Gustav F. Papanek (Eds.) *The Indian Economy: Recent Development and Future Prospects*, London: Westview Press, 345-360.

AITD (1997), 'Infrastructure Planning: The Transport Sector', In H. Bhaya (Ed.) *Indian Planning: Search for Change*, New Delhi: AITD.

----- (1998), *India: National Infrastructure Report-1998*, New Delhi: AITD.

Akhtar, R. (1991), *Health Care Patterns and Planning in Developing Countries*, Greenwood Press.

----- and N. Izhar (1994), 'Spatial Inequalities and Historical Evolution in Health Provision: Indian and Zambian Examples', in D.R. Phillips and Y. Verhasselt, (Eds), *Health and Development*, Routledge, 216-33.

Aldrich, J.H. and F.D. Nelson (1984), *Linear Probability, Logit and Probit Models*, Newbury Park, CA: Sage Publications.

Anderstig, C. and L.G. Mattson (1989), 'Interregional Allocation Models of Infrastructure Investment', *Annals of Regional Science*, 23, 287-316.

Annis A. (1985), 'Physical Access and Utilisation of Health Services in Rural Guatemala', *Social Science and Medicine*, 15D, 515-23.

Antle, J.M. (1983), 'Infrastructure and Aggregate Agriculture Productivity: International Evidence', *Economic Development and Cultural Change*, 31, 609-19.

Argyris, C. (1964), *Integrating the Individual and the Organisation*, New York: John Wiley.

Asthana, S. (1994), 'Economic Crisis, Adjustment and The Impact On Health', in D.R. Phillips, and Y. Verhasselt, (Eds), *Health and Development*, Routledge, 50-64.

Attfield, R. and B. Wilkins (1992), *International Justice and The Third World*, Routledge.

Banuri, T. (1990), 'Modernisation and Its Discontents: A Cultural Perspective On Theories of Development', in F.A.Marglin and S.A.Marglin (Eds.), *Dominating Knowledge*, Oxford: Clarendon Press.

Barber C. (1988), 'Speech At The Opening of The 1988 World Bank and IMF Joint Meeting', Reported in *The Guardian*, 28th September, 1988.

Baran, P. (1957), *The Political Economy of Growth*, New York: Monthly Review.

Barnes, D. and H.P. Binswanger (1986), 'Impact of Rural Electrification and Infrastructure on Agriculture Changes, 1966-1980', *Economic and Political Weekly*, 21(1), 26-34.

Behrman, J.R. and N. Birdsall (1983), 'The Quality of Schooling: The Standard Focus on Quantity Alone is Misleading', *American Economic Review*, December.

Bell, C., P. Hazell and R. Slade (1982), *Project Evaluation in Regional Perspective*, Baltimore: Johns Hopkins University Press.

Belsky, E.S and G.J. Karaska (1990), 'Approaches to Locational Urban Functions in Developing Rural Areas', *International Regional Science Review*, 13(3), 225-40.

Bennett, J. (1987), *The Hunger Machine: The Politics of Food*, Cambridge: Polity Press, P. 13.

Berry, A. and R. H. Sabot (1978), 'Labour Market Performance in Developing Countries: A Survey', *World Development*, 6(11-12),

Berry, B.J.L. and D.F. Marble (eds. [1968]), *Spatial Analysis: A Reader in Statistical Geography*, Englewood Cliffs, NJ: Prentice Hall.

Bhagwati, J. (1988), 'Poverty and Public Policy', *World Development*, 16(5), 539-55.

Bhalla, G.S., G.K. Chadha, S.P. Kashyap and R.K.Sharma (1990), *Agricultural Growth and Structural Changes in Punjab Economy: An Input-Output Analysis*, Research Report 82, Washington DC: IFPRI.

Bhalla, G.S. and G. Singh (1999), *Evaluation and Selection of Infrastructure Interventions Aimed at Poverty Reduction in Rural Area*, Bangkok: UNESCAP (Forthcoming).

Bhambhri, C. P. (1998), *The Indian State: 1947-98 (50 Years)*, New Delhi: Shipra.

Bhaya, H. (1997), 'Organising For Planning', in H.Bhaya (Ed.), *Development Policy and Administration: Readings in Indian Government and Politics-1*, New Delhi: AITD.

Binswanger, H. and M.R. Rasenzweig (1986), 'Behavioural and Material Determinants of Production Relations in Agriculture', *Journal of Development Studies*, 21 503-39.

Binswanger, H., M.C. Yang, Abowers, and Y. Mundlak (1987), 'On The Determinant of Cross Country Aggregate Supply', *Journal of Econometrics*, 36(1), 111-31.

Binswanger, H., S. Khandker, and M. Rosenzweig (1989), *The Impact of Infrastructure and Financial Institutions on Agriculture Output and Investment in India*, World Bank Working Paper-163, Washington DC: IFPRI.

Birdsall, N. and R.H. Sabot (1993a), *Opportunities Foregone: Education, Growth and Inequality in Brazil*, Washington DC: World Bank

----- (1993b), *Virtuous Circles: Human Capital Growth and East Asia*, Washington DC: World Bank

Bose, A. and P.B. Desai (1983), *Studies in Social Dynamics of Primary Health Care*, New Delhi: Hindustan Publishing Corp.

Brockington, C. F. (1958), *World Health.*

Bromley, R. (1981), 'From Calvary to White Elephant: A Colombian Case of Urban Renewal and Marketing Reform', *Development and Cultural Change*, 12, 77-120.

----- (1983), 'The Urban Road to Rural Development: Reflections On USAID's Urban Functions' Approach', *Environment and Planning A*, 15, 429-32.

Bühler, G. (1879-82), 'The Sacred Laws of the Aryas as taught in the schools of Apastamba, Gautama, Vâshista and Baudhyama', In Max Mûllar (ed.) *The Sacred Books of the East*, vol-II (cited as sacred law).

Census of India (1981), *Study On Distribution of Infrastructural Facilities in Different Regions and Levels of Urbanization*, Occasional Paper 1 of 1986, New Delhi: ORGI.

----- (1981), *District Census Handbook (Rohtak, Bhiwani, Hisar and Sonipat District)*, Chandigarh: Directorate of Census Operation, Haryana.

----- (1991), *District Census Handbook Rohtak and Bhiwani*, Chandigarh: Directorate of Census Operation, Haryana.

Chadha, G.K. (Ed.[1994]), Sectoral Issues in The Indian Economy: Policy and Perspective, New Delhi: Har-Anand Publications.

Chambers, R. (1983), *Rural Development: Putting The Last First*, London: Longman.

----- (1992), *Rural Appraisal: Rapid, Relaxed and Participatory*, IDS Discussion Paper 311, Sussex: IDS

Cheema,G.S.(Eds.[1981]), *Institutional Dimensions of Regional Development*, Singapore: Maruzen Asia.

Chorley, R.J. and P. Haggett (1967), *Models in Geography*, London: Methuen.

Christaller, W. (1966), *Central Place in South Germany* (Translated By C.J. Baskin), Eaglewood Cliffs NJ: Prentice-Hall.

Clark, A. N. (1985), *Dictionary of Geography*, Longman Publications.

Cleveland, W.S. (1979), 'Robust Locally Weighted Regression and Smoothing Scatterplots', *Journal of the American Statistical Association*, 74, 829-36.

Cobb R., R. Hunt, C. Vandervoort, C. Bledsoe and R. McClusky (1980), *Impact of Rural Road in Liberia*, AID Project Impact Evaluation Report - 6, Washington DC: USAID.

Cochrane S. (1979), *Fertility and Education: What Do We Really Know?* Baltimore: Johns Hopkins University Press.

Colclough, C (1982), 'The Impact of Primary Schooling On Economic Development: A Review of The Evidence', *World Development*, 10(3), 167-85.

Cooter, R. and P. Rapppoport (1984), 'Were the Ordinalists Wrong About Welfare Economics', *Journal of Economic Literature*, 22.

Corbridge, S. (ed [1995]), *Development Studies: A Reader*, Arnold.

Cowen, M.P. and R.W. Shenton (1995), 'The Invention of Development', in J. Crush (Ed.), *Power of Development*, Routledge, 27-63.

----- (1996), *Doctrine of Development*, Routledge.

Crow, B. and M. Thorpe (1988), *Survival and Change in the Third World*, Cambridge: Polity Press.

Crush, J. (ed. [1995]), *Power of Development*, Routledge.

D'Aeth, R. (1975), *Education and Development in The Third World*, Saxon House.

Dasgupta, P. and D. Ray (1986), 'Inequality as a Determinant of Malnutrition and Unemployment: Theory', *Economic Journal*, 96.

----- (1987), 'Inequality as a Determinant of Malnutrition and Unemployment: Policy', *Economic Journal*, 97.

DeVries, E. (1960), 'Finance for Development', In *Proceedings of the International Conference of Agricultural Economist*, London: Oxford University Press.

Denison, E.F. (1962), *The Sources of Economic Growth in United States*, New York: Committee For Economic Development.

DGHS (1998), *Health Profile: Haryana*, Chandigarh: Directorate General, Health Services, Haryana.

Diskett, P. and P. Nickson (1991), Financing Primary Health Care: an NGO Perspective, *Development in Practice* 1, 1, 43-51.

Dower, N. (1992), 'Sustainability and The Right to Development', in Attfield, R. and B. Wilkins (Eds.) International Justice and The Third World, Routledge, 93-116.

Draper, N. and H. Smith (1981), *Applied Regression Analysis*, Second Edition, New York: John Wiley and Sons.

Drewe (1977), 'Regional Policy As Social Planning' in Kuklinski, A. (Ed.), *Social Issues in Regional Policy and Regional Planning*, The Hague: Mouton and Co., 33-50.

Drèze, J. and A. Sen (1995), *India: Economic Development and Social Opportunity*, Oxford University Press.
----- (Eds [1996]), *Indian Development: Selected Regional Perspectives*, Oxford University Press.
Drèze, J. and H. Gazdar (1996), 'Uttar Pradesh: The Burden of Inertia', in J. Drèze and A. Sen (Eds), *Indian Development: Selected Regional Perspectives*, Oxford University Press, 33-128.

Drèze, J. and M. Saran (1995), 'Primary Education and Economic Development in China and India: Overview and Two Case Studies', in K. Basu, P. Pattaniak and K. Suzumura (Eds), *Choice, Welfare and Development*, Oxford: Clarendon Press, 182-241.
Eade, D. (1997), *Capacity-Building : An Approach to People-Centred Development*, Oxford : Oxfam.
Elliott, J. A. (1994), *An Introduction to Sustainable Development: The Developing Countries*, Routledge.
Epstein, T. S. (1962), *Economic Development and Social Change in South India*, Manchester: University Press.
Escobar, A. (1993), 'Planning', in W. Sachs (Ed.) *The Development Dictionary: A Guide to Knowledge As Power*, London: Zed Press, 132-45.
------ (1995), *Encountering Development: The Making and Unmaking of The Third World*, Princeton, N.J.: Princeton University Press.
ESRI (1998), *ARC/INFO*, Redlands: ESRI, (Version 7.12), Starter Kit, ARCPLOT, and Online Help.
----- (1999), *ARC/INFO*, Redlands: ESRI, Online Help (Version 7.21)
Esteva, G. (1992), 'Development', In W. Sachs (Ed.) *The Development Dictionary: A Guide to Knowledge As Power*, London: Zed Press, 6-25.
Evans, J. R, K.L. Hall and J. Warford (1995), 'Health Care in the Developing World: Problems of Scarcity and Choice', in V.K. Pillai, L.W. Shannon and J.L. McKim (1995[eds.]), *Developing Areas: A Book of Readings and Research*, Oxford: BERG, 408-19.
Evenson, R.E. (1986), 'Infrastructure, Output Supply and Input Demand in Philippine Agriculture: Provisional Estimates', *Journal of Philippine Development*, 13(23), 62-76.
Fajewonyomi, B.A. (1983), 'An Approach to Effective Health Care Delivery in Developing Nation: A Case For Nigeria', *Social Science and Medicine*, 17(9), 525-29.
Fan, S, P. Hazell and S. Thorat (1998), *Government Spending, Growth and Poverty: Analysis of Interlinkages in Rural India*, Washington, DC: IFPRI.
Fisher, H. B. and G. Rushton (1977), 'Integrated Rural Area Planning in India : Experiences of The Pilot Research Project in Growth Centres - 1969-74', in R.C. Eidt, K.N.Singh and R.P.B. Singh (eds) *Man Culture and Settlement*, New Delhi: Kalyani Publisher, 342-62.
Folch-Serra, M. (1989), 'Geography and Postmodernism: Linking Humanism and Development Studies', *Canadian Geographer*, 133(1), 66-75.
Freud, P.J. (1986), 'Health Care in a Declining Economy: The Case of Zambia', *Social Science and Medicine*, 23 , 875-88.
Ghosh. A. and G. Rushton (Eds. [1987]), *Spatial Analysis and Location-Allocation Models*, New York: Van Nostrand Reinhold Co.
Gilbert, N. (1993), *Analysing Tabular Data: Loglinear Logistic Models for Social Researchers*, London: UCL Press.
Godagama, S. (1997), *The Handbook of Ayurveda: India's Medical Wisdom Explained*, Kyle Cathie Limited.

Godelier, M. (1978), 'Infrastructure, Societies and History', *New Left Review*, 112, 84-96.
Golladay, F. and B. Liesen (1980), *Health Problems and Policies in The Developing Countries*, Washington, DC: World Bank Staff Working Paper No, 421.
Gopal, S. (ed [1983]), *Jawaharlal Nehru: An Anthology*, Oxford and New Delhi: Oxford University Press.
Government of Haryana (1982a), *Statistical Abstract of Haryana: 1980-81*, Chandigarh: Economical and Statistical Organisation, Haryana.
----- (1982b), *Budget 1982-83: Demands for Grants With Detailed Estimates of Expenditure*, Vol.-II, Chandigarh: Finance Department, Haryana.
----- (1987a), *Statistical Abstract of Haryana: 1985-86*, Chandigarh: Economical and Statistical Organisation, Haryana.
----- (1987b), *Budget 1987-88: Demands for Grants With Detailed Estimates of Expenditure*, Vol.-II, Chandigarh: Finance Department, Haryana.
----- (1992a), *Statistical Abstract of Haryana: 1990-91*, Chandigarh: Economical and Statistical Organisation, Haryana.
----- (1992b), *Budget 1992-93: Demands for Grants With Detailed Estimates of Expenditure*, Vol.-II, Chandigarh: Finance Department, Haryana.
----- (1992c), *Directory of Schools in Haryana: 1992*, Chandigarh: Director of Secondary Education, Haryana.
----- (1996), *Directory of Schools and List of J.B.T./D.I.E.T. Institutions*, Chandigarh: Director of Secondary Education, Haryana.
----- (1997a), *Statistical Abstract of Haryana: 1995-96*, Chandigarh: Economical and Statistical Organisation, Haryana.
----- (1997b), *Budget 1997-98: Demands for Grants With Detailed Estimates of Expenditure*, Vol.-II, Chandigarh: Finance Department, Haryana.
Government of India (1907-09), *The Imperial gazetteer of India*, Oxford : Clarendon Press.
----- (1952), *First Five Year Plan*, New Delhi: Planning Commission.
----- (1956), *Second Five Year Plan*, New Delhi: Planning Commission.
----- (1976), *Fifth Five Year Plan*, New Delhi: Planning Commission.
----- (1982), *Report of the Expert Group on the Programme for Alleviation of Poverty*, New Delhi: Planning Commission.
----- (1992), *Eighth Five Year Plan*, New Delhi: Planning Commission.
----- (1993), *Report of The Expert Group On Estimation of Proportion and Number of Poor*, Perspective Planning Division, New Delhi: Planning Commission, Nashik District, Maharashtra.
----- (1994), *Annual Report 1993-94 (Part-I) of Department of Education*, New Delhi: Ministry of Human Resources Development.
----- (1995), *Economic Survey 1994-95*, New Delhi: Ministry of Finance.
----- (1997), *Ninth Five Year Plan*, New Delhi: Planning Commission.
Granville, A. (1966), *The Indian Constitution: Cornerstone of a Nation*, Oxford: Clarendon Press.
Green R.H. (1991), 'Politics, Power and Poverty: Health For All in 2000 in The Third World'? *Social Science and Medicine*, 32, 745-56.
Greene, W. H. (1993), *Econometric Analysis*, (Second Edition) New York: Macmillan.
Griffin, C. (1991), 'The Need to Change Health Care Priorities in The Less Developed Countries', *Finance and Development*, 28, 45-47.

Grove, D. and L. Hussar (1964), *The towns of Ghana : The Role of Service Centres in Regional Planning*, Accra : Ghana University Press.

Hall, G.B and R. Bowerman (1996), 'Using GIS to Evaluate The Accessibility of Family Planning Services in The Central Valley of Costa Rica', *ITC Journal*, 1996-1, 38-48.

Hakimi, S.L. (1965), 'Optimum Distributions of Switching Centers in a Communication Network and Some Related Graph Theoretical Problems', *Operation Research*, 13, 462-75.

Hamilton, L.C. (1992), *Regression with Graphics: A Second Course in Applied Statistics*, California: Brooks/Cole Publishing Company.

----- (1993), "sqv8: Interpreting multinomial logistic regression", *Stata Technical Bulletin,* 13, 24-28.

Hansen, P., D. Peters, and J.F. Thisse (1983), 'Public Facility Location Models : A Selective Survey', in J.F. Thisse and H.G. Zoller (Eds.) *Location Analysis of Public Facilities*, New York : North Holland Pub. Co., 223-62.

Hassouna,W.A.(1994), 'Strategies Against Poverty', *World Health*, 47(6), 6-7.

Hettne, B. (1990), *Development Theory and the Three Worlds*, Harlow: Longman.

Heyneman, S. P. (1980), 'Investment in Indian Education', *World Development*, 8(2), 145-63.

----- and W. Loxley (1983), 'The Distribution of Primary School Quality Within High and Low Income Countries', *Comparative Education Review*, February, 108-18.

Hick, N. and P. Streeten (1995), 'Indication of Development: The Search For A Basic Needs Yardstick', in V.K.Pillai, L.W.Shannon and J.L.Mckim (Eds), *Developing Areas: A Book of Readings and Research*, BERG, 31-44.

Hirschman, A. (1958), *The Strategy of Economic Development*, (2nd Edition), New Haven, Conn, USA: Yale University Press.

Hodder B.W. and R. Lee (1974), *Economic Geography*, London : Methuen.

Hodgart, R.L. (1978), 'Optimising Access to Public Services: A Review of Problems, Models, and Methods of Locating Central Facilities', *Progress in Human Geography*, 2, 17-48.

Hutton, J.H.(1946), *Caste in India*, Cambridge University Press.

IFPRI/BIDS (1988), *Infrastructure and Development of The Rural Economy of Bangladesh*, A Report By USAID, Dhaka: Bangladesh.

ILO (1976), *Employment, Growth and Basic Needs*, Geneva: ILO.

ICSSR, (1981), *Health For All: An Alternative Strategy*, New Delhi: ICSSR.

Ishikawa, W.H. (1963), 'An Agriculture Surplus As A Factor in Economic Development', *Journal of Political Economy*, 71,1-29.

Israd, W. (1956), *Location and Space Economy*, Cambridge: MIT Press.

Jallade, J. P. (1982), 'Basic Education and Income Inequality in Brazil', *World Development*, 10(3), 187-97.

Jeffery, R. (1991), 'The Impact of Socio-economic and Political Factors On The Provision of Health Care in India', in R. Akhtar, (Ed.), *Health Care Patterns and Planning in Developing Countries*, Greenwood Press, 99-119.

Johnson, E.A.J (1966), Market towns and Spatial Development in India, New Delhi: National Council of Applied Research.

----- (1970), *The Organisation of Space in Developing Countries*, Cambridge: Harvard University Press.

Johnston, R.J., D. Gregory and D. M. Smith (1996), *The Dictionary of Human Geography*, (Third Edition), Blackwell.

Jones, P. W. (1992), *World Bank Financing of Education: Lending, Learning and Devleopment*, Routledge.
Kabra, K. N. (1997), *Development Planning in India: Exploring an Alternative Approach*, Sage Publications.
Kaluba, L.H. (1995), 'Education in Zambia: The Problem of Access to Schooling and The Paradox of The Private School Solution', in K.P. Vijayan and L.W. Shannon (Eds) *Developing Areas: A Book of Readings and Research*, Oxford Providence: BERG, 267-73.
Kaviraj, S. (1991), 'On State, Society and Discourses in India', in J. Manor (ed.) *Rethinking Third World Politics*, London: Longman.
Killen, J.E. (1983), *Mathematical Programming for Geographers and Planners*, London: Croom Helm.
Kohli, A (1991), *Democracy and Discontent: India's Growing Crisis of Governability*, Cambridge: Cambridge University Press.
Kuklinski, A. (Ed.) (1977), *Social Issues in Regional Policy and Regional Planning*, The Hague: Mouton and Co.
Kumar, N. (1993), 'Regional Dimensions of The Status of Women', *Social Change*, 23(1), 20-29.

Lall, S. V. (1999), 'The Role of Public Infrastructure Investment in Regional Development: Experience From Indian States', *Economic and Political Weekly*, 34(12), 717-25.
Lanjouw, P. and N.H. Stern (1993), 'Agriculture and Inequality in Palanpur, 1957-84', in K.A. Hoff and J. Stiglitz (Eds.) *The Economics of Rural Organisations*, Oxford: University Press.
Lea, D.A.M. and D.P. Chaudhri (Eds.[1983]), *Rural Development and the State*, Cambridge: Cambridge University Press.
Levy, H. (1996), *Kingdom of Morocco – Impact Evaluation Report of Socio-Economic Influence of Rural Roads*, Washington, DC: Operation Valuation Department, World Bank.
Lewis, W. A. (1955), *The Theory of Economic Growth*, London: Allen Unwin.
----- (1962), 'Education and Economic Development', *International Social Science Journal*, 14(4), 685-99.
Lipsky, M. (1980), *Street-Level Bureaucracy: Dilemmas of The Individual in Public Services*, New York: Russell Sage Foundation.
Lipton M. (1977), *Why the Poor Stay Poor: Urban Bias in World Development*, Canberra: Australian National University Press.
Lockheed, M.E. and A.M. Verspoor (1991), *Improving Primary Education in Developing Countries*, Oxford University Press.
Logan. B.I. (1985), 'Evaluating Public Policy Costs in Rural Development Planning: The Example of Health Care in Sierra Leone', *Economic Geography*, 61, 144-57.
Losch, A. (1954), *The Economics of Location*, New Haven, CT: Yale University Press.
Mandal, B.P. (1980), *Report of Mandal Commission: Commission of Backward Classes*, New Delhi: Government of India.
Marx, K. (1968), Preface to *A Critique of Political Economy*, In K. Marx and F. Engels (eds) *Selected Works*, London: Lawrence and Wishart (First Published 1859).
Mathew, G. (1995), 'A Vote for Panchayati Raj', *The Hindu*, January 4, 1995.
Mathur, K. (ed. [1996]), *Development Policy and Administration*, Sage Publications.
McClelland, D. (1961), *The Achieving Society*, New York: Random House.
Mellor, J. W. (1976), *The New Economics of Growth: A Strategy for India and the Developing World*, New York: Cornell University Press.

----- (1988), 'Food Production, Consumption, and Development Strategy', in E.B. Lucas and G.F. Papanek (Eds.) *The Indian Economy: Recent Development and Future Prospects*, London: Westview Press, 53-76.

Menike, K. (1999), 'People's Empowerment from the People's Perspective', *Development and Patronage: Development in Practice*, Oxford: Oxfam, 25-29.

Mikkelsen, B. (1995), *Methods for Development Work and Research: A Guide for Practitioners*, New Delhi: Sage Publications Inc.

Miller, B. (1981), *The Endangered Sex: Neglect of Female Children in Rural North India*, Ithaca, New York: Cornell University Press.

----- (1982), 'Female Labour Participation and Female Seclusion in Rural India', *Economic Development and Cultural Change*, 30(4), 777-94.

Morris, D. (1979), *Measuring Conditions of World Poor: The Physical Quality of Life Index*, Washington DC: Overseas Development Council.

Morris D. and B. Mc Alpin (1982), *Measuring The Conditions of Indian Poor: The Physical Quality of Life Index*, New Delhi: Promilla Abd Co. Publishers.

Murray, A. and R.L. Church (1994), "Expanding Spatial Detail and Restriction in Public Sector Location Models", Paper presented at *The Regional Science Association International*, 41st North American Meetings, Ontario: Niagara Falls.

Murthi, M., A.C. Guio and J. Drèze (1995), 'Mortality, Fertility and Gender Bias in India: A District Level Analysis', In J. Drèze and A. Sen (Eds), *Indian Development: Selected Regional Perspectives*, Oxford University Press, 357-406.

Nicholls, W.H. (1963), 'An Agriculture Surplus as a Factor in Economic Development', *Journal of Political Economy*, 71 (February), 1-29.

Nisbet, R. (1969), *Social Change and History: Aspects of the Western Theory of Development*, New York: Oxford Univeristy Press.

Noor, A. (1981), *Education and Basic Human Needs*, World Bank Staff Working Paper No. 450, Washington DC: The World Bank.

Nordlinger, E. (1972), *Decentralising the City*, Cambridge: Massachusetts Institute of Technology Press.

Nussbaum, M. and A. Sen (eds. [1993]), *Quality of Life*, Oxford: Clarendon Press.

Nutley, S.D. (1981), *Evaluation of Accessibility Levels in Rural Wales: Case Study of the Llandovery Area, with Special Reference to the Rural Transport Experiment*, Cardiff: Welsh Office.

Oppong, J.R and M. J. Hodgson (1994), 'Spatial Accessibility to Health Care Facilities in Suhum District, Ghana', *Professional Geographer*, 46(2), 199-202.

Ostrom , E. (1990), *Governing the Commons: The Evaluation of Institutions for Collective Action*, New York: Cambridge University Press.

Ostrom, E., L Schroeder and S. Wynne (1993), *Institutional Incentives and Sustainable Development: Infrastructure Policies in Perspective*, Oxford: Westview Press.

Paul, S. (1993), 'Bangalore's Public Services: A Report Card', *Economic and Political Weekly*, 28(52), Pp 2901-09.

Phillips, D. R. (1990), *Health and Health Care in the Third World*, New York: Longman, Scientific and Technical.

----- and Y. Verhasselt (Eds. [1993]), *Health and Development*, Routledge.

Pigou, A. C. (1952), *The Economics of Welfare*, London: Mcmillan.

Pillai, V.K., L.W. Shannon and J.L. McKim (1995[eds.]), *Developing Areas: A Book of Readings and Research*, Oxford: BERG.

Preston, P.W. (1996), *Development Theory: An Introduction*, Blackwell Publishers.

Psacharopoulos, G. (1981), 'Returns to Education: An Updated International Comparison', *Comparative Education*, 17(3), 321-41.

----- (1987), *Critical Issues in Education: A World Agenda*, EDT Discussion Paper 96, Washington DC: World Bank.

----- and Woodhall, M (1986), *Education For Development: An Analysis of Investment Choices*, Oxford University Press.

Ram, R. and T.W. Schultz (1979), 'Life Span, Health, Saving, and Productivity', *Economic Development and Cultural Change*, 27, 399-421.

Ramachandran, V.K. (1997), 'On Kerala's Development Achievements', in J. Drèze and A. Sen (Eds), *Indian Development: Selected Regional Perspectives*, Oxford University Press, 205-356.

Registrar General India (1998), *Sample Registration System Bulletin*, 32(2), New Delhi: RGI.

ReVelle, C.S. and R.W. Swain (1970), 'Central Facilities Location', *Geographical Analysis*, 2, 30-42.

Rietveld, P. (1989a), 'Employment Effects of Changes in Transport Infrastructure: Methodological Aspects of Gravity Model', *Papers of Regional Science Association*, 66, 19-30.

----- (1989b), 'Infrastructure and Regional Development; A Survey of Multi-regional Economic Models', *Annals of Regional Sciences*, 23(2), 255-74.

----- (1990), 'Infrastructure Planning and Rural Development: Reflections On The Urban Functions Approach', *International Regional Science Review*, 13(3), 249-55. 329-41.

----- (1994), 'Spatial Economic Impact of Transport Infrastructure Supply', *Transport Research – A*, 28(4), 329-41.

Robinson, A. H, J.L. Morrison, P.C. Muehrcke, A.J. Kimberling and S.C. Guptill (1995), *Elements of Cartography*, (Sixth Edition), John Wiley and Sons.

Rondinelli, D.A. (1985), *Applied Methods of Regional Analysis: The Spatial Dimensions of Development Policy*, Boulder: Westview Press.

----- (1990), 'Locational Planning and Regional Economic Development: Appropriate Methods in Developing Countries', *International Regional Science Review*, 13(3), 241-48.

Rostow, W. (1960), *The Stages of Economic Growth: A Non-Communist Manifesto*, London: CUP.

Royston, P. (1991), 'Lowess Smoothing', *Stata Technical Bulletin*, 3, 7-9.

Rushton, G. (1984), 'Use of Location-Allocation Models For Improving the Geographical Accessibility of Rural Services in Developing Countries', *International Regional Science Review*, 9(3), 217-40.

----- (1988), 'Location Theory, Location-Allocation Models and Services in Development Planning', *Economic Geography*, 64(2), 97-120.

----- (1991), 'Use of Location Allocation Models for Improving the Geographical Accessibility of Rural Services in Developing Countries', In R. Akhtar, (Ed.), *Health Care Patterns and Planning in Developing Countries*, Greenwood Press, 147-169.

Ruttan, V. (1984), 'Models of Agricultural Development', In C. Eicher and J. Staatz (eds.) *Agricultural Development in the Third World*, Baltimore: Johns Hopkins University Press, 221-25.

Sagar, S.L. (1975), *Hindu Culture and Caste System in India*, New Delhi: Uppal Book.

Sadik, N. (1990), *The State of the World Population*, New York: UNFPA.

Samuelson, P. (1954), 'The Pure Theory of Public Expenditure', *Review of Economics and Statistics*, 36(4), 387-89.

Saith, A. (1986), *Contrasting Experience in Rural Industrialisation: Are East Asian Experiences Transferable?* New Delhi: ILO-ARTEP.

Sato, T and W.E. Smith (1996), 'The New Development Paradigm: Organising For Implementation', in J.M. Griesgraber and B.G.Gunter (Eds), *Development: New Paradigms and Principles for the Twenty-First Century*, Pluto Press, 89-102.

Savas, E.S. and S. Ginsburg (1973), 'The Civil Service – A Meritless System', *The Public Interest*, 32, 70-85.

Schatzberg, M.G. (1979), 'Islands of Privilege: Small Cities in Africa and The Dynamics of Class Formation', *Urban Anthropology*, 8, 173-90.

Seers, D. (1979), 'The New Meaning of Development', in D.Lehmann (Ed.), *Development Theory; Four Critical Theory*, London: Cass.

Sen, A. (1970), 'The Crisis in Indian Education', Lal Bahadur Shastri Memorial Lecture, Hydrabad: The Institute of Public Enterprise.

----- (1985), *Commodities and Capabilities*, Oxford University Press.

----- (1992), *Inequalities Reexamined*, Oxford: Clarendon Press.

----- (1996), 'Radical Needs and Moderate Reforms', in J. Drèze and A. Sen (Eds), *Indian Development: Selected Regional Perspectives*, Oxford University Press, 1-32

Sills, D. L. (1968), *International Encyclopaedia of Social Sciences*, Volume-2, The Macmillan Company and The Free Press.

Singh, D.K. (1975), *The Constitution of India*, (Sixth Edition), Lucknow: Eastern Bok Company.

Smith, D. M. (1973), *Human Geography: A Welfare Approach*, London: Edward Arnold.

----- (1981), *Industrial Location: An Economic Geographical Analysis*, New York: John Wiley.

Standing, G. (1978), *Labour Force Participation and Development*, Geneva: ILO.

Stata (1997), *Stata Release-5: Statistics, Data Management and Graphics (Reference A-Z)*, Texas, Release-5, College Station: Stata Corporation.

----- (1999), *Stata Release-6: Statistics, Data Management and Graphics-Reference Manual Extract*, Texas, Release-5, College Station: Stata Corporation.

Staudt, K. (1991), *Managing Development: State Society and International Contexts*, Newbury Park California: Sage Publications.

Stock, R. (1983), 'Distance and The Utilisation of Health Facilities in Rural Nigeria', *Social Science and Medicine*, 17, 563-70.

----- (1985), 'Health Care For Some: A Nigerian Study of Who Gets What, Where and Why', *International Journal of Health Services*, 15, 469-84.

Stohr, W. B. (1981), 'Development from Below: The Bottom-Up and Periphery-Inward Development Paradigm', In W.B. Stohr and D.R.F. Taylor (eds.) *Development from Above or Below: The Dielectrics of Regional Planning in Developing Countries*, New York: John Wiley and Sons.

Streeten P. and S.J. Burki (1978), 'Basic Needs: Some Issues', *World Development*, 6(3), 411-21.

Sundberg, L. and G. Carlen (1989), 'Allocation Mechanism in Public Provision of Transport and Communication', *The Annals of Regional Sciences*, 23, 311-27.

Taylor, P.J. (1977), *Quantitative Methods in Geography: An Introduction to Spatial Analysis*, Boston: Houghton Mifflin.

Teitz, M. and P. Bart (1968), 'Heuristic Methods for Estimated the Generalised Vertex Median of a Weighted Graph', *Operation Research*, 16, 955-61.

Tilak, J.B.G. (1989), *Education and Its Relation to Economic Growth, Poverty and Income Distribution: Past Evidence and Further Analysis*, World Bank Discussion Paper 46, Washington DC: World Bank.

Tiwari,V.K.(1992), 'Improving Access to Services and Facilities in Developing Countries', *International Regional Science Review*, 15(1),25-37.

----- and S. Jena (1987), 'High School Location Decision Making in Rural India and Location Allocation Models', In A. Ghosh and G.Rushton (Eds.) *Spatial Analysis and Location-Allocation Models*, New York: Van Nostrand Reinhold Co. Inc.

Tobler, W. (1970), 'A Computer Movie', *Economic Geography*, 46, 234-40.

Tony, S. (1995), 'Requiem Or New Agenda For Third World Studies'?, in V.K.Pillai, L.W.Shannon and J.L.Mckim (Eds), *Developing Areas: A Book of Readings and Research,* BERG, 14-30.

Truman, H. S. (1949), 'Inaugural Address', in *Documents On American Foreign Relations*, Connecticut: Princeton University Press.

UNDP (1993), *Human Development Report*, New Delhi: Oxford University Press.

UNESCO (1991), *Women, Population and Development*, Bangkok: UNESCO Principal Regional Office for Asia and Pacific, Abstract and Bibliography Series No. 11.

United Nations (1962), *The UN Development Decade: Proposals of Action*, New York: United Nations.

---- (1967), *A Compilation of International Instruments of the United Nations*, New York: United Nations.

----- (1986), *Declaration on the Right to Development*, New York: United Nations.

UNRISD (1980), *The Quest for a United Approach to Development*, Geneva: UNRISD.

USAID (1994), 'Strategy For Stabilising World Population Growth and Protecting Human Health', *Population and Development Review*, 20(2), 483-87.

Vaidyanathan, A. (1988), 'Agriculture Development and Rural Poverty', in E.B. Lucas and G.F. Papanek (Eds.) *The Indian Economy: Recent Development and Future Prospects*, London: Westview Press, 77-90.

Veen, K.W. Van Der (1991), 'Government and Private Health Care: Two Competing Institutions', *Managing Rural Development: Health and Energy Programmes in India*, Sage Publications, 79-94.

Vijayan, K.P. and L.W. Shannon (1995), *Developing Areas: A Book of Readings and Research*, Oxford Providence: BERG.

Wanmali, S. (1985), *Rural Household Use of Services: A Study of Miryalguda Taluk, India*, Research Report - 48, Washington DC: IFPRI.

----- (1991), 'Determinants of Rural Services Use Among Households in Gazaland District, Zimbabwe', *Economic Geography*, 67(4), 346-60.

----- (1992), *Rural Infrastructure: the Settlement System, and Development of Regional Economy in Southern India*, Research Report 91, Washington, DC: IFPRI.

----- and Islam, Y.(1995), 'Rural Services, Rural Infrastructure and Regional Development', *The Geographic Journal*, 161(2), 149-66.

Weber, A. (1929), *Alfred Weber's Theory of the Location of Industries*, Translated By C.J. Friedrich, Chicago: University of Chicago Press.

Weitz, R. (1971), *From Peasant to Farmer: A Revolutionary Strategy for Development*, New York: Columbia University Press.

Wheeler, R. (1981), 'Factors of Well-Being and Health Promotion', *Proceedings of 17th Annual Meeting of The Society of Perspective Medical*, Stevens Point, WT, 60-62.

WHO (1998), *The World Health Report 1998; Life in The 21st Century: A Vision for All*, Geneva: WHO.

Willemain, T. (1974), *The Status of Performance Measures for Emergency Medical Services*, Technical Report, 6-74, Cambridge: Operations Research Center, Massachusetts Institute of Technology.

Williams, G. (1997), 'State, Discourse and Development in India: The Case of West Bengal's Panchayati Raj', *Environment and Planning A*, 29.

Williamson, J. and C. Milner (1991), *The World Economy: A Textbook in International Economics*, New York: Simon and Schuster.

World Bank (1980a), *Health Sector Paper*, Washington DC: The World Bank

----- (1980b), *Meeting The Basic Needs: An Overview, Poverty and Basic Need Series*, Washington: World Bank.

----- (1980c), *World Development Report 1980*, New York: Oxford University Press.

----- (1990), *World Development Report: Poverty*, Oxford University Press.

----- (1991), *Gender and Poverty in India*, Washington DC: The World Bank.

----- (1993), *World Development Report: Investigating in Health*, Oxford University Press.

----- (1994) *World Development Report: Infrastructure for Development*, Oxford University Press.

----- (1999), *World Development Report 1998/99: Knowledge for Development*, Oxford University Press.

Wrigley, N. (1985), *Categorical Data Analysis: for Geographers and Environmental Scientists*, London: Longman.

Youngson, A. J. (1967), *Overhead Capital: A Study in Development Economics*, Edinburgh: Edinburgh University Press.

Zaidi, S.A. (1986), 'Why Medical Students Will Not Practice in Rural Areas: Evidence From A Survey', *Social Science and Medicine*, 22,533-57.

Zakaria, T. (1974), 'Urban Transportation Accessibility Measures: Modifications and Uses', *Traffic Quarterly*, 28(3), 467-79.