## *The Outcast Dead: Health and Diet of London's Post-Medieval Poor (1540-1853)*

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# THE OUTCAST DEAD

*HEALTH AND DIET OF LONDON'S POST-MEDIEVAL POOR (1540-1853)*

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## Abstract

This thesis integrates osteological and historical evidence to examine the effects of the workhouse on inmates in 19th century London and to assess whether the 1834 change to the English Poor Laws led to a deterioration in health.

The initial foundations of the English Poor Laws were enacted in 1601 by Elizabeth I, and were largely unchanged until 1834. Welfare issues under the Old Poor Laws were managed parochially where paupers either received a monetary allotment or received shelter in the Parish workhouse. The new legalities of the New Poor Laws sought to create a nationalised system of welfare, which culminated with the Union workhouse. The aspects of daily life that were influenced within the institution included extraneous physical labour and changes to diet and the living conditions, whilst instilling the 'virtues of the independent labourer'.

It is hypothesised that the effects of the New Poor law would have exposed inmates to episodes of dietary deficiencies and infectious disease, detectable in the osteological record. This was investigated utilising published osteological data for five Post-Medieval London cemeteries (n=1,271) and four associated historical registers of burials (n=5,184), which date from before and after the 1834 Poor Law.

Nutritional analysis of seven workhouse diets and historical workhouse admission records, were also analysed. By adopting a multidisciplinary approach, this study has demonstrated that there was a detrimental impact of this change to the Poor Laws on the health of London's paupers. Inmates of the union workhouses would have been subsisting on a starvation diet, and as a result metabolic conditions, joint disease, cribra orbitalia and trauma increased in prevalence in the later 19th century cemeteries.

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# Dedication

This thesis is dedicated to everyone that has kept me sane, including but not limited to the following people. Sam Wilford who has indulged me in farsical discussions about aliens, the pangolin space empire, and what my Mormon moon paradise would look like. Sophie Newman and Lauren Walther who have enjoyed countless coffee and cupcake breaks, binging various television shows, and generally talking about anything that was **not** work. The kind people at the Calman Learning Centre cafe who have been providing me with Toffee Nut Lattes, even though they are no longer on the menu and I am certain the syrup is out of date.

Kevin Shields, as he has accepted that I now have multiple degrees in ‘digging dirt slowly’, though I have not dug anything in years. And finally, to friends and family near and far.

# Chapter 1 Introduction

This thesis will explore the health and diet of the English pauper and the workhouse inmate through a comparative assessment of osteological and historical data associated with five Post-Medieval cemeteries across London, as well as published workhouse diets and discharge records. Combining historical and archaeological sources allows for a comprehensive understanding of the impacts of 19th century social reform. As part of wider political and social pressure, the introduction of the New Poor Law in 1834, centralised the existing Parochial care of the poor, into standardised Government Unions and abolished outdoor relief, in favour of a Union Workhouse. Instead of being a safety net, the workhouse became a place to 'deter the idle, punish the immoral, reform the redeemable, and treat the physically unable' (Newman, 2013:124). To achieve this workhouses introduced a standardised regime that included hard labour and restricted diets that were meant to deter institutionalisation. This project aims to examine the effects of these political reforms on the health and well-being of London's poor, through the analysis of diet, demography and skeletal evidence for pathology.

## 1.1 Historical Sources and Archaeology

Utilising historical documentation in conjunction with archaeological evidence allows researchers to augment, confirm or correct the accepted documentary record (Connah, 2009:82). This study focuses on London's poorest citizens, the pauper and workhouse inmate. There have been previous attempts by historical archaeologists to place class distinctions upon archaeological populations (Wurst, 1999:7). Spencer-Wood and Herberling (1987:59) described status as a 'defined social position located in a defined social universe'. They argue that whilst the two terms are not completely synonymous, status and class are indeed tightly linked. Class, ultimately, is an objective category within populations that is based on attributes of the individual (Wurst, 1999:8).

Leone and Crosby (1987:399) suggest that historical archaeologists should utilise the two sources of data- the archaeological and the documentary - to highlight key differences in the records. By acknowledging the potential biases (see Chapter Three and Seven) within historical and archaeological

records and combining sources of workhouse administration and osteological records, which allows for a more detailed understanding of the welfare of London's Poor.

## 1.2 Research in Socioeconomic Status

Research has shown that social inequality can influence the health of an individual (Braveman et al., 2005:2879). Despite the fall in mortality rates and increased life expectancy during the 20th century, those of lower economic status still face lower life expectancy when compared to higher status individuals (Braveman et al., 2005:2883; Connah, 2009:84; Feinstein, 1993:279; Sapir-Hen and Ben-Yosef, 2014:780; Stranska et al., 2015:65). In attempting to explain the source of social inequalities (Table 1-1), Feinstein (1993:280) has identified a correlation between resource-dependency (materials) and behavioural influences (i.e. psychological, genetic, and cultural factors). Unequal access to health care services, differences in diet, exercise and occupation can lead to social inequalities that can in turn affect the health of an individual (Braveman et al., 2005:2880; Feinstein, 1993:300; Lewis, 2002:215; Linhares et al., 1984:627; Mays et al., 2009b:411; Stranska et al., 2015:70).

***Table 1-1: Source of inequality, (Feinstein, 1993:305).***

| | **Life Span** | **Access to health care** |
|---|---|---|
| **Materialistic** | Housing, overcrowding, sanitation, transit mode, occupational hazards, environmental hazards | Ability to purchase health care, ability to purchase pharmaceuticals , regular physician |
| **Behavioural** | Diet, exercise, leisure activities, risk taking, alcohol and substance abuse | Comprehensive medical information, 'playing the system', following instructions, self-diagnosis, awareness of recurrence |

These definitions are however, often influenced by the criteria of study (i.e. poor/rich, uneducated/educated, etc.), as well as its political and social context. European based research on socioeconomics, often uses an individual's occupation to measure social status in contrast to the United States where status is defined by household income and education (Braveman et al., 2005:2879). Archaeologists, who are often forced to employ an *etic* approach in reconstructing past

societies, often draw upon such approaches to understand socioeconomic status (Arnold, 1971:21; Asante et al., 2013:5; Hughes, 2015:25).

Indeed, archaeological research examining historic societies often focuses on the material culture to determine individual status (Connah, 2009:85; Larrea and Freire, 2002:360; Sapir-Hen and Ben-Yosef, 2014:780). Lower status dwellings are thought to be smaller and constructed using poorer quality materials and would therefore have been less comfortable and more crowded (Connah, 2009:86). Archaeological artefacts and faunal assemblages have also been utilised, sometimes in conjunction with dwellings, by historical archaeologists to determine socioeconomic status (*ibid.*.).

However, an *emic* approach can be taken when studying a well-documented historical society, such as that of 19th century London. This additional context can be used to reinforce interpretations of the archaeological record. In Victorian London (1837-1901), socioeconomic status was determined by an individual's birth, education, employment and personal wealth (Connah, 2009:82). However, as with modern studies, classifications of societal differences can be blurred; for example some wealthy members of society might be viewed as socially inferior due to how they had accumulated wealth (*ibid.*.). Nevertheless, from historical accounts, the lowest on the socioeconomic ladder were the urban poor who inhabited overcrowded and unsanitary areas within polluted cities. These individuals would have also been the most frequent users of the workhouse during the industrial revolution.

## 1.3 Previous Research on Workhouses- Historical

Previous historical research into the workhouse, and the poor laws, has focused on social and legal reforms, economy, and medical care (Boulton et al., 2013; Forsythe et al., 1996; Hilton, 2006; Horrell & Oxley, 2013; Miller, 2012a, 2013, 2014; Smith et al., 2008; Tomkins, 2013). Studies have also discussed the impact of the New Poor Laws on life within the workhouse (Englander, 1998:50; Goose, 2006:365; Stewart and King, 2004:75). Johnston's (1985) study of institutionalised diets from 1834-1895, contrasted prison and workhouse menus, concluding that prisons actually provided a healthier diet for inmates. Changes in diet, and the resulting impact on health, have also been studied in Irish

workhouses, where following the potato famine, Indian corn meal was added to the menus to the detriment of the Irish workhouse inmate as they would either actively avoiding consuming the corn meal or did not correctly know how to prepare the meal for consumption (Miller, 2014:5, 2013:941, 2012:445; O'Connor, 1995:116).

A number of detailed databases are also available for the study of workhouse populations and the lives of the poor. Research by Higginbotham (2013a), has provided a detailed corpus of all workhouses across the United Kingdom, alongside references to available parish records and online historical databases. One of these references, London Lives directed by Hitchcock and Shoemaker (Hitchcock et al., 2012), includes links to digitised parliamentary papers, registers, and manuscripts from 1690 until 1800. As a result of the wide availability of the material, many studies on workhouses have been conducted as part of ancestry research by the general public and those interested in local history.

## 1.4 Previous Research on Workhouses- Archaeological

Archaeological research on workhouses have primarily focused on the architecture of the buildings, examining how the inmates would have perceived and ultimately experienced the workhouse (Beisaw & Gibb, 2009; Casella, 2007; Newman, 2013; Piddock, 2007). Parallels have been drawn between the similarities of workhouse buildings and contemporary prisons, suggesting that the poor were often seen as criminals (Morrison, 1999:193). Morrison (1999), based on the work of Markus (1993), has established a chronological typology of English workhouses, linking the architectural experience to expressions of power and control that was central to the New Poor Law workhouses (described in Historical background) (Markus, 1993:141).

Similar interpretations of workhouses as metaphors of social control have been revealed through landscape studies of site location (Newman, 2014:124). The marginal location of workhouses in Northern England, placed inmates both literally as well as metaphorically on the edge of society (*ibid.*.). However, institutions in densely populated areas, such as London, were intentionally located in visible areas of the landscape to act as a constant reminder of the 'consequences of pauperism',

enhancing the social stigma surrounding the use of the workhouse especially under the New Poor Law (*ibid.*.). Urban workhouses would have been part of the cityscape, and the plain and domineering architectural features would have acted as a deliberate deterrent (Driver, 1993:40).

## 1.5 Brief Overview of Post-Medieval England

The Post-Medieval period (spanning the mid-16th century to the end of the 19th century) is characterised by the rural to urban migration that fuelled the increasing urbanisation during this time (Buer, 2006:22; Houlbrooke, 1998:30; Mathias, 1993:167; McCord, 1979:10; Singleton, 1970:43). From this, and following the Reformation, new social and religious ideals were introduced- including the belief of corporeal resurrection after death (Houlbrooke, 1998:43; Richardson, 1987:276). In order for corporeal resurrection to occur, the body could not be disturbed or damaged following burial. This became a primary practical concern for those living in crowded urban centres where burial space was at a premium and the sanctity of the dead body was at risk of defilement from resurrection men (Tarlow, 2010:94). The sanctity of the final resting place was a significant issue surrounding death in the workhouse and subsequent burial by the parish (See Chapter Five: Discussion).

### 1.5.1 Living Standards

The lack of proper sanitation in the overcrowded cities during the Industrial Revolution led to a heightened transmission of typhus, louse-borne diseases, intestinal disease, and other diseases ranging from minor infection to deadly epidemics (McCord, 1979:30). The epidemics of the Industrial Revolution were typically associated with warmer climates (i.e. typhoid, plaque, and cholera), transmission of these diseases would have been facilitated by city ports and improved communication networks (*ibid.*.).

The cramped conditions (Figure 1-1) and poor nutrition, engendered by food shortages, exacerbated the spread of tuberculosis and resulted in high mortality rates (Roberts and Buikstra, 2003:50). Such diseases were a common affliction of poorer individuals in society, who resided mainly in overcrowded areas. These slums were notorious for their ‘filth and squalor’ (Porter, 1998:76) and, combined with

the pollution from factories would have had a negative impact on health. The restriction of sunlight would have also increased the risk of vitamin deficiency (Roberts and Cox, 2003:299).

*Figure 1-1: A Victorian slum. A picture of the Seven Dials district of London in 1872. (Anon., 2015d).*

Living conditions were also impacted by the harsh manual labour that was typically undertaken by the urban poor. Within London, a significant proportion of the working class were employed in factories, mostly in the textile industry (Hamlin, 1995:857; Porter, 1998:90). All members of a working class family were expected to have been employed in what was often long and dangerous work, for low wages (Hilton, 2006:55; Mathias, 1993:344).

## 1.6 Research Questions

1) **A decline in health within the lowest class of Londoners during the mid-19$^{th}$ century should be observable due to the change in welfare strategies after the passing of the 1834 Poor Law Amendment.**

   a. **How did the quality and composition of workhouse diets before and after the 1834 amendment change?**
   b. **Is there a correlated increase in pathological conditions observable on the skeleton associated with poor diet and poor living conditions amongst those buried in cemeteries associated with workhouses and/or the poor?**

2) **Historical studies have stated that union workhouse populations are more likely to have a higher proportion of female inmates** (Boulton & Schwarz, 2010; Hollen Lees, 1998; Mackay, 1995)**.**
   a. **Is there a change in the demography of the skeletal collections of the 19th century (St Bride's and Cross Bones) compared to the earlier collections (St Thomas and Broadgate)?**
      i. **Is there an increase in the prevalence of elderly individuals in the 19th century cemeteries compared to the earlier collections?**
      ii. **Is there an increase in the prevalence of elderly males in the 19th century cemeteries due to 'domestic value'?**
   b. **Do the historical and archaeological records present similar demographics?**
3) **Utilising the Shoreditch Union Workhouse register of admissions and discharges, is it possible to determine cyclical use of the workhouse?**
   a. **Was it more likely for workhouse inmates to pass away whilst an inmate in the workhouse after an extended period of residence in the workhouse?**

## 1.7 Thesis Layout

**Chapter Two** will provide a historical background of the workhouse and the English poor laws. It will outline important early statutes, from the end of feudalism and the creation of the working class to the earliest government provisioning of relief. The creation of the New Poor Laws will then be discussed alongside changes to health care provided by workhouses and will explore gendered differences of the workhouse inmate and the independent poor. The introduction of the New Poor Laws will also be contextualised within wider changing perceptions of the poor during the Victorian period.

**Chapter Three** will outline the materials and methods that were utilised within this study. This includes a historical discussion of the five study cemeteries, as well as an outline of the pathological conditions thought to be associated with lower socioeconomic populations. Methods of the desk-

based study will be discussed in reference to workhouse dietaries, osteological collections and the historical sources consulted. Limitations and biases will also be introduced.

**Chapter Four** will outline the results of the study, including the dietary composition of the workhouse menus which are compared to the caloric expenditure of work activities in the workhouse. Osteological analysis will focus on the conditions discussed in Chapter 3 and compared to the historical sources of workhouse admission and cemetery burial records.

**Chapter 5** contextualises the results outlined in the previous chapter within the wider historical framework of Post-Medieval London (see Chapter 2). Analysis will be related to the research questions discussed in Chapter 1, by comparing the results of the caloric and osteological studies to the historical study of workhouse demographics.

**Chapter Six** will summarise and conclude the thesis, indicating future avenues for research as well as the limitations of the study.

# Chapter 2 Historical Background

*"The establishment of a Poor Law in any shape, or systematic organization for affording relief to the destitute, must be regarded as indicating a considerable advance in civilisation"*

*(Nicholls and Willink, 1898a:2)*

The continual rise in vagrants, as a result of the decline of feudalism and the consequent rise of a wage-driven working class, led to the establishment of a series of laws that were aimed at stopping the movement of the itinerant poor, who would move from parish to parish in order to receive alms (Pound, 1971:24). These laws provided the foundation of the Poor Laws, which began with the establishment of the Old Poor Law, also known as 43 Elizabeth c.2 (Marshall, 1985:30). They aimed to provide outdoor relief for paupers and the creation of a Parish Workhouse to act as a 'safety net' for the poor. These laws remained largely unchanged until the 19th century when Victorian attitudes towards the destitute and their relief underwent a fundamental shift (Blaug, 1963:155; Englander, 1998). Across Britain rising population, coupled with urban migration and low employment, led to an increase in those receiving Parish aid. Instead of being seen as the 'deserving poor' (Halper, 2012:71; Hollen Lees, 1998:41; Lloyd, 2003:122; O'Connor, 1995:28), the destitute began to be perceived as a lazy immoral underclass. The institution of the New Poor Law in 1834, as a result of biased and politically motivated attitudes towards the destitute, changed the function of the workhouse from a 'house of relief' to a deterrent, where only the desperate would enter (Boyer and Schmidle, 2009:250; Hollen Lees, 1998:232).

The poor laws were a network of laws and practices that were interwoven into the 'fabric of society and the economic system' of England (Poynter, 1969:xi). An understanding of the pre-existing laws regarding the poor prior to the Old Poor Laws and the intervening laws before the implementation of the New Poor Laws is therefore crucial in understanding the social and cultural context surrounding the poor and the impact that the institutions had on paupers within their boundaries.

This chapter will outline the change in the legal atmosphere of England in relation to the treatment and care of the poor. Important earlier statutes will be briefly outlined and the foundations of the Old Poor Laws will be discussed, including how the laws related to the care of the poor by the parish and ultimately the creation of the workhouse. Finally, the resultant change brought about by the New Poor Laws will be situated within the changing perceptions of the poor and the running of the workhouse in general. As the agrarian society evolved into an industrialised society, more citizens were relying on the Poor Rates for aid. This increase in the number of poor rate applicants influenced the creation of the New Poor Laws and the subsequent changes to the workhouse.

## 2.1 Important Early Statutes Regarding the Poor

### 2.1.1 The End of Feudalism and the Great Plague

By the end of the reign of Edward II, in 1327, the decline of feudalism resulted in the creation of a free working class who could now own land and receive wages for work (Dyer, 1989:50; Halper, 2012:74; Nicholls and Willink, 1898a:30-31; Thompson, 1979:2). Given the insecure and seasonal nature of much of the agricultural work, this change also led to the rise in the number of itinerant poor. This created the issue of the vagrant or sturdy beggar, which would become the objective of the statues discussed below.

Furthermore the Black Death, which reached London by 1348, claimed the lives of one-third to one-half the population of Britain (Pound, 1971:14), which led to an increase of the vagrant poor and the loss of skilled labourers, prompting Edward III (1327-1377) to pass the 1349 *Statute of Labourers*, which focused on vagrants who refused to work and those who were demanding excessive wages (Leonard, 1900:3; Nicholls and Willink, 1898a:36). The statute further outlined that any able-bodied individual who was refusing to find employment would be ‘taken and committed to the gaol [jail]’ (Nicholls and Willink, 1898a:39) where they would then be held until suitable employment was found.

### 2.1.2 The Provision of Outdoor Relief

By the reign of Richard II, the first statue (*25 Richard II c.6,* 1392) passed explicitly outlined the role of the church in the collection and distribution of alms to the poor by its parishioners (Nicholls and

Willink, 1898a:60). This rate was distributed once yearly by the churchwarden to the poorest members of the parish, and would have been given in the form of money or goods such as food or clothes (Boulton, 2013:27; Oxley, 1974:62; Thane, 1978:29). This provisioning formed the basis for parochial 'outdoor relief' (Oxley 1974: 2) that would continue until the 19th century (see below).

### 2.1.3 Vagrancy and Begging

During the Tudor period a number of statues were passed to curtail the movement of the poor between parishes, partly as a result of the threat of rebellion (Fletcher 2014: 20). *An Act Concerning the Punishment of Beggars and Vagabonds* (*27 Henry VIII c. 25*) was passed in 1535 to combat the numbers of itinerant poor by stipulating the provision of voluntary parochial alms to the poor, and to turn the poor into productive members of the Parish (Beier, 1978:210; Slack, 1999:160). Those who continued to move between parishes were taken to jail and taught skills to enable them to find work (Nicholls and Willink, 1898a:121).

The itinerant poor were also the focus of the *5 Elizabeth c.3* (1562), which necessitated the appointment of a collector of alms in the Parish as well as introducing a parochial begging licence, whereby beggars would be identified by wearing a badge (Hitchcock, 1985:20; Horrell et al., 2001:345; McIntosh, 2005:462; MacKay, 1995:215; Nicholls and Willink, 1898a:151). This act was an almost exact copy of statutes passed during the reign of Mary in 1555 (*2 & 3 Philip and Mary c. 5*) (Nicholls and Willink, 1898a:151). However, the collection of alms were now coerced by a £10 bond placed on those who refused to provide poor relief (Beales, 1948:313; van Leeuwen, 1994).

This statute also allowed for movement of the poor between parishes, if a licence was obtained from the churchwarden or parish that indicated that the parish did not have the means to sustain all of their poor. By 1576, each county was to have at least one house of correction as was laid out in the *18th Elizabeth c. 3*. These houses of correction were to hold criminals, vagrants, and beggars who were taught skills as a labourer so that they were more employable and to 'staunch the decay of their moral

fibre' (Green, 2009:270; Newman, 2010:50; Nicholls and Willink, 1898a:160; Spencer-Wood, 2001:120; Van der Slice, 1936:50).

## 2.2 The Foundations of the Old Poor Laws

As the population continued to rise during the 17th century, there was no corresponding increase in employment resulting in a surge in the number of individuals reliant on aid from the community (Pound, 1971:12). As a result in 1601 the *43 Elizabeth c.2* was enacted, which is considered to be the foundation of the Old Poor Laws (Rose, 1971:11). The law again required a parochial overseer of alms who would collect a Poor Rate tax from all parishioners and utilise the rate as they saw fit to maintain the parish poor.

Each parish was obligated to care for the destitute, by supplying work to those who were able and relief to those incapable of working in their home parish (Rose, 1971:17). The parish was to provide flax, hemp, wool or thread and 'other ware and stuff' with which all recipients would be set to work (Nicholls and Willink, 1898a:189). The parishes responded by giving the poor the opportunity to earn pay by oakum picking or manufacturing textiles, spinning for women or weaving for men, or to place them into workhouses or alms-houses "until they betake themselves to some service or other employment" (Nicholls and Willink, 1898b:196; Oxley, 1974:94).

The behaviour of the lower class was the focus of both *1 James I c. 9* in 1603 and *4 James I c. 5* in 1606 AD. *1 James I c.5* aimed to restrain the amount of time being spent 'haunting and tippling in Inns and Alehouses' (Nicholls and Willink, 1898a:215) and to stop working class individuals from spending all their wages on alcohol and loitering too long at inns (Beier, 1978:215; McIntosh, 2005:462).

The statute stated that locals should only be spending one hour a day in the inns and alehouses to eat their meal, and if they lingered longer the innkeepers would have run the risk of being fined for allowing this 'fiscally irresponsible behaviour' to persist (Halper, 2012:73). Three years later, *4 James I c. 5* was introduced to, once again, combat alcohol in the lives of the poor. Due to the perceived increase in drunkenness in the working class. This perceived excessive drinking was considered to be

'the root and foundation of many other enormous sins, as bloodshed, stabbing, murder, swearing, fornication, adultery' and was beginning to influence the working class opinion of the poor (Nicholls and Willink, 1898a:225). There were also the sturdy beggars and vagrants who when they were not begging, were spending all their time in 'victualing places' (Pound, 1971:62).

### 2.2.1 The Establishment of the Workhouse

In 1623 the passing of *An Act for the Erecting of Hospitals and Working-houses for the Poor (21 James c.1*) allowed for the construction of parochial workhouses and hospitals aimed at providing the poor with a place of care (Hitchcock, 1985:45; Nicholls and Willink, 1898a:233). Prior to this, the earlier *Act Against the Erecting and Maintaining of Cottages* (*31 Elizabeth c. 7*) banned the use of dwellings for multi-occupancy (Nicholls and Willink, 1898a:175), though if more than four acres of land was attached there was no such restriction. *21 James c. 1* allowed for the parish to maintain a number of the poor in parish accommodation, which would have hypothetically allowed for some saving from the expenditure of the poor rate. As a result of this statute, by the late 1700s there were almost 2000 parish workhouses across England (Hindle, 2004:187).

The introduction of the *Settlement Act* of 1662 (*14 Charles II c. 12*) aimed to restrict the number of poor rate applicants to only settled members of the parish being eligible for receiving aid (Nicholls and Willink, 1898a:280; Poynter, 1969:3). From 1662 the licensed poor were no longer able to receive aid anywhere other than their home parish. This statute allowed the overseers to rid their parish of 'unwanted outsiders' as they were marginal to the local community, and the *Settlement Act* allowed the parish to have them removed prior to them gaining settlement, which would have been forty days after they moved into the parish (Ashforth, 1985:58; Hollen Lees, 1998:52). As a result of this act, women, who gained and maintained their settlement status through their fathers or husbands, were more likely than men to have been removed by the poor law authorities. This was especially true for widowed women with children, as they were seen as a drain on the poor rate; and even if these women were working they still would have needed to supplement their wage with poor relief. (Hollen Lees, 1998:50).

Administration under George I (1714-1727) further imposed the obligation of the parishes to provide for all settled members who belonged to, or lived, in the parish (Nicholls and Willink, 1898b:6). It was the community's Christian duty to take care of the less fortunate and make sure that they were able to maintain themselves (Forsythe et al., 1996:340; Thompson, 1979:120). Poverty was viewed as "the natural, the primitive, the general, and the unchangeable lot of man" (Poynter, 1969:119; Rose, 1971:47), and was not only tolerated by some members of the community but was expected to exist as a part of modern civilisation (Hollen Lees, 1998:21). Nevertheless, aid given as a result of the Poor Laws was still seen publically as a stigma, and it was thought better to have starved as 'a man of God than to have received aid as a pauper' (Hollen Lees, 1998:14; Poynter, 1969:263). *36 George III* in 1796 stated that the relief given to parish paupers was to be provided in 'such a manner as to place them in a situation of comfort' (Kaplan, 1993:355; Rose, 1971:27), and to have done otherwise would have been 'inconvenient and oppressive' and would discourage the 'industrious poor person' from actively obtaining employment (Nicholls and Willink, 1898b:115).

The Old Poor laws were criticized by legislators of the 19th century, stating that due to the unstable nature of the laws there was, at the same time, "institutional cruelty and abuse towards workhouse inmates" and "unregulated kindness that encouraged the poor to rely upon charitable relief" (Miller, 2013:6). Under the Old Poor Laws, a man could not leave his family in the parish workhouse in order to look for work, which unintentionally insured that both he and his family remained habitual inmates (Wakefield et al., 1909:448).

There were times, however, when the parish would determine that it was in the best interests of the community to provide outdoor relief rather than to have families entering the workhouse (Leonard, 1900:209). In North Riding, Yorkshire, overseers would pay rent, build cottages, buy fuel, and pay for new windows and thatching in an attempt to keep paupers out of the workhouse (Hollen Lees, 1998:52). It was documented that a parish in the county of Hertfordshire during November of 1816 paid the rent on a cottage for Thomas Morris and family (wife and seven children), as it was decided

by the commissioners that it would be cheaper to pay the rent than to support them in the workhouse (Hollen Lees, 1998:36).

### 2.2.2 Key Points: The Old Poor Laws

- The Old Poor Laws provided 'outdoor relief' to supplement the wages of the old and indigent with the aim of curbing the numbers of wandering beggars (Hilton, 2006:22).
- Members of the parish who were able to contribute to the poor rate considered it their duty in order to ensure that no member of the parish would perish due to want.
- Paupers were considered to be deserving of relief under the Old Poor Laws, and if they were capable of labour they were expected to earn their relief.
- Commentators of the 19th century believed that the Old Poor Laws were operated with unregulated kindness and created a new class of pauper who were content to live on handouts rather than labour for their relief.
- The *Settlement Act* allowed Churchwardens and poor law administrators to stop all outsiders from achieving settlement by removing them from the parish before those crucial forty days were up (Rose, 1971:28).

## 2.3 Change in Public Opinion of the Poor

### 2.3.1 Old Poor Laws and the Poor

The moniker of 'pauper' was introduced into the English vernacular as the legal term, *in forma pauperis*. First appearing in a statue dating to 1495, the term granted the poor the right to take legal action without court fees, if they would swear before the justice that they owned less than five pounds of property (Hollen Lees, 1998:40). From the end of the 15th century, paupers were seen as deserving individuals whose extreme need required charity (Miller, 2012:448). By the 19th century a complete shift in the public perception of pauperism had occurred, which 'projected deep social fears of corruption and decay onto the bodies of the destitute' (Hollen Lees, 1998:41). The pauper was no longer viewed as 'deserving', but instead was culpable for urban pollution and disease, as a consequence of their perceived moral failures and idleness (Geber and Murphy, 2012:512; Gillin, 1929:425; Miller, 2013:950).

### 2.3.2 Changing Perceptions of the Poor

Increasing demonisation of the pauper by the middle classes, peaked in the first two decades of the 19th century (Hilton, 2006:580). These opinions were also expressed by the presiding government officials who believed that the availability of the compulsory aid offered under the Old Poor Law had 'corrupted and demoralised the country's labourers' (Humphreys, 1995:154; Johnston, 1985:14) and 'led the poor to think they had the right to relief' (Hilton, 2006:341). This ultimately created a new class of pauper who was viewed as not only tolerating their chronic poverty, but willingly desiring it (Hollen Lees, 1998:11). By 1834 and the New Poor Law, paupers were widely considered to be unworthy of aid and their impoverished status was thought to be routed in their own personal inadequacies.

Importantly, the earliest statutes leading up to 1601 were never aimed at removing poverty completely as it was believed that it was a 'normal God-ordained part of the social order' (Hollen Lees, 1998:14). Aid was to be given in the form of the poor rate, a compulsory alm given weekly by members of the parish and controlled by parish vestries and elected overseers (see above). It was estimated that during the Elizabethan era 14% of London's urban population were poor (Miles et al., 2008:14). By 1660, the population of London was recorded as being between 400,000 and 450,000 people (Harding, 2002:15) as a result of the 'haemorrhaging of population from the countryside' into cities and towns (Hilton, 2006:3). The population increased further between the 18th and 19th centuries, due to increased industrialisation, increased fertility rates, and falling mortality rates (Hilton, 2006:5). The population of London by the beginning of the 19th century had almost doubled with 864,845 citizens being recorded in the 1801 census, and thirty years later the population sat at 1,474,069 individuals (Cunningham, 1849a:414). Of this vastly inflated population, 80% were employed in manual labour (i.e. the lower classes) (Garwood, 2011:8), while more than 60% of the population were recorded on the census as being below 24 years old in the first half of the 19th century (Hilton, 2006:5).

Jeremy Bentham, an English philosopher, believed that the Old Poor Laws were 'fundamentally misguided' and should be completely abolished as they were responsible for the new class of poor

who believed that they were entitled to relief without labour (Poynter, 1969:33). Bentham designed a new institution, the Panoptican, in which he theorised that paupers and criminals could be housed under conditions of close observation and behavioural regulation, in order to enforce moral reform to counteract idleness and poverty. The unique circular design would have guaranteed that paupers and criminals alike would have their 'morals reformed, health preserved, industry invigorated' (Hilton, 2006:329). The circular architectural design was largely ignored by the Poor Law Commissioners, though the elements of close observation and behavioural regulation were integrated into the design of the union workhouse.

Thomas Malthus, a contemporary of Bentham, wrote extensively on the impact of the poor laws on the lives of the destitute (Bailey, 2010:6). He believed that the poor rate was encouraging the poor to 'breed' overly, to the detriment of society: 'the farmer breeds only from the best cattle; but our laws choose rather to preserve the worse' (Poynter, 1969:42). In his *An Essay on the Principle of Population*, Malthus concluded that 'if any man chose to marry, without a prospect of being able to support a family, he should have the liberty so to do…he should be taught to know that the laws of nature, which are the laws of God, had doomed him and his family to starve… that he has no claim of RIGHT on society for the smallest portion of food' (Malthus, 1798:539). Like Bentham, Malthus believed that the poor laws were to blame for the increase in the numbers of paupers, and the perceived decline in the moral fibre of society. Malthus argued that the poor laws should be abolished completely, believing that the poor were undeserving of the relief that they were receiving, and his views were influential in the shaping of the later amendment to the Poor Laws.

Philanthropists of the 19$^{th}$ century were also opposed to the poor laws, though not because the laws could be considered harsh, but because they believed that private charity was a far superior way of supporting the poor than public provisioning (Wingbermuehle, 2004:4). The Victorian philanthropists believed that their 'Maker- God held the rich accountable for what they do with their money, while the poor were tested by how they coped with their poverty' (Hilton, 2006:341). In a letter in 1819

Thomas Chalmers, a professor of theology, wrote that the 'salvation of a single individual [was] more important than the rescue of a whole empire from pauperism' (Hilton, 2006:342).

## 2.4 Factors Leading Toward Poor Law Reform

The changing nature of social attitudes towards the poor provided a major stimulus for the creation of the New Poor Law. As discussed above, the identity of Britain's poor shifted from those who were 'deserving' to those who were 'burdensome' and who posed a threat to the moral fibre of society (Fissell, 1989:40; Halper, 2012; Matic, 2003).

By the end of the 18th century the amount of available welfare was reduced with the aim of combating the rising tide of the poor applying for aid, and to also minimise expenditure on poor relief (Wood, 1985:20). However, the magistrates and overseers of the poor across Southern England boosted the poor rate due to fear of a 'French-style revolution' as during the last decade of the 18th century the poor were considered 'potential revolutionaries' (Hilton, 2006:31). There were also a multitude of financial crises during the years 1811, 1825, 1837 and 1847 (*ibid.*.). As a result of the financial crisis of 1847, debtors prisons across England recorded a total of 13,586 new inmates in that year alone (Hilton, 2006:23). These crises led the government to establish an income tax for the first time during peace time; increasing the tax burden on the population.

During the early 1830's, Parliament created a committee to look into the management of the Old Poor Laws. Assistant Commissioners were sent out across England and Wales to compile reports and submit their recommendations for reform. Ireland (Poor Law Established in 1838) and Scotland (Poor Law Established in 1845) were not included in the original survey conducted by the commissioners or the Poor Law Amendment until years later (Hilton, 2006:658; O'Connor, 1995:68). Despite the 'geographic breadth' of the survey, the inquiry was also biased by the commissioners and assistant commissioners who had preconceived opinions regarding how the poor rate was being handled (Hollen Lees, 1998:91). The commissioners were given set agendas informing them of what they were to report, which included: establishing that out-relief was ruining the country and leading to the demoralisation

of the labouring classes (Rose, 1971:23), whilst also establishing that the existing workhouses were ineffective if every parish were to continue managing their own (Longmate, 1974:50). The reports would include statements of how the Old Poor Laws in every parish suffered from maladministration and that the availability of 'outdoor relief' was a leading cause in the breakdown of the industrious spirit of the paupers leaving them content to live on relief (Hollen Lees, 1998:42; Humphreys, 1995:17). Edwin Chadwick (a student of Jeremy Bentham) and Nassau Senior (a lawyer and economist) were the primary authors compiling the report for the Poor Law Commission, and they used the collected evidence selectively to sway the opinions regarding the laws to back their proposed measures, which ultimately resulted in the 1834 Poor Law Amendment (Driver, 1993:50; Rose, 1971:77; Thane, 1978:30; Wingbermuehle, 2004:4).

The returned report detailed that paupers of the parish workhouse under the Old Poor Law were either under or over nourished when compared to poor independent labourers (Senior et al., 1834:63). A commissioner stated within the ***Report from His Majesty's Commissioners for Inquiring into the Administration and Practical Operation of the Poor Laws*** that they considered pauperism to have been 'nearly as infectious as smallpox', and 'without constant vigilance it would soon overspread the whole parish' (Hilton, 2006:177). This report resulted in the *Poor Law Amendment Act* of 1834, known colloquially as the New Poor Laws, which altered the laws concerning welfare of the poor substantially since the original *43 Elizabeth c. 2* was passed. Nassau Senior believed that the ultimate object of Poor Law reform 'was the removal of an extensive and complicated set of abuses, which had become entwined with habited and prejudices both of the distributors and receivers' of the parish poor rate (Beales, 1948:315).

Senior, and other members of the commission, believed that the Elizabethan Poor Laws were ultimately the cause of 'the ruined freedom, industry and morals' of the poor and that the Old Poor Laws had been 'imposed on them by the ignorance and vanity of the higher orders, and the avarice and fraud of the middle classes' (Beales, 1948:315). The authors rejected 'the notion that there was a

need to combat poverty' (Hollen Lees, 1998:11), indicating that they believed that if poverty were to be removed, all social hierarchy would collapse as there would no longer be a lower class (Mackay, 1995:212). For them, the disease of pauperism had fully invaded society and was destroying not only individuals and family relationships, but also the very motivation for labour (Hollen Lees, 1998:135).

## 2.5 The Creation of the New Poor Laws

The 15,000 pre-existing parishes, all of which had a form of workhouse, across England and Wales were combined following 1834 to create approximately 600 unions (Hilton, 2006:591). As the New Poor Laws were being administered on the national level, these 600 unions were divided again, into various districts that contained 40 unions. These 40 unions were administered by one assistant poor law commissioner who would report to the Poor Law Commission based in London. Crucially, outdoor relief was also removed under the New Poor Laws, thereby forcing all those who needed aid into the workhouse (Carter, 2014:38; Price, 2012:5; Simmons, 2011:3).

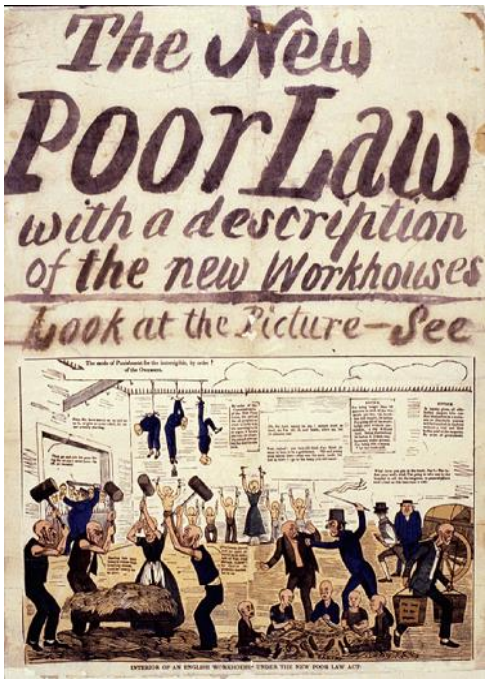



*Figure 2-1: 'Interpreting the New Poor Laws' 1834, (Anon., 1834).*

Once the Amendment was passed, William Cobbett stated that the law was the "Poor Man's Robbery Bill which was designed to reduce yet further the living standards of the labouring poor" (Figure 2-1) (Rose, 1971:93). The diets of the new workhouses were also reformed, and had to conform to the

'less eligibility principle', which reduced the amount of food and aid offered to the individual (Clarkson and Crawford, 2001:185; Dunkley, 1981:126; Forsythe et al., 1996:340; Murphy, 2002:3). In return for receiving restricted aid within the workhouse, paupers would have to work for the parish exclusively, typically for less wages and under more gruelling conditions than independent labourers (Wakefield et al., 1909:448). The average jobs within the workhouse were those of extreme physical labour, like crushing bones, digging holes, breaking stone, whilst some employed inmates to pick oakum (Hollen Lees, 1998:204).

As the structuring of the welfare state changed, the workhouse became a barrier between poverty and death. It was deliberately designed to provide conditions that were worse than those endured by the poorest independent labourer. Admission into the workhouse was therefore a test of desperation and the 'want of the paupers' (Dunkley, 1981:126; Hamlin, 1995:857; Higginbotham, 2013; Miller, 2012:447; Nicholls and Willink, 1898b:295). The workhouses of the late 1830's were designed to have a foreboding architectural design, influenced by the likes of Bentham, in which the disciplinary regime would impress upon the poor 'the virtues of the independent labourer' (Philo, 2004:21). This contrasted to the earlier ideologies of the Old Poor Laws where an individual did not have to undertake such heavy manual labour in return for their aid (Hamlin, 1995:857).

As discussed above, one of the main aims of the New Poor Laws was to replace outdoor relief with mandatory aid in the workhouse (Hilton, 2006:4-5). Senior wrote that there was to be no relief given to the able-bodied, or their families, except in return for work '…as hard as it can be made… and that the workhouse was as disagreeable as it can be made' (Hilton, 2006:593). There was also the belief that there was a 'decline in the quality of care provided by the community' (Boulton and Schwarz, 2010:221), and that by streamlining the avenues of relief with the required admission into the workhouse, only the truly needy would apply. In order to keep the 'vagabonds' from entering and continuing to abuse the system of welfare, a principle of less eligibility was used; in which inmates of the Union workhouse were to be 'worse fed, worse clothed, and worse lodged then the [poor]

independent labourers' (O'Connor, 1995:98). Every inmate admitted into the union workhouse was also expected to participate in menial manual labour, correcting the perceived tendency that the Old Poor Law rewarded idleness (Riley, 1997:135).

***Figure 2-2: Houseless and Hungry (4 December 1869) illustrated by Sir Luke Fildes and printed in the Graphic (de Vries and van Amstel, 1974).***

By the 19th century the urban poor, for the most part, no longer owners of their own homes, with most renting their lodgings (Jütte, 1994:66). This left them vulnerable to unemployment, seasonal work, and low wages (*ibid.*.). Rent prices during this time also rose faster than the average wage of the worker (Hilton, 2006:8; Garwood, 2011:16). Victorian wages for the vast majority of the poor could not support a family, even at the lowest subsistence level (Kaplan, 1993:xi). Indeed, *The Times* published in 1848 that 'there exists in this metropolis [London] an extraordinary want of comfortable, decent and healthy habitation for the labouring classes. Our institutions contribute to the evil… the very stabling of the metropolis, besides its other bearings on public health, takes up the room of many thousand families…' (Figure 2-2) (Beales, 1948:318).

The popularity of stories, such as ***Oliver Twist*** (1837-9) by Charles Dickens, has lead a number of modern researchers to argue that there is a 'cultural bias that has been built into popular concepts regarding the life of poor Victorians' (Clayton and Rowbotham, 2008b:350). The assumption being

that during the 19th century London's poor lived a 'short and malnourished life' subsisting off of a diet that was 'unstable and degraded' (Clayton and Rowbotham, 2008:282) was a result of biased political writing (E. Miller, 2012:319; Miller, 2013:942). Nevertheless, taking into account the wider evidence discussed throughout, it is clear that while 19th century novelists may have exaggerated the conditions in the workhouse, there were some union workhouses where the master made life much worse than the principle of 'less eligibility' would have proscribed. For example, evidence from the investigation of conditions in Andover Workhouse, Hampshire in 1845 revealed that many of the inmates were starving as a result of the workhouse master stealing food (Anstruther, 1973:101).

As a result of the new attitudes and stigma towards pauperism, people would avoid entering the workhouse at all costs, including selling all their possessions before applying for aid. The loss of all worldly goods made re-entry to their previous lives and occupations almost impossible (Kaplan, 1993:367; Siena, 2013:20). When all else was finally exhausted they would apply to enter, but even having as little as four pence on hand at admittance was enough to disqualify their application of aid (London, 1903:31).

### 2.5.1 Key Points: The New Poor Laws

- The parish workhouses were grouped together to create the larger unions with the hope of lowering the poor rate expenditure.
- Paupers no longer had to be settled members of the parish in order to apply for aid within the workhouse, though they could still be removed from one workhouse and sent to another.
- There was an increased emphasis on the moral reformation of the pauper as it was believed that they were poor due to moral failure.
- Workhouse inmates were employed in menial hard labour that was punitive and, not for profit, to improve their moral fibre.
- There no longer existed any deserving poor. Like all the other key points of the new Poor Laws, this had to do with perceived moral failures of the pauper as they were now believed to be poor due to their own vice and failures.
- The union workhouse was to be a test of destitution. 'No luxuries must be permitted within its sombre walls; even the comforts and conveniences of life must be maintained in it below the average of those attainable by the industry of the labouring poor.' (Philo, 2004:257)

## 2.6 Gender and Poverty in the 19th century

Legally, gender was never a focus of the Old Poor Laws (Hollen Lees, 1998:55). If a woman was capable of work then she was to be put to work for her relief. However, the social context of gender during the time period did result in different attitudes by poor rate officials. Due to the perceived dependency of women on men, it was easier for a single mother to gain aid whereas men would have less chance of their application being granted (Hollen Lees, 1998:57). Single or widowed mothers were, however, less likely than their male counterparts to be remarried and their work opportunities would have been more limited, making them more likely to have to apply to the parish or union for aid (Goose, 2006:351). With women's wages being between a third and half that of men's, it is of no surprise that single women would have at some point relied on the poor rate for help.

In the 19th century, there was an assumption on the part of the upper and middle class men that their 'womenfolk' were an extension of themselves (Hilton, 2006:353), and would therefore have no legal identities outside of their husband or fathers. It was only widows that would experience any semblance of legal freedom. The authors of the New Poor Laws believed that if a woman did enter the union workhouse it was due to some moral failure on the part of her husband or father that led her to destitution (Hollen Lees, 1998:55). Working-class women were largely blamed for the increase in the illegitimacy rates during the 1830s and 40s, as Poor Law officials believed that these women were deliberately 'acquiring bastards' in an attempt to increase their relief hand outs (Hilton, 2006:577).

Indeed, modern research into the New Poor Laws, by the likes of Goose (2006) and Boulton (2012), have identified that there were a large number of women utilising the workhouse as a form of laying-in hospital to give birth. Significantly, however, older women were more likely to be employed as co-residents for their domestic skills, with elderly males often left in the workhouse (Goose, 2006:368).

## 2.7 Change in Medical Care Available within the Union Workhouse

Modern historians still know very little about the domestic care of the poor in times of sickness (Levene et al., 2012:15), though it can be argued that illness would have been a common cause of destitution (Boulton et al., 2013:65). The parish workhouse (Old Poor Laws) provided care for the

infirm poor, and was also used to store bodies prior to burial (Siena, 2013:32). The infirmary within the workhouse was utilised for providing care for people who were 'excluded from care due to economics, connections, morality or diagnosis' (Siena, 2013:34), a practice that would continue during the New Poor Laws (Marks, 1993:519; Tomkins, 2013:87). While the parish and union workhouse became a place where the poor could gain access to medical care, it was also one where epidemic diseases would spread rapidly (Marx, 1968:224). In a committee report in 1909, an investigation into the state of medical care in the union workhouses, reported that 'medicine and care were hard to come by inside the workhouse' as the supplies that were desperately needed were not provided by the workhouse guardians (the assistant commissioner or the workhouse master or matron) (Wakefield et al., 1909:175). The buildings that housed the sick wards were also reported to be inefficient in preventing illness, with no bathrooms or sources of water, and no surgical supplies provided. The sick were not isolated or separated, which contributed to the spread of various contagious conditions. The doctors employed by the Poor Law Commission to care for the inmates were underpaid, with one interviewed for the report receiving a salary of £70 per year from which £25 was used to purchase the medicine and supplies that he would need to treat the workhouse patients (Wakefield et al., 1909:190). It was recorded in one Welsh union, outside of Cardiff, that the Poor Law doctors had their own private practices, which took precedence above the poor (Stewart and King, 2004:76). This led to the Central Board of Health asserting that "institutionalisation was a greater evil than allowing the poor to fend for themselves in the community" (Miller, 2012:452).

## 2.8 Treatment of Children in the Poor Laws

As discussed briefly above, there were a few poor law officials during the 19th century who believed that pauper women were having multiple children in an attempt to receive more aid (Hilton, 2006:577). The parish officials under the Old Poor Laws were responsible for any child within their parish who was born to legally settled parents (Hollen Lees, 1998:53), or any illegitimate children that were found within the parish boundaries (Boulton, 2007:134; Walsh, 1973:233). After 1722, parish officials were placing children six years or older into the workhouse or houses of industry, while infants

were 'farmed out' to parish nurses (Green, 2009:271; Smith, 1979:71). This act of removing the infants from the workhouse and sending them away was probably an attempt by the overseers to 'thin the numbers of the poor' (Hollen Lees, 1998:54). Jonas Hanway, a London philanthropist and reformer, recorded that between 1750 and 1755 there were around 2,300 children who were admitted into the parish workhouse, but only 7% would have survived to adulthood (Hollen Lees, 1998:54). By the late 18th century, it was common practice for the poor law officials to apprentice out pauper children (Levene et al., 2012:17). New Poor Law officials continued to send pauper children who were older than 12 years outside of the parish for their apprenticeships, some of which would have been sent to Northern England to work in factories (Beales, 1948:320; Honeyman, 2007:120; Levene, 2010:930, 2008:45). The younger children would have been separated within the workhouse from the adults, and would have spent their time in the workhouse schools, while some would have been sent to a different workhouses or industrial schools to provide training in various trades (Figure 2-3) (Green, 2009; Murphy, 2002; Newman, 2010; Rogers, 1991; Tanner, 1999).

***Figure 2-3: Children at the Lambeth workhouse, late 1800s. (Higginbotham, 2013b).***

In a report compiled by William Farr, a pioneering Victorian statistician and epidemiologist, in 1839 there were 63 deaths recorded that were linked to starvation with the City of London. Of these 36 were infants, who would have died due to a lack of appropriate nutrition as their mothers had also died (Hamlin, 1995:858). Farr believed that these deaths indicated a wider particular economic

condition that was affecting members of the lower socioeconomic class, and that the aid under the New Poor Law was doing nothing to help.

## 2.9 Conclusion

Poverty in and of itself is a relative term that can only be defined by the relevant standard of the contemporary culture. It was never the point of the poor laws to eliminate poverty completely, as prior to the mid nineteenth century it was viewed as a "normal God-ordained, and desirable part of the social order" (Hollen Lees, 1998:25). During the late 18th and early 19th centuries, social attitudes towards the poor changed. Instead of being seen as people who needed aid, the lower socioeconomic classes, were viewed as morally corrupt and responsible for their condition. The New Poor Laws and the reforms to workhouses and poor relief, reinforced by social opinion, reflected this change with an abandonment of outdoor relief and the creation of the 'principle of less eligibility' (Oxley, 1974:82). Outdoor Relief was seen as the cause of an excess population who were perceived as lazy and immoral. This reduction in welfare meant that only the impoverished would seek aid through a system that acted as a deterrent (Hollen Lees, 1998:191; Miller, 2013:951; Nicholls and Willink, 1898b:116).

Chapter Three will outline the materials and methods that were utilised within this study, including a discussion of the historical context of the five study cemeteries, as well as the pathological conditions associated with lower socioeconomic populations. Methods will be discussed in reference to workhouse dietaries, osteological collections and the historical sources consulted.

### 2.9.1 Key Points

- Old Poor Law, 1601-1834
    - 43 Elizabeth c. 2 in 1601 is the 'textbook' foundation of the Old Poor Laws.
    - The poor rate and the poor were maintained on the parish level, typically in the form of a payment.
    - The poor rate was administered by yearly-elected Overseers of the Poor.
    - Relief was given as the Overseers saw fit.
    - All poor were deserving of relief.
    - Paupers would only have a right to relief in the parish which they claim settlement.
    - Paupers were employed when they were able, alms given if unable.

- New Poor Law, 1834 onwards
    - 1834 Poor Law Amendment Act altered the existing poor laws, became the New Poor Laws, nationalising all relief, and the diets of the workhouse were changed along with the legal policies.
    - The poor rate and the poor were maintained on the national level.
    - 'Outdoor relief' was prohibited, relief only available indoor the workhouse.
    - Multiple parishes were grouped together to create unions.
    - The workhouse became a site of incarceration and moral reformation.
    - Employment was focused on moral reformation- menial and hard (stone breaking, etc.)

# Chapter 3 Materials and Methods

This study is dependent on the existing bioarchaeological and historical records of five Post-Medieval London cemeteries, as well as the surviving contemporary London parish burial records and workhouse registers. Workhouse dietary menus were also examined in order to determine and compare the nutritional resources available for the inmates both before and after the 1834 Poor Law Amendment Act (New Poor Laws).

This chapter will outline the materials and methods used within this study, including the rationale behind the selection of sites and historical sources. By placing the five cemeteries within their historical context and linking them with their associated records, it will be shown that sites were selected based on their use as pauper and workhouse burial sites both during the Old and New Poor Laws. This allows for a comparative analysis of the effects of the New Poor Law changes in 1834, as well as an overall understanding of the health of London's poor. As this study also uses historical records to outline discharge and admittance into workhouses, and diet and work rotas, these sources will also be discussed below and placed within their broader historical context. Finally, the five pathological categories indicative of poor diet and living conditions will be outlined. The methods used to analyse the nutritional values of workhouse diets, as well as the work rotas, will also be discussed.

Pre-existing published and unpublished osteological records from five cemeteries from Post-Medieval London were used in the study. These were obtained from the Museum of London's Centre for Human Bioarchaeology's online database (WORD database from here on), as well as unpublished reports from the St Bride's Lower Churchyard (Miles & Conheeney, 2005) and Broadgate (Dyson et al., 1987) cemeteries, provided by the London Archaeological Archive and Research Centre (LAARC).

This was a desk-based study utilising published and unpublished osteological reports from the Museum of London Archaeology (MoLA), one cemetery report from the London Archaeological Archive and Research Centre (LAARC), and parish and workhouse registers that have been digitised by the London Metropolitan Archive.

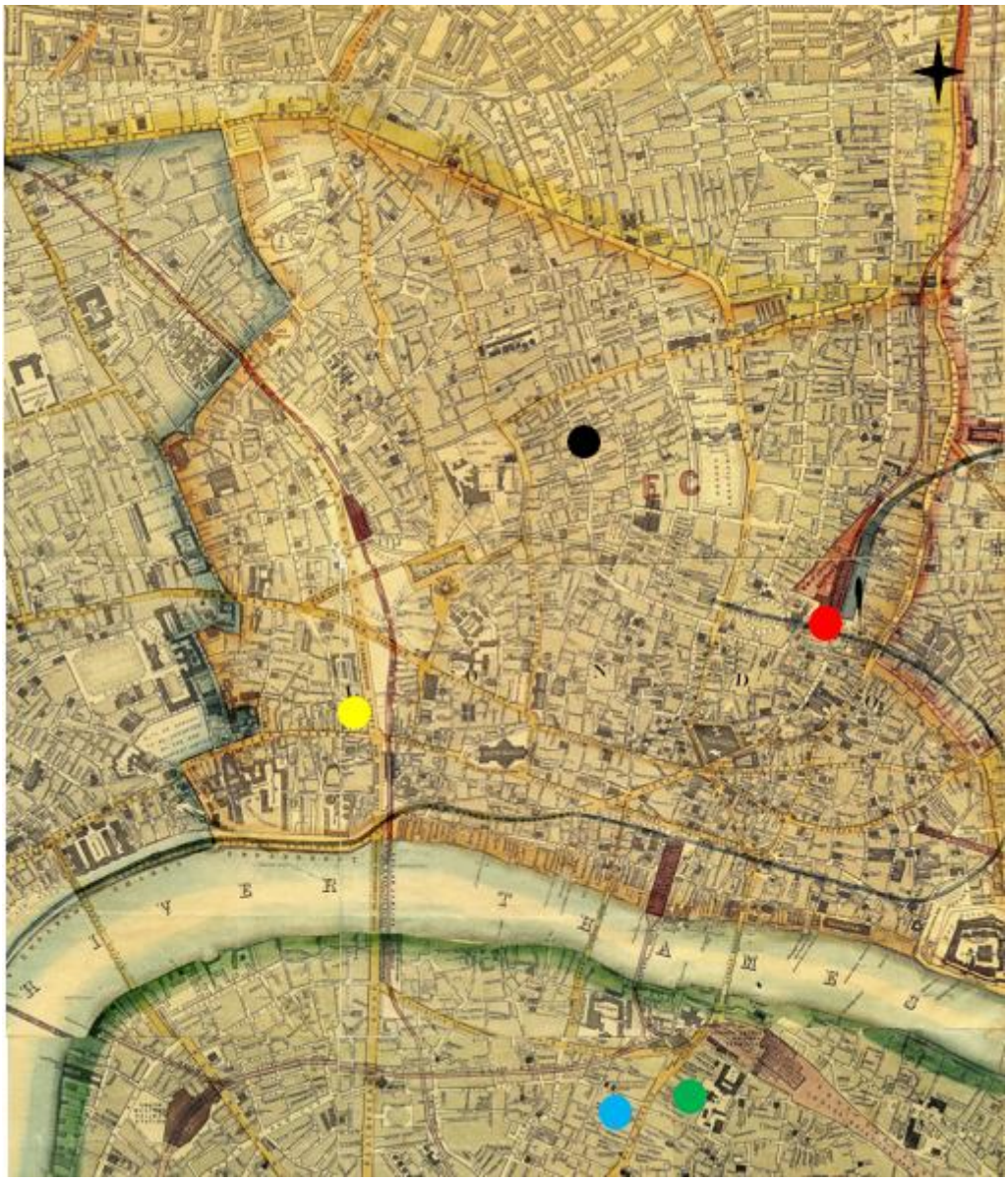


*Figure 3-1: Historic map of London (Weller and Dower, 1868). Showing all site locations (clockwise from top): Black circle- City Bunhill; Red circle- Broadgate (New Churchyard); Green circle- St Thomas Hospital; Blue circle- Cross Bones; Yellow circle- St Bride's lower churchyard; Black star- Shoreditch Union Workhouse.*

## 3.1 Rationale behind Site Selection

Five cemeteries were chosen in the study (Figure 3-1), which date to the periods prior to and post-workhouse reform in 1834 (Table 3-1). All five cemeteries served lower class and workhouse populations within London (Boulton and Schwarz, 2010; Brickley and Miles, 1999:22; Carver, 2012; Cherryson et al., 2012; Connell and Miles, 2010; Dyson et al., 1987; Geber and Murphy, 2012; Harding,

2002; Harris, 2013; Matic, 2003; Miles and Conheeney, 2005; Newman, 2010; WORD database, 2012a, 2012b, 2012, c, 2012, d, 2012e).

Both the St Thomas and Broadgate cemeteries, which were in-use between the 16th to early 18th centuries (WORD database, 2012e; WORD database, 2012a), were considered to be related to periods of burial during the Old Poor Laws. In contrast, the populations of the St Bride's lower (WORD database, 2012d) and Cross Bones (WORD database, 2012c) cemeteries can be dated from the late 18th to mid-19th century, a period during which Union Workhouse reforms and the New Poor Laws were in effect. Finally, the sub-urban 19th century population from City Bunhill was also chosen in order to provide a comparative analysis of independent poor populations.

The five cemeteries provided a total of 1,271 analysed individuals (Table 3-1). These were divided into categories based on their date of burial during the Old or New Poor Laws. Parish, or Old Poor Law, samples from two cemeteries provided a total of 340 analysed individuals (27% of study sample), whilst Union, or New Poor Law, samples comprised a total of 692 analysed remains (54% of study sample). The final 239 analysed individuals (19% of the study sample), were excavated from the independent labourer cemetery of City Bunhill.

*Table 3-1: Post-Medieval London cemetery dates, number of individuals and study category.*

| Cemetery | Dates | Number of analysed remains | Study Category |
|---|---|---|---|
| **St Thomas' Hospital** | 1540-1714 | 193 | Parish (Old Poor Laws) |
| **Broadgate** | 1569-1714 | 147 | Parish (Old Poor Laws) |
| **St Bride's lower** | 1770-1849 | 544 | Union (New Poor Laws) |
| **Cross Bones** | 1800-1853 | 148 | Union (New Poor Laws) |
| **City Bunhill** | 1833-1853 | 239 | 19th century Independent |

### 3.1.1 Historical Background for Cemeteries Relating to the Parish (Old Poor Laws)

In order to fully justify the choice of site selection, the historical background and contemporary historical records associated with each cemetery will be discussed below.

*A. St Thomas Hospital cemetery*

The St Thomas' Hospital was located in Southwark (Jones, 1991:8) (Figure 3-2) and was associated with a Post-Medieval cemetery, excavated by the Museum of London in 1991 (WORD database, 2012e). The hospital, dedicated to St Thomas the Martyr, was founded in 1106 and rebuilt during the 13th century, with the aim of treating the sick and poor of St Saviours (Southwark) parish(Jones, 1991:18; Nicholls and Willink, 1898:177). During the dissolution of the monasteries under Henry VIII, the monastic hospital was closed in 1540, but reopened as a parochially run hospital in 1552 (Cunningham, 1849b:372; Leonard, 1900:27), making it one of only three hospitals to survive the dissolution (Roberts and Cox, 2003:319).

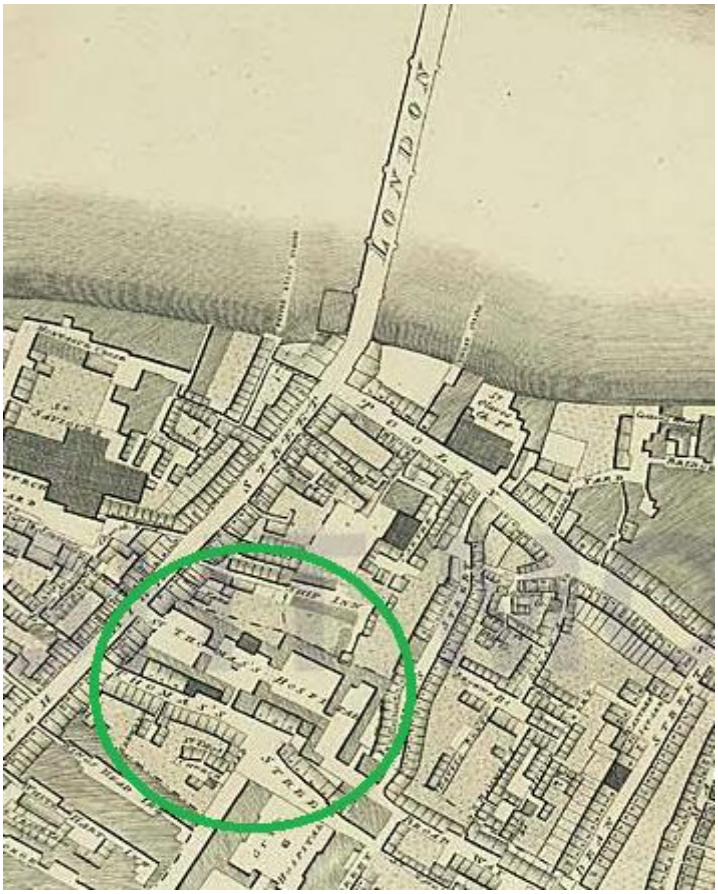



***Figure 3-2: Historic map extract for St Thomas Hospital, (Horwood, 1799). The green circle indicates the location of St Thomas Hospital.***

John Stow (see Chapter Two: Historical Background) noted that in 1598, parish officials were sending 'the aged, impotent, sick… lame, or blind' applicants for poor relief to St Thomas' Hospital (Stow,

1987:240). Certain rules were established by 1635 (Siena, 2004:67) that restricted the type of patient and care that was available from the hospital (*ibid.*.).

Patients with chronic illnesses (or those who would have required extensive recovery period) who had been previously discharged from St Thomas' Hospital were not allowed to be re-admitted with the 'same complaint' (Jones, 1991:23). There were to be no patients with the 'fowle (*sic*) disease' (i.e. syphilis) admitted unless there was room within the ward (Siena, 2004:68). Patients who were admitted to the hospital were expected to provide a fee to cover funeral costs should they die, or have a certificate from the parsons of their parish that stated that the parish would provide the funds to pay for the funeral (Jones, 1991:23). Early burials within St Thomas' cemetery were interred using a shroud to save costs, and only after 1697 were coffins provided (Jones, 1991:19).

The site excavation revealed three burial trenches that have been interpreted by archaeologists as either epidemic burials or pauper graves (WORD database, 2012e). There were multiple rows of individuals who had been stacked on top of each other in all trenches, and in the largest trench some of the individuals had been laid directly on top of each other with no dirt separating the bodies (Jones, 1991:31).

There were a total of 227 articulated individuals that were recovered during the excavation carried out in 1991 by the Museum of London. The articulated remains were recovered from beneath disarticulated remains that would have comprised part of a charnal pit (WORD database, 2012e). The site was dated to the 17$^{th}$ century by the remains of decorated pottery (Jones, 1991:28). Of the 227 individuals that were recovered, 193 have been analysed by the Museum of London to date (WORD database, 20123).

### *B. Broadgate burial ground*

The New Churchyard (Broadgate) was established in 1559 by the Mayor of London in east central London in an effort to relieve the burden on city parish cemeteries, and was utilised until 1714 (Pinhasi et al., 2006:373; WORD database, 2012a). The churchyard was the first early modern non-parochial

cemetery, and was set up and maintained outside the local parish church (Carver, 2012:2; Harding, 2002:53). Historically, individuals who were buried in the New Churchyard were typically recorded in local parish records across London (Carver, 2012:3), meaning there is no main register of burials associated with this burial ground. This cemetery was not associated with a parish, so the burial fees were much lower or completely waived, indicating that this cemetery was used primarily for the interment of poor individuals (Carver, 2012:3), and the majority of people were buried without coffins (burials dated 1593-1603, see phasing plan in Appendix One). The typical profile of the New Churchyard during the 16th and 17th centuries was comprised of servants, suicides, non-conformists, unclaimed bodies of prisoners from the prison or workhouse, and plague victims (Harding, 1993:52). In 1665, overcrowding prompted the closure of New Churchyard, with orders given to 'cover the ground…and burn pieces of coffin boards lying around' (Carver, 2012:4). Burials did continue however, with individuals being interred in single cut graves, rather than mass burial pits, the last of which was in 1714 (Harding, 1993:52).

The last map to record the New Churchyard as a burial site was Rocque's map of 1738-47, and by the end of the 18th century it was being labelled as a garden (Carver, 2012:5) (Figure 3-3). The burial ground has been disturbed a number of times due to rail construction - first in 1829 with the construction of Liverpool Street, and Broad Street Station in the later 1880s (*ibid.*.). Approximately 400 individuals were recovered from excavations during the 1980s, though only 150 have been analysed and therefore used as part of this study.

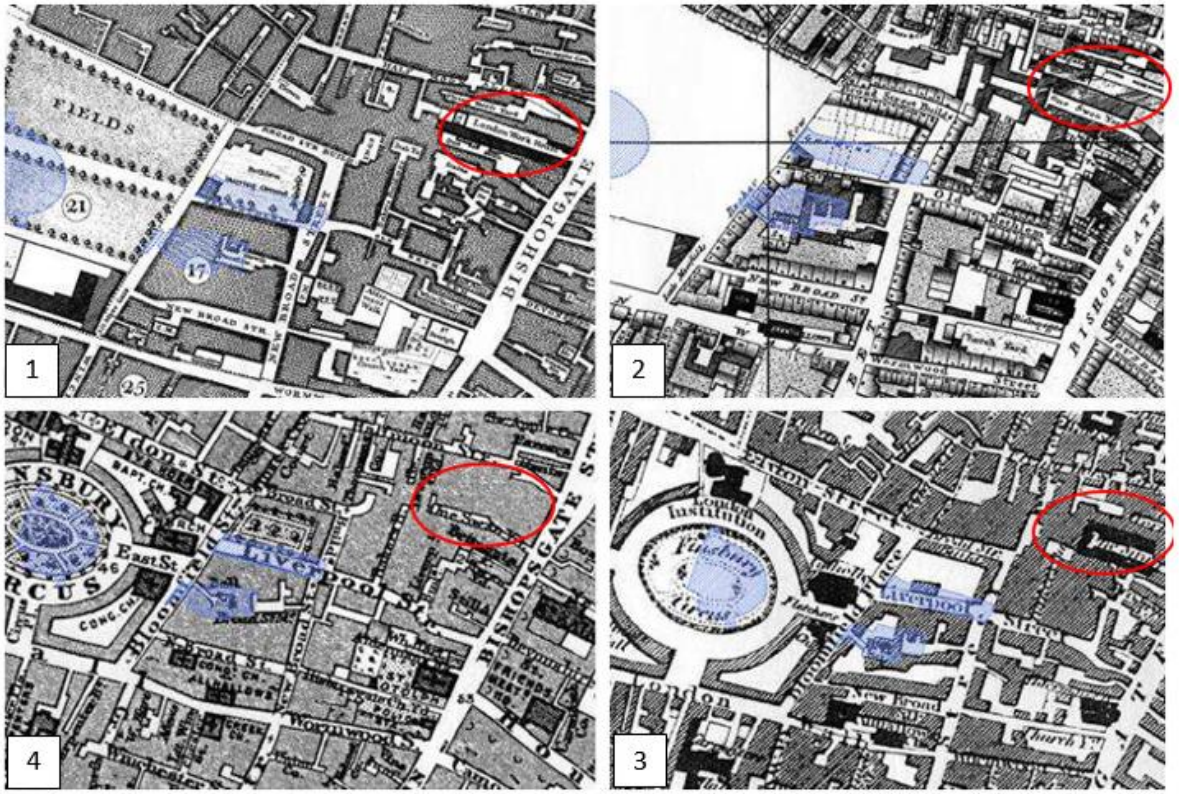



*Figure 3-3: Historic map extracts for Broadgate (New Churchyard). Clockwise from top left: 1- Rocque 1746; 2- Horwood 1799; 3- Greenwood 1824; 4- Standford 1862 (Carver, 2012:2). The shaded blue areas on the maps are the current locations of Cross Rail construction (ibid..). While the red circles indicate the location of the City of London Corporation of the Poor Workhouse.*

As of this year (2015), a further 3,000 individuals have been excavated as part of the Cross Rail project (Carver, 2012).

### B.1 Historical Records relating to the New Churchyard (Broadgate)

In 1698, The City of London Corporation of the Poor (LCotP) attempted to provide work spinning wool to London's poor which allowed them to continue to live independently (Hitchcock, 1985:102). Given the costs associated with the scheme, however, a number of City parishes complained and the original scheme was abandoned in favour of a residential workhouse(Higginbotham, 2013b). The City of London Corporation of the Poor Workhouse was opened in 1700 on Bishopsgate Street, located on the same street as the New Churchyard () and was 'to employ all the poor Children, Beggaars (*sic*), Vagrants, and other idle or disorderly persons' (Higginbotham, 2013a; Hitchcock, 1985:102).

Given the location next to the workhouse it is probable that individuals dying in the workhouse were interred in New Churchyard. Burial records from the LCotP workhouse were therefore analysed to

provide an example of a historical demography of a Parish (Old Poor Law) workhouse. The names, age at death, and residence, were noted so that the recorded population could be compared with the osteological demography.

### 3.1.2 Historical Background for the Records Relating to the Union (New Poor Law)

#### *A. St Bride's lower churchyard*

St Bride's lower Churchyard in Central London, on the north bank of the river Thames, was established as an overflow cemetery for the churchyard of St Bride's Church Parish (WORD database, 2012d). It was within the ward of 'Farringdon without', which was the largest of the 26 wards of London (Cunningham, 1849a:32). Parish records indicated that the lower churchyard was used for the burials of inmates from nearby Bridewell workhouse and even Fleet Prison (Figure 3-4), but there were also other individuals of lower socioeconomic status who were buried within the lower churchyard (*ibid.*.). The parish was described in 1843 in Edwin Chadwick's sanitary report as a filthy and unpleasant place:

> *The houses are generally remarkable for their dirty and uncomfortable appearance, and are mostly without any proper receptacle for dirt and ashes. The population is very dense; 15 to 20, and, I am informed, sometimes 30 persons, inhabiting one house, consisting of six rooms. The general condition of the population is very bad, particularly as regards the women and children, who are more confined to these localities than the men, the latter generally being employed elsewhere during the day-time. Many of the persons renting these houses suffer in pocket by letting lodgings to parties who never pay; and in health, by thus crowding their families, so as to induce disease and infectious disorders.* (Chadwick, 1843)

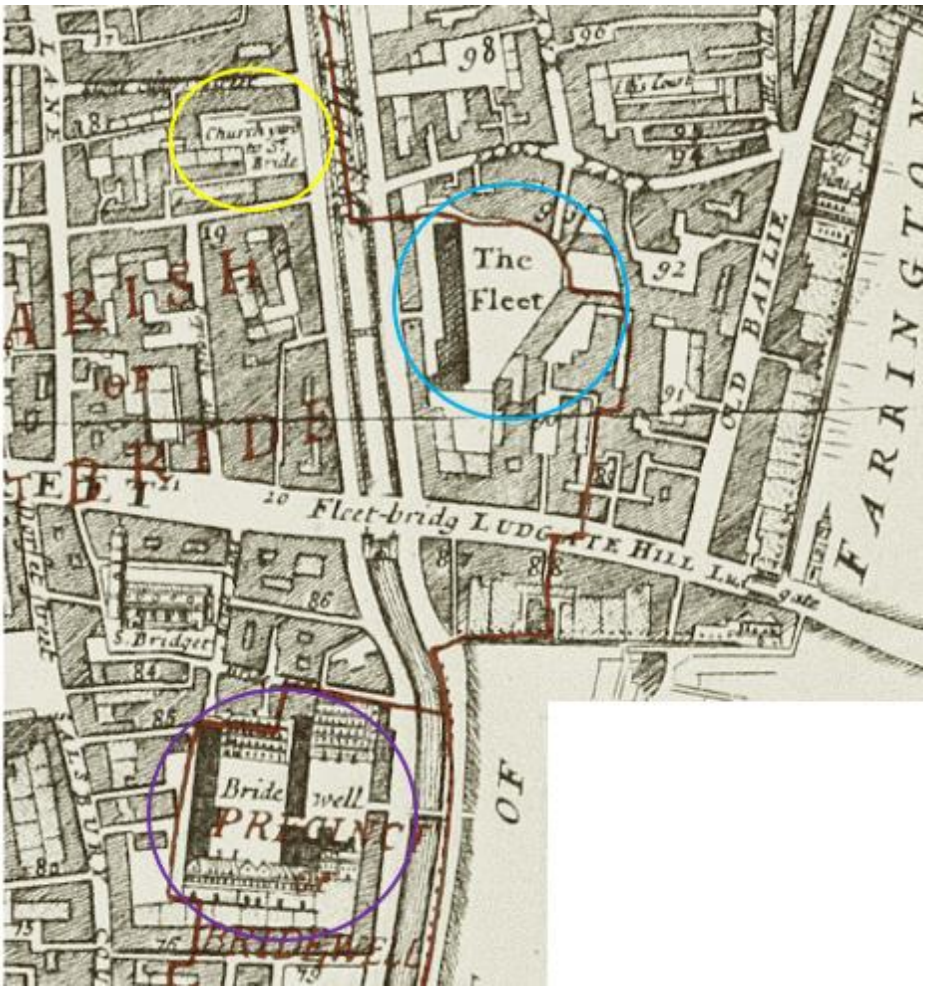



***Figure 3-4: Historic map extract for St Bride's Fleet Street, map drawn in 1755 and was commissioned for Stow's survey of London (Stow, 1987). The yellow circle indicates the location of St Bride's lower churchyard, while the light blue circle shows the location of Fleet Prison and the purple indicates the Bridewell workhouse.***

The last burials within the cemetery were recorded by parish records in June 1849 after which it was closed for burials completely. Mrs Isabella Holmes, a chronicler of London burial grounds during the late 19th century, recorded in 1895 that the former burial ground had 'no tombstones and the ground is untidy' (Holmes, 1897:319). Between the years of 1874 and 1903, the Third City of London Rifle Volunteers utilized the disused burial ground as a parade ground (Miles & Conheeney, 2005).

The excavation of the cemetery was carried out by the Museum of London between late 1991 and early 1992 (Brickley, 1997:107). There were a total of 606 individuals who were excavated, most of whom had been buried in coffins, which were stacked on top of each other in large open pits (WORD database, 2012d). These pits would have been kept open until they were completely filled, with

women and children typically placed on top (Brickley and Miles, 1999:30). Of the recovered individuals, 544 were analysed by the time of this study, representing 50% of the original burial population in the lower churchyard (WORD database, 2012d).

### A.1 Historical Burials Records for St Bride's Parish

For the paupers that died in the workhouse, the price of the funeral was charged to their parish of settlement, as outlined by the Fifth Report of the Poor Law Commission (1839:49-50). The parish was to bury the workhouse inmates in the churchyard or burial place of the parish in which the workhouse was located. This stipulation by the Commissioners was unpopular with the parishioners as the burials of the workhouse inmates were increasing the number of burials within the parish churchyards (Brickley and Miles, 1999:8).

The burial records from St Bride's parish lower ground were analysed alongside the St Bride's lower archaeological site. A total of 579 entries from 1824 to 1844 whose final residence was given as a workhouse, hospital or prison were recorded. The names, age at death, and residence, were noted so that the recorded demography could be compared with the osteological demography. The perceived cause of death was also recorded.

### *B. Cross Bones burial ground*

The Cross Bones burial ground in Southwark, on the south bank of the river Thames, was established as early as the 17th century and was believed to have been a burial ground for prostitutes (Brickley and Miles, 1999:10). It is located on Red Cross Way in the parish of St Saviour's, and included in the ward Bridge Ward Without (Cunningham, 1849b:284). The Bankside, the Clink, and the Stews comprised the area surrounding Cross Bones burial ground. The Bankside was the 'old seat of every vice, dissipation and amusement' (Cunningham, 1849c:52). The Clink was the old prison and liberty in Southwark, and fell under the jurisdiction of the Bishop of Winchester (*ibid.*.). Whilst the Stews were a district within Bankside where the bordellos and prostitutes resided (Cunningham, 1849b:314). The burial ground has a history of being associated with 'single women' (prostitutes). The first published mention was in Stow's 1603 *Survey of London* that 'these single women were forbidden the rites of

the church… and were excluded from Christian burial' (Stow, 1987:361). As the burial ground was unconsecrated, during the 19th century it was used typically for poor or pauper burials (Brickley and Miles, 1999:7). During Booth's survey of London when he was creating his poverty map (Anon, 2002), the area surrounding the burial ground was coloured black which indicated an area of the 'lowest class' who were vicious and semi-criminal (Figure 3-5).

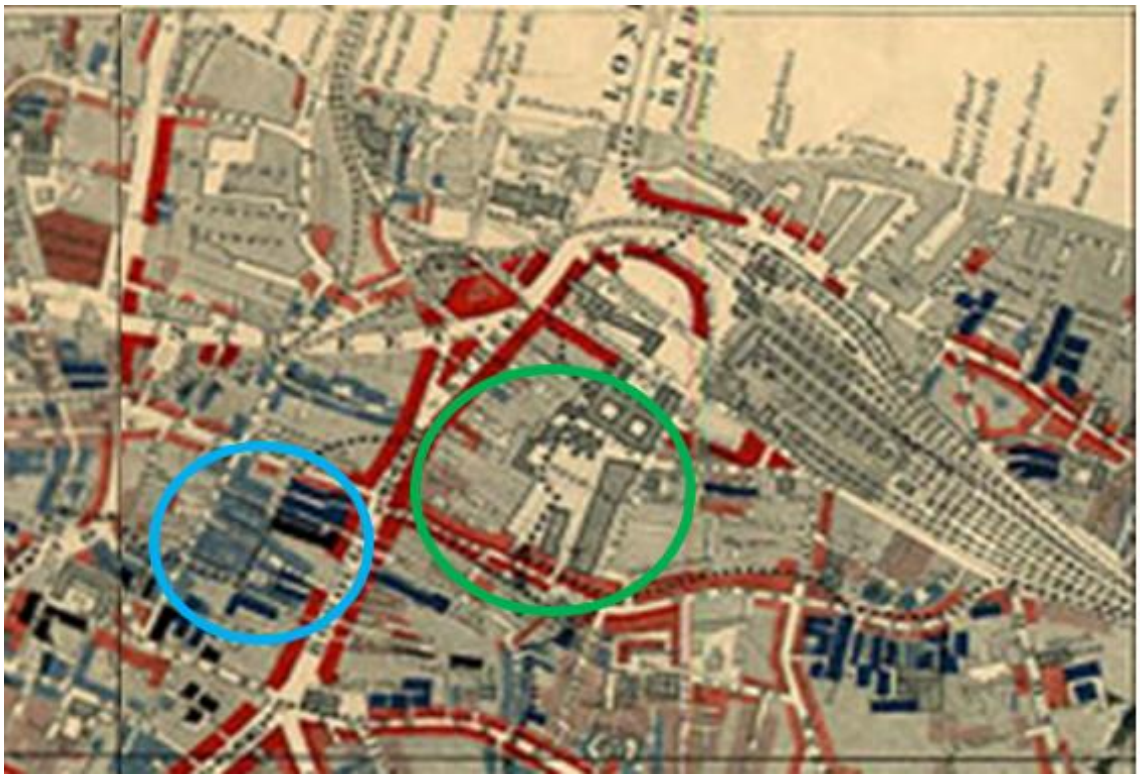


*Figure 3-5: Historic map extract for Cross Bones burial ground, Booth's poverty map of 1898-99 (Booth, 2002). The blue circle indicates the location of Cross Bones burial ground, while the green circle indicates the former location of St Thomas Hospital.*

Cross Bones burial ground was excavated under rescue conditions as a result of the Jubilee Line extension (Brickley, 1997:102; Harris, 2013:159). Due to the extent of the cemetery many of the human remains were improperly recorded and excavated, and were subsequently lost (Brickley, 1997:102). From those that were recovered during the excavations of 1992, 148 individuals were analysed (WORD database, 2012c). The 148 individuals are thought to date to the last 50 years of use during 1800-1853 (Miles, 1993). The burials excavated in Cross Bones burial ground, like that of the contemporaneous St Bride's lower churchyard, were stacked coffins that would have been placed in

large pits (WORD database, 2012c). However, because of the time constraints of the excavation, none of the burials pits were completely excavated like St Bride's. The incomplete excavation of this cemetery introduces the possibility of a bias towards children and infants, as the cemetery patterns observed in other contemporaneous sites across London would suggest that the lower levels of the burial pits would have contained more adults (Brickley and Miles, 1999:24; WORD database, 2012c).

### B.1 Historical Burials Records for St Saviour's Parish

The burial records from St Saviour's parish for the Red Cross Way burial ground were analysed alongside the Cross Bones archaeological site. A total of 1230 entries were recorded between 1824 and 1844 from individuals whose final residence was documented as a workhouse, hospital or prison. The names, age at death, and residence, were also noted so that historical mortality could be compared with the osteological demography.

In 1838, the population in the St Saviour's parish was 31,711 individuals and of this population, 1,856 were considered to be paupers (Brickley and Miles, 1999:23). The burial records for St Saviour's parish show that a large portion of the population were workhouse inmates (Brickley, 1997:106), and 25% of the parish burial records were individuals who died whilst an inmate of the workhouse (*ibid.*.). The burial record which is currently housed at the London Metropolitan Archive (accessible online on ancestry.co.uk), was utilised for this study to compare against Cross Bones' osteological sample. The limited excavations that were undertaken (see above) also indicate that the individuals that had been buried within this cemetery were the poorest members of society who were living within extreme poverty.

### 3.1.3 Historical Background for the 19th Century Independent Labourer Cemetery

#### *A. City Bunhill*

City Bunhill was a nonconformist burial ground opened in 1833 and closed for burials in 1853 (Connell and Miles, 2010:6) (Figure 3-6). The population around City Bunhill were poor labourers, typically Irish immigrants who would have been more likely to be buried in the cemetery (*ibid.*.). An article in *The Times* dating to 1842 indicated that the area surrounding the burial ground was one of the worst

ventilated areas in the City of London and was a 'thickly-inhabited spot… crowded with abodes of poverty and wretchedness' (*ibid.*.). A report compiled by a committee of the House of Commons was also quoted in *The Times*, stating that within City Bunhill 'public graves… were 30 feet deep, coffins would be stacked up to 16 or 18 high, and about 18 across. All opening filled with the smaller coffins of children' (Connell and Miles, 2010:19). Henry Mayhew would later describe the neighbourhood as a 'bad, ruffianly, thievish' area (Mayhew, 1861:237).

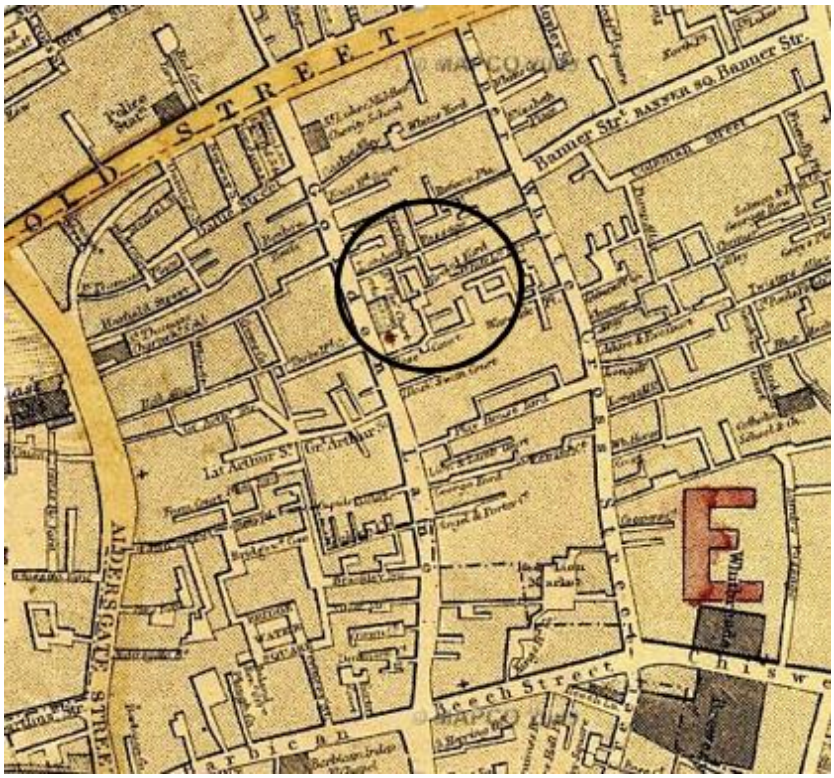



***Figure 3-6: Historic map extract for City Bunhill burial ground, Edward Weller 1868. The black circle indicates the location of City Bunhill burial ground.***

Mrs Holmes also wrote about the City Bunhill burial ground in her 1896 book, and stated that it was the former site of a brewery that was then turned into a burial ground (Holmes, 1897:291). By the end of the 19th century the area was split into thirds, with one third housing a carrier company, one third laying fallow, and the southern third was the site of the City mortuary and coroner's court (*ibid.*.). During the second World War, the site was hit by the German air raids which severely damaged the mortuary and coroners court (Connell and Miles, 2010:3), and a primary school was built on the site

in 1965. Excavation was carried out by the Museum of London in 1995 with 239 burials being recovered and analysed (WORD database, 2012b), which comprises 1.37% of the total documented burial population (18,036 individuals were recorded) (*ibid.*.).

### 3.1.4 Historical Sources to Study Workhouse Admission and Discharge

In order to examine the nature of workhouse demography, four historical sources were analysed. The City of London Corporation of the Poor workhouse burial records (Anon, n.d., a), burial records of St Bride's parish (Anon, n.d., b), the burial records of St Saviour's Parish (Anon, n.d., c), and the admission and discharge records of Shoreditch Union Workhouse (Anon, n.d., d). As outlined above, three of these can be related to osteologically examined populations - St Bride's, Cross Bones and Broadgate. By recording information such as name, age, and residence, workhouse demographics can be reconstructed and compared to the archaeological record.

Furthermore, admission and discharge records from Shoreditch Union Workhouse were studied in order to examine the cyclical nature of admission and the likelihood of death within a Union Workhouse. Records from Shoreditch Union Workhouse (1856-1870) were chosen because it was a complete record of admissions and discharges relating to a workhouse operating under the New Poor Laws and the 'principles of less eligibility' (Chapter Two: Historical Background).

#### *A. Shoreditch Union Workhouse Admission and Discharge Record*

Shoreditch is a parish located at the north-east end of London (Cunningham, 1849a:243) (Figure 3-7). Sir Isaac Newton towards the end of the 17$^{th}$ century, wrote in a letter that the parish was notorious for the 'easy character of its women' and the phrase 'to die in Shoreditch was not a mere metaphorical term for dying in the sewer' (*ibid.*.). By 1731, there were 84 inmates employed spinning mop-yarn within the parish workhouse associated with the church of St Leonard. These inmates were earning three pence per pound of yarn and provided with meals and board in the workhouse (Higginbotham, 2013b). A new workhouse was built in 1777, authorised by a special Act of Parliament (*ibid.*.), which included an infirmary and apothecary on the site. Due to the special Act of Parliament, the Shoreditch workhouse was outside the jurisdiction of the 1834 Poor Law Amendment Act (New Poor Laws),

though by 1847 its conditions were criticised by a parliamentary sub-committee due to overcrowding and poor sanitary conditions (Higginbotham, 2013b). As a result, Shoreditch Workhouse came to be included in the New Poor Laws.

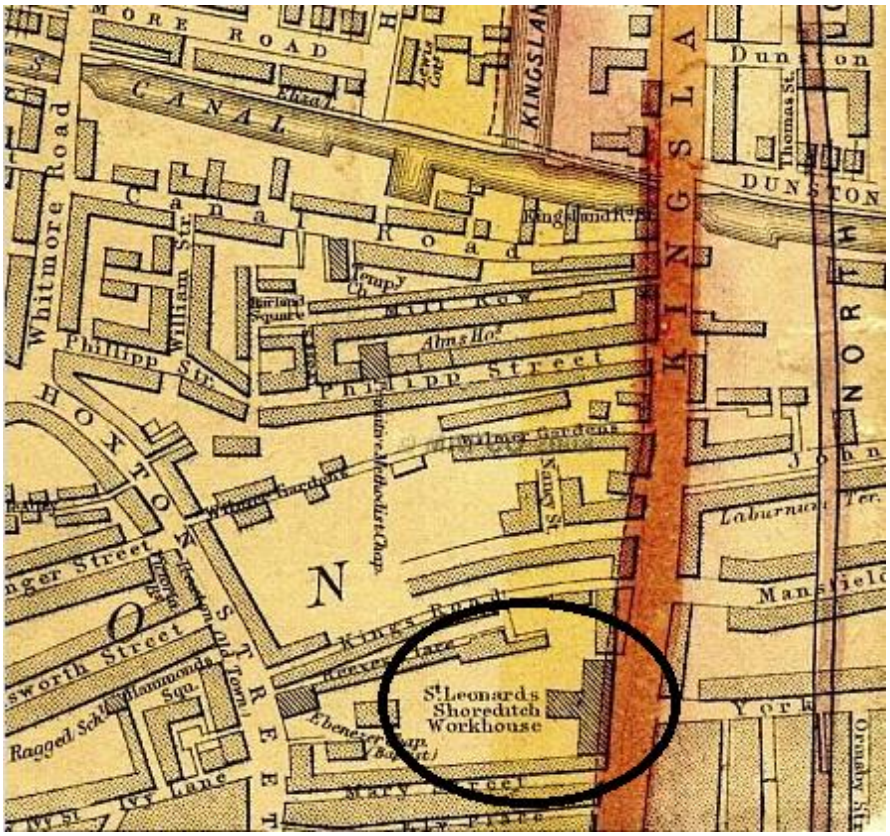



***Figure 3-7: Historic map extract for Shoreditch Union workhouse on Kingsland Road, Edward Weller 1868. The black circle indicates the location of the workhouse.***

The Shoreditch workhouse was the subject of a series of articles in 1865 published in *The Lancet* which sought to investigate the living conditions within the London workhouses (Anon, 1865). The article described that in the summer of 1865, Shoreditch workhouse had 700 residents. The medical officer indicated that 'seven-eighths may be considered as belonging to the permanent population' (*ibid.*.). This permanent population was divided by the medical officer into two age categories- 50-60 years and 70-80 years (*ibid.*.), which could have been an exaggeration on the part of the medical officer. All nurses that were employed within the workhouse were pauper nurses who were currently residing in

the workhouse, and were irregularly administering medicine to those in the infirmary (*ibid.*), in that they would occasionally choose not to deliver medicine to the sick.

While the workhouse and the infirmary were being rebuilt in the 1850 and 60s, a number of the inmates were transferred to the Wapping workhouse in Stepney, which had been condemned and abandoned, and was the subject of Charles Dickens' *The Uncommercial Traveller* (Anon, 1865; Higginbotham, 2013b). The Shoreditch trustees established the Brentwood Industrial School in 1852 so that the pauper children who were not old enough to be apprenticed could be educated in industrial trades. The boys were trained in the skills of engineers, carpenters, painters, tailors or shoemakers, while girls were trained for entry domestic skills so that they could be employed as maids when they were old enough (Higginbotham, 2013b).

The records dated from 1856-1870 were analysed to determine if there was a pattern of cyclical use of the workhouse inmates during the New Poor Laws. It was also utilised to examine how long the inmates would have stayed within the workhouse either before they were eventually discharged or died. There is no correlated osteological record for Shoreditch Union Workhouse.

## 3.2 Methods of Osteological Data Collection

This was a desk-based study utilising excel spreadsheets provided by the Museum of London for the five cemetery collections (WORD database, 2012a; WORD database, 2012b; WORD database, 2012c; WORD database, 2012d; WORD database, 2012e). These spreadsheets included a demographic breakdown of the cemeteries including age, sex, and recorded pathologies. Age determination for all cemetery samples were established utilising established methods, including tooth wear (Brothwell, 1981), phases of the public symphysis (Brooks & Suchey, 1990), the auricular surface (Lovejoy et al., 1985), and finally the costo-chondral method following Işcan *et al* (1985, 1984). Sex determination was established based on the visual assessment of sexually dimorphic skeletal features located on the pelvis and skull (Table 3-2).

*Table 3-2: Skeletal features utilised to determine sex (Connell et al., 2012).*

| Pelvic characteristics | Skull characteristics |
|---|---|
| **Greater sciatic notch** | Supraorbital ridges |
| **Preauricular sulcus** | Mastoid process |
| **Ventral arc** | Inion protuberance |
| **Medial portion of pubis** | Nuchal crest |
| **Subpubic angle** | Slope of the forehead |
| **Subpubic concavity** | Zygoma root |
| **Median ischiopubic ridge** | Gonions |

Within this study, when the osteological and historical records were compared, the youngest three age categories (perinatal, 1-6 months, and 7-11 months) were combined to create a category of 'infant', aged 0-12 months. This was done in order to correlate with historical records, in which any child between birth and one year of age was recorded as infant. All other age categories remain as they are outlined in *Standards* and the *Rapid Method for Recording Human Skeletal Data* (Buikstra & Ubelaker, 1994; Connell et al., 2012) (Table 3-3).

*Table 3-3: Age categories (Connell et al., 2012).*

| Age group | Description |
|---|---|
| **Perinatal** | IU-Neonate |
| **1-6 months** | Early Post-neonatal infant |
| **7-11 months** | Later Post-neonatal infant |
| **1-5 years** | Early Childhood |
| **6-11 years** | Later Childhood |
| **12-17 years** | Adolescence |
| **18-25 years** | Young Adult |
| **26-35 years** | Young middle adult |
| **36-45 years** | Old middle adult |
| **46 years +** | Elderly |

Originally, sex determination was broken into six categories (Female, Female?, Indeterminate, Male?, Male, and Unknown) (Buikstra and Ubelaker, 1994:21; Connell et al., 2012:9)(Table 3-4). This study compressed them into three (Female, Indeterminate, and Male). Probable female was included with female, probable male with male, and unknown and indeterminate were combined for ease of

analysis. As children's remains cannot be reliably sexed osteologically, they were left as they were (non-adult).

*Table 3-4: Sex determination codes used at the Museum of London (Connell et al., 2012).*

| Male | Male? | Intermediate/Indeterminate | Female? | Female |
|---|---|---|---|---|
| **1** | 2 | 3 | 4 | 5 |

All the pathological recording procedures that were utilised by the Museum of London were based on Roberts and Connell (2004:40-48). As this is a desk-based study, all age, sex, and pathological identification at the time of the study are assumed to be reliable.

### 3.2.1 Pathological Conditions Recorded

The number of individuals recorded with infectious, joint, metabolic, trauma, or 'other' conditions were recorded, along with the age and sex distributions. Crude prevalence rates were calculated utilising the number of overall pathologies. Each pathology was then analysed separately to determine the prevalence within the assumed parish or union workhouse samples. This study utilises crude prevalence rates as it is assumed that the level of recording for true prevalence to be calculated would not have been possible for all sites. Crude prevalence is determined by the total number of individuals who were recorded as suffering from a pathological condition. This prevalence rate is useful for creating an overall impression of the disease within a population. It must also be noted that different preservation levels may affect the figures that are produced within this study.

Past studies have shown that urbanisation and industrialisation had a detrimental effect on the health of an individual (DeWitte et al., 2015; Lewis, 2002; Powers, 2005; Redfern & Roberts, 2005). As people migrate into the cities there is a correlated increase in the presence of disease and injury (Ortner, 2003:8; Roberts and Manchester, 2010:1). The Museum of London records a total of nine fields for pathology codes which include: congenital, infectious disease, joint disease, trauma, neoplastic, metabolic, endocrine, circulatory, and 'other' disease categories (Connell et al., 2012:24). This study has focused on five broad pathological categories (infectious, joint, metabolic, trauma, and other)

prevalent within London's lower socioeconomic class. Some of these conditions are directly related to diminished diets, while the synergistic effect between infectious disease and poor nutrition will account for some. Manual labour and the generally lamentable living standards of London's 19th century poor were also responsible for poor health and well-being.

### *A. Infectious Conditions*

Infectious disease is considered to be the major cause of high infant mortality in ancient human populations (Ortner, 2003:180), with between one third to one half of all individuals dying before they reached sexual maturity (Carmichael, 1989:29; Ortner, 2003:180). With an increasing urban population in Victorian England the possibility of endemics (Ortner, 2003:180; Roberts and Cox, 2003:15), encouraged by close-quarters living and unsanitary living conditions (Powers, 2005:45), increased. The average life expectancy amongst London's poor is thought to have been around 20 years of age, given the high prevalence of infant mortality associated with the increase of infectious disease (Harding, 2002:55).

Studying infectious conditions is hampered by the 'osteological paradox' as infection that resulted in death rarely leaves a trace on the human skeleton (Wood et al., 1992). Only chronic sufferers of some diseases or survivors provide an osteological response, which therefore results in a bias in recognising the prevalence of disease in archaeological populations (*ibid.*).

#### A.1 Venereal Syphilis

Venereal Syphilis is a condition caused by the bacteria *Treponema*, which can remain latent within the human immune system from 3 to 30 years before eventually presenting with physical manifestations (Cole and Waldron, 2012:2; Ortner, 2003:273). However only 15% of untreated cases of syphilis would eventually present with skeletal lesions. When they do occur, these typically manifest on the tibia and the bones surrounding the nasal cavity or cranial vault (Ortner, 2003:279).

Venereal syphilis is an infectious disease that is transmitted via sexual contact between individuals. In Victorian England, the sufferers of the disease were stigmatised by society and it was often associated

with the lower classes (Siena, 2004:3). To avoid public embarrassment, family members of higher class individuals who died whilst suffering from syphilis, would often bribe officials to falsify Bills of Mortality (Siena, 2004:13). A few of the parish workhouses did provide mercury treatment, but only for first admittances of 'pox' sufferers, repeated applicants would be sent to Bridewell jail (Siena, 2004:135).

***Figure 3-8: Caries sicca lesions on the skull of a young female from Blackfriars*** (Anon, 2015b).

The diagnosis of treponemal disease can be difficult as yaws and venereal syphilis (two conditions that are caused by variants of the *Treponema* bacteria) are closely related, and many researchers have considered the skeletal lesions they leave behind to be virtually indistinguishable (Buckley and Dias, 2002:179). A combination of characteristics, when present together, can increase the certainty of diagnosis. The presence of *caries sicca* (Figure 3-8), gummatous foci, and 'sabre shin' are considered to be pathognomic of tertiary treponemal disease (Powers, 2012:40). There could also be lesions relating to destructive facial/nasal changes or aortic aneurysm recorded, though they are not pathognomic of the condition (*ibid.*).

### A.2 Tuberculosis

Tuberculosis is a chronic infection that is caused by the bacteria *Mycobacterium tuberculosis* (Ortner, 2003:227). The infection and maintenance of the disease is dependent on infected humans living within close proximity to maximise the spread of the contagion (Horrell and Oxley, 2013:148; Roberts

and Buikstra, 2003:20; Santos and Roberts, 2001:38). In most of the palaeopathological literature, tuberculosis has been considered to be a 'disease of poverty' (Horrell and Oxley, 2012:159; Roberts and Buikstra, 2003:55). Urbanisation and industrialisation of the Post-Medieval period saw an increase in the frequency of lower socioeconomic individuals suffering from the disease, due mostly to the poor living conditions. Tuberculosis has been described as an 'opportunist condition' (Castro, 1995:567; Mokyr and Ó Gráda, 2002:346; Steere-Williams, 2010:5), especially in individuals with an already suppressed immune system.

Tuberculosis was diagnosed macroscopically by the morphology of lesions and the distribution throughout the skeleton, based on criteria presented by Aufderheide and Rodríguez-Martín (1998), Ortner (2003), and Resnick (2002). The diagnostic characteristics of tuberculosis are: predominantly destructive lesions on the vertebral bodies or metaphyses of the long-bones; with a predilection for the lumbar and thoracic vertebral bodies, joints of the appendicular skeleton, and frequent vertebral collapse with kyphosis of the spine (Powers, 2012:39). Rib lesions, active or remodelling new bone, were also considered to be an extension of the spinal involvement of tuberculosis. In instances where the lesions were not confined to the rib head, but distributed over all or part of the shaft, they were considered to be caused by adjacent pulmonary infection (*ibid.*).

### A.3 Non-specific periostitis

The presence of periosteal new bone growth indicates that there was an irritation to the periosteum, which is not always restricted to an infectious process (Resnick and Niwayama, 1995:4435; Schultz, 2001:170). Periosteal new bone growth is considered to be a secondary reaction to infection (Oxenham et al., 2005:366; Roffey and Tucker, 2012:176), though it has been linked in past studies with the presence of syphilis or leprosy (Bennike et al., 2005:738; Buckley and Tayles, 2003:305; Hackett, 1976:7; Schultz, 2001:108). The condition is also a non-specific indicator of scurvy, tuberculosis, or even anaemia (Mays, 2008, 2013; Santos & Roberts, 2001; Sullivan, 2005; Vasalech, 2011). Periostitis could also be a bony response to a traumatic event (Ortner, 2003:208) as the periosteum can be irritated by a sudden or chronic insult to the bone. The most common area that

presents with periostitis is the tibial diaphysis. While the reasons behind this are unclear, it could be because the soft tissue covering the bone is thinner than in other locations (*ibid.*).

As stated above, periostitis presents as a bony proliferation (Figure 3-9) that results from the inflammation of the periosteum, and can be classified as healed or active at the time of death (Powers, 2012:38). As the ultimate cause of the reaction is unknown, 'periostitis' is the descriptive term for change to the bone that is diagnostic of inflammation (*ibid.*).

For this study, periostitis is analysed as an non-specific indicator of stress (Ribot and Roberts, 1996:69) that has links to metabolic and traumatic (Powers, 2012:38) events during the individuals life course in addition to infectious disease.

***Figure 3-9: Non-specific periostitis of the long bone*** (Anon, 2015c)***.***

## Relevance of Infectious Conditions in this Study

Infectious disease thrives in close quarters, and areas of poor hygiene, such as those that the lower socioeconomic classes of 19th century London would have resided in. Workhouses would not have been any better, as their infirmaries were typically staffed by inmates with inefficient medical oversight by Poor Law Doctors (see Chapter Two: Historical Background). Syphilis and tuberculosis have been associated with the lower classes historically (Smith, 1979:287), and an increase would

have been expected during the 19th century as more people were migrating into London during the 19th century creating even more over-crowding in the slum areas and workhouses.

### *B. Joint Conditions*

'Joint disease' covers various conditions with different aetiologies, though they all affect the articular joints of the skeleton. A number of factors influence the presentation of the various degenerative diseases including physical activity, occupation, workload, and age (Caffell and Holst, 2010:15; Ortner, 2003:561).

Joint disease was identified by macroscopic analysis following the criteria originally established by Ortner (Ortner, 2003:545-88), Aufderheide and Rodríguez-Martín (1998), Rogers and Waldron (1995) and Rogers *et al* (1987)(Powers, 2012:48). Criteria for identifying joint disease is based on location, severity, distribution and the type of lesion (formation or destruction) and relies on good preservation and the completeness of the skeleton (*ibid.*).

#### B.1 Osteoarthritis

Osteoarthritis increases in the frequency in which it presents, and the severity of the lesions, with age, though external factors (e.g. diet and climate) and intrinsic factors (e.g. sex, genetic propensity, obesity, etc.) could also influence the presence of the condition (Rogers and Waldron, 1995:55-63). Osteoarthritis is also the most common pathological condition, other than dental disease, that is observed on the skeleton and it affects any animal with synovial joints (Waldron, 2008:30). As the articular cartilage breaks down, a number of changes can be observed on the articulating bones, including: formation of marginal osteophytes; pitting on the joint surfaces; changes to the contour of the normal joint; and the production of eburnation (*ibid.*). Eburnation, a polishing of the bone due to constant contact, is pathognomonic of osteoarthritis on the dry skeleton (Figure 3-10) (Ortner, 2003:546; Roberts and Manchester, 2010:138; Waldron, 2008:32). There are two categories of osteoarthritis that affects the skeleton, the primary form tends to be a slow process associated with old age; the secondary form is a result of trauma or abnormal joints and can occur in younger individuals (Ortner, 2003:546). Osteoarthritis is most commonly recorded on weight-bearing joints

(i.e. hip or knee) (Roberts and Manchester, 2010:138). Clinically, osteoarthritis is associated with severe pain and disability (Jurmain, 1999:24; Rogers, 2000:163) which impacts the wider health of the individual.

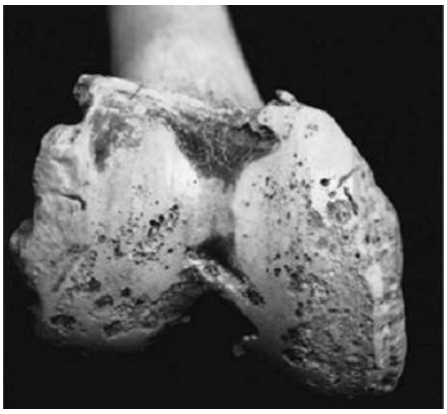


***Figure 3-10: Evidence of eburnation on the distal aspect of a femur*** (Anon, 2015c)***.***

Each joint surface with evidence of degenerative joint changes is recorded using the system of presence and absence. The severity of the osteophytes present and pitting is based on a three-point scale (slight, moderate, and severe) (Powers, 2012:48). The presence of eburnation is a diagnostic requirement for the presence of osteoarthritis.

While osteoarthritis is commonly associated with old age, studies that have linked osteoarthritis with occupational stresses (Henderson et al., 2013; Lai & Lovell, 1992; Rossignol et al., 2005). Rossignol *et al.* (2005), determined that there was a moderate link between the presence of osteoarthritis and occupation during their clinical study of 2002/2003 French patients. They found that a number of hard, manual occupations (I.e. commercial or industrial cleaners, construction workers, tailors, and masons) were more likely to have osteoarthritis than those with more sedentary occupations (i.e. clergy, teachers, managerial positions) (*ibid.*). It is this link with manual labour that is interest to this study as the workhouse inmates in the 19$^{th}$ century would have been employed in menial, hard labour and it would be expected that osteoarthritis would be more prevalent with the change to the New Poor Laws.

### B.2 Gout

Gout is caused by an increase in the level of uric acid within the blood stream (Ortner, 2003:583; Roberts and Manchester, 2010:161). The disease is uncommon within modern populations, presenting a prevalence of between 1-3%, though there is evidence that it is increasing (Rogers, 2000:173). Males are more likely to be affected, 9 out of 10 patients in modern studies are male (Ortner, 2003:583; Resnick and Niwayama, 1988:1619; Roberts and Manchester, 2010:162), and are most likely to be elderly (40 years or older) when the symptoms begin to manifest. The disease is associated with a rich diet and excessive alcoholic intake (Roberts and Manchester, 2010:162). In the Post-Medieval period, alcohol contained high traces of lead, due to the use of lead equipment and the adding of lead to improve taste. This addition of lead would, over time, have caused kidney failure and a subsequent increase of uric acid (Steinbock, 1976:309).

The diagnostic criteria utilised was the observation and description of sharply defined lytic lesions of the para-articular joint surfaces of the first metatarsal (Figure 3-11) (Aufderheide et al., 1998:108; Powers, 2012:49), with unilateral joint involvement.

***Figure 3-11: Lytic lesion on the 1st metatarsal*** (Anon, 2015b)***.***

### Relevance of Joint Disease to this Study

As stated above, there have been studies that have linked occupational stresses to an increase in the prevalence of osteoarthritis in populations. As workhouse inmates were employed in heavy manual labour while residing within the union workhouse, the increase in prevalence of osteoarthritis in the populations from St Bride's and Cross Bones could be indicative of the heavy labour.

Whilst gout is a disease of rich diets, or increased alcohol consumption, it would be expected for this condition to decrease as the diets of the poor after 1834 would typically not be comprised of rich foods that would have facilitated in the presentation of the condition.

### *C. Metabolic Conditions*

Metabolic bone disease refers to the conditions arising when the process of bone formation and remodelling are disrupted (Brickley and Ives, 2008:2). The majority of the conditions that are included within this study relate to the growth period (i.e. childhood) such as rickets and infantile scurvy, though some occur during adulthood (e.g. osteomalacia and osteoporosis). It is also important to note that evidence of rickets, occurring during childhood, may be retained in the adult skeleton. Furthermore, as it is common for an individual to be deficient in more than one vitamin, the presentation of more than one metabolic condition could occur at one time (Stuart-Macadam, 1989:219). During the Victorian era, these metabolic conditions were considered to be the 'special plague of the poor' (Snow and Dunnigan, 2003:340), even though higher status individuals were not completely immune to suffering from them. This study has focused on conditions that would have resulted from a deficiency of vitamins D and C.

Conditions were identified macroscopically and were assessed by the criteria established by Ortner (Ortner, 2003:383-418), and Aufderheide and Rodríguez-Martín (Aufderheide et al., 1998:305-44).

#### C.1 Vitamin C Deficiency- Resulting in Scurvy

Scurvy was not typically recorded with much reliability until the 1990s (Ortner & Ericksen, 1997; Ortner et al., 1999) when the diagnostic criteria became more reliable, which could underestimate the prevalence in skeletal populations that were analysed prior to the change in criteria. Scurvy is caused when an individual has a prolonged deficiency in vitamin C, which helps with the production of collagen within the body, essential for connective tissues and organs (Mays, 2008:180). Vitamin C cannot be synthesized within the human body, so it must be received through dietary means (Brickley and Ives, 2008:42). The skeletal changes of scurvy are often very subtle and mostly the side effect of soft tissue changes (Kozlowski and Witas, 2012:409). The most common effect that is associated with

scurvy is the manifestation of haemorrhages (Brickley and Ives, 2008:48) located at muscle attachment sites, e.g. the roof of the eye orbits. The intra-cranial haemorrhages due to the movement of the eyes are typically seen clinically as a manifestation of scurvy, and since the haemorrhages are occurring adjacent to the bone there would be an associated osteological response (Geber and Murphy, 2012; Mann and Hunt, 2005; Mays, 2008).

Symptoms of scurvy would take several months to become apparent (Maat, 2004:78), though it could be accelerated in children compared to adults. In addition to the haemorrhaging that was discussed previously, bone formation can be disrupted or halted entirely. The condition would manifest osteologically with profuse irregular and porous new bone on the ectocranial surfaces, especially on the greater wing of the sphenoid (Ortner and Ericksen, 1997:218), pitting on the lingual aspect of the mandibular rami, and the deposition of new bone on the diaphysis of long bone (Powers, 2012:52). New bone formation in the eye orbits and flaring of the sternal rib ends are also considered to be evidence of scurvy for the Museum of London (*ibid.*). It is also interesting to note that lesions associated with scurvy are most likely to manifest once vitamin C is re-introduced within the diet (Geber and Murphy, 2012:521).

### C.2 Vitamin D Deficiency

As vitamin D is essential for the absorption of calcium and phosphorus within the body (Roberts and Manchester, 2010:173), it is needed to maintain the bone matrix (Holick, 2005:2742). A deficiency in vitamin D hinders the mineralisation of osteoid, resulting in an excess of unmineralised cartilage and weakened bones that are easily deformed (Stuart-Macadam, 1989:207).

The pollution present in industrialised London would have led to reduced production of vitamin D, generated through contact with sunlight (Lewis, 2002:221). As a result, inhabitants would have relied upon an increase of vitamin D from dietary sources (e.g. fatty fish, fish liver oil, beef liver, cheese, and egg yolks) in order to maintain proper health. Three conditions relating to vitamin D deficiency have been examined in this study.

### C.2.1 Rickets

Caused by a lack of vitamin D, rickets is a disease of childhood. This disease extensively effects the skeleton of children, but is not fatal (Ortner, 2003:393). Skeletally, rickets presents in deformities in the weight-bearing bones, i.e. bowing of the long bones (Ortner and Mays, 1998:46; Pinhasi et al., 2006:374). Flaring of the metaphyses of long bones may also be observed (Mays et al., 2009a:411), and cortical bone porosity may be present throughout the skeleton (Brickley and Ives, 2008:97). The primary cause of rickets is a prolonged lack of exposure to sunlight, and a dietary deficiency. A fully clothed infant, without a hat, would need to spend 2 hours a week exposed to sunlight to generate the minimum amount of vitamin D required to maintain health (Brickley and Ives, 2008:77). As it was historically common to swaddle babies and keep them indoors and away from the polluted air (Picard, 2005:233), dietary vitamin D would have become far more important.

***Figure 3-12: Example of severe rachitic deformities of the tibia and fibula (Site and context number unknown)*** (Anon, 2015b).

The criteria regarding diagnosis of rickets were established by Mays *et al* (2006) and Ortner and Mays (1998). Diagnostic changes associated with rickets include: bowing of the long bones, particularly legs and humerus and forearms of infants (Figure 3-12); lack of cortical density; thickening of the cranium; the flaring and cupping of metaphyseal end; decreased curvature of the ribs; and rachitic rosary which is characterised by the enlargement or flaring of the sternal rib ends (Powers, 2012:52).

### C.2.2 Osteomalacia

Adults who are deficient in vitamin D may develop osteomalacia, which is caused by inadequate or complete failure of mineralisation of newly formed bone matrix throughout the skeleton (Brickley et al., 2007:69). The resulting bone will be soft, leading to a generalised weakening of the skeleton, with characteristic skeletal changes most typically found in the pelvis or vertebrae (Mays et al., 2009a:412; Mithal et al., 2009:1816; Wagner and Greer, 2008:1148). Osteomalacia is relatively rare within the archaeological record (Brickley and Ives, 2008:123), which could be linked to earlier osteologists misreporting the condition as fractures, poor preservation of the bone due to taphonomic changes, or incompleteness of the skeletal remains.

Osteomalacia is recorded where there is evidence of stress in the form of healed or hair-line fractures to the base of the acromial spine, especially when bilateral (Brickley et al., 2007:70). Evidence of vertebral collapse, stress fractures, decreased curvature of the ribs, and angular deformation of the sternum is also associated with osteomalacia (Powers, 2012:52).

### C.2.3 Osteoporosis

Osteoporosis is the condition of an ageing population, as it is mostly recorded in elderly individuals (Brickley, 1997:120; Mithal et al., 2009:1824). Osteoporosis causes the bones to thin increasing the likelihood of fractures (Mawer and Davies, 2001:154). The condition is also tenuously linked with vitamin D deficiency (Brickley and Ives, 2008:263; Brickley, 1997:120; Mawer and Davies, 2001:155).

The diagnostic criteria utilised from the Museum of London for osteoporosis included generalised cortical thinning, in addition to the presence of vertebral compression or femoral neck fractures (Powers, 2012:53). Aufderheide and Rodríguez-Martín (1998:314-15) also include diminished bone mass, vertebral micro-fractures, multiple healed/unhealed rib fractures, and increased porosity/lamination of the cortex as diagnostic features of osteoporosis (Powers, 2012:53).

### Relevance of metabolic conditions to this study

One of the main research questions of this study is focused on the change in the nutritional status of workhouse menus before and after 1834. It is expected that the status of the menus would decrease

following 1834, so there should be a correlated increase in the prevalence of osteoporosis, osteomalacia, rickets, and scurvy as the nutritional status of the diet was altered.

Osteoporosis is also indicative of ageing populations. This is relevant as all the historical research into union workhouses indicate that there was an increase in the number of elderly residents compared to parish workhouse populations.

### *D. Trauma Conditions*

Trauma is any bodily injury or wound that is sustained by an individual, and has been divided into four subcategories by Ortner (Ortner, 2003:120): partial or complete break in the bone resulting in fractures; abnormal displacement or dislocation of bone; disruption in nerve and/or blood supply resulting in necrotising; and artificial modification to the shape or contour of bone. Amputation and surgical intervention is included within the first category. Fractures are the most common form of trauma that is seen on the skeleton in palaeopathology, and is a result of a traumatic event that causes the bone to break either completely or partially (Roberts and Manchester, 2010:89). If the individual survives the traumatic event, the bone will begin to heal.

There were a number of fractures recorded, which were examined macroscopically and radiographically (Powers, 2012:44). The location of the fracture was recorded using standard anatomical terms. For long bones, metacarpals, metatarsals, and phalanges; the location on the shaft was described as on the proximal, middle or distal portion. The type of fracture recorded followed the criteria described by (Lovell, 1997:141-4), and the state of healing was noted (Powers, 2012:44).

This study focused on recorded instances of accidental trauma (i.e. fractures) and surgical intervention (i.e. craniotomies and autopsies).

#### D.1 Surgical Intervention

Voluntary or charitable hospitals during the 16$^{th}$ century were closely associated with a medical school where students would receive training in surgical dissection and anatomy (Cope, 1961:62; Knapman, 1999:12; Richardson, 1987:207). Most of the bodies that were eventually utilised within these

dissection theatres in the 17th century were hanged criminals (Mitchell et al., 2011:91). In the 18th century the number of criminals who were hanged declined but the demand for cadavers did not, so a proportion of the remains that were eventually delivered to the schools were exhumed by 'resurrectionists', or grave robbers (Bhanji, 1995:1213; Burch, 2007:15; Durey, 1976:214). The 1832 Anatomy Act was eventually past to stop grave robbing by allowing unclaimed bodies from workhouses and charitable hospitals to be taken for dissection (Mitchell et al., 2011:92; Richardson, 1987:148). One would therefore expect to see evidence of post-mortem dissection in the remains of some of London's poorest citizens.

### *E. Other Conditions- Cribra Orbitalia*

Cribra orbitalia is the osteological response from hyperactivity of haematopoietic marrow of the orbital roof and an expansion of the diploë (Walker et al., 2009:2-3). It is believed that cribra orbitalia is the result of a childhood disease with greater prevalence seen in children compared to adults, due to the greater plasticity of the non-adult skeleton compared to the adult (Stuart-Macadam, 1989:206). A number of past studies have argued that cribra orbitalia is the manifestation of iron-deficiency anaemia (Caffell and Holst, 2010:20; Miles et al., 2008a:30; Ortner, 2003:55; Stuart-Macadam, 1989:206). However a study in 2009 identified a deficiency of vitamin $B_{12}$ as the cause of cribra orbitalia (Walker et al., 2009:6).

***Table 3-5: Score used in the identification of Cribra orbitalia by the Museum of London (Connell et al., 2012).***

| | |
|---|---|
| **0** | Normal bone surface |
| **1** | Capillary like impressions on the bone |
| **2** | Scattered fine foramina |
| **3** | Large and small isolated foramina |
| **4** | Foramina have linked into a trabecular surface |
| **5** | Outgrowth in trabecular form from the outer table surface |
| **9** | Not present/unobservable |

Lesions were recorded and assigned either 0 (normal bone surface) or 9 (not present/unobservable) or a score 1 to 5 (Table 3-5), following the guidelines that were developed by Stuart-Macadam (1989). Each orbit is examined macroscopically and recorded as a single unit (Powers, 2012:53)

As stated above, there are researchers who believe that aetiology of cribra orbitalia has links to nutritional deficiency, including vitamin $B_{12}$ or iron, which is why it has been included within this study.

## 3.3 Historical Data Collection

The historical records for the City of London Corporation of the Poor, St Bride's parish, and St Saviour's parish are all burial records. The digitised registers were recorded so that the historical records could be compared to their corresponding osteological population. Each individual's name, age, final residence, and burial date were included. Sex was determined by the individual's names, though there were a number of individuals for whom their name was unisex, illegible, or unknown and recorded as indeterminate. The same was done for age, though this method could be inaccurate as inmates would occasionally lie about, or not know, their age. As stated above, infants comprised all records between birth and one year.

The Shoreditch Union workhouse register comprised all admissions and discharges from 1856-1870. For this study, applicants whose surnames began with A, B, E, L, N, O, Q, U, V, X, Y, and Z, were selected from the original register which resulted with 3,125 admissions being recorded. These were randomly chosen and theoretically would have comprised half of the register (12/26 letters). These were chosen by random by the researcher, due to time constraints, especially as the 'B' surnames comprised 1702 separate entries. The name, date of admission, date of discharge, year of birth, and reason for discharge were recorded. The admissions and discharges were recorded to determine the cyclical nature of workhouse applicants. Evidence of cyclical admittance was examined only in individuals with surnames beginning with A and B, amounting to 2,189 individuals (70% of the analysed record). The sex categories are the same as those for the osteological records for ease of comparison. For ageing,

it was possible to determine perinatal infants as the original recorders indicated when an infant was born within the workhouse.

## 3.4 Surviving workhouse dietaries (Parish and Union)

One of the primary aims of the thesis is to study the effects of the change in workhouse diet after the New Poor Laws of 1834. In order to do so, the workhouse menu given to the inmates of the parish workhouse of St John's at Hackney (Table 3-6) in 1750 were compared to the six diets recommended by the poor law commission (Table 3-7) (Nicholls and Willink, 1898b, 50).

The diet that was served in the Hackney parish workhouse was comprised of beer, bread, butter and cheese, which was a similar diet given to the inmates at the LCofP parish workhouse (Higginbotham, 2013b). Union workhouses operating in London would have served the third commission diet (Johnston, 1985:14), which was noted by Jack London, a 19th century writer, as not being 'fit enough for an average man to begin a day's work' (London, 1903:96) (see Chapter Two: Historical Background).

*Table 3-6: Menu of St John's Workhouse, London, in 1750, per week.*

| Menu Items | 1750, St John Workhouse |
|---|---|
| **Bacon (oz.)** | - |
| **Beer (oz.)** | 420 |
| **Bread (oz.)** | 112 |
| **Butter (oz.)** | 14 |
| **Cheese (oz.)** | 28 |
| **Meat (oz.)** | - |
| **Potato (oz.)** | - |
| **Rice pudding (oz.)** | - |

*Table 3-7: Menus of the Six Poor Law Commission Diets given to the Union Workhouse inmates (Parliamentary Papers, XXIX, 1836:56-9)*(Anon, 1836; Hitchcock et al., 2012).

| Day | Diet | Breakfast | | Dinner | | Supper | | |
|---|---|---|---|---|---|---|---|---|
| **Monday** | 1 | 6 oz. bread | 1 1/2 oz. cheese | 1 1/2 pt. soup | | 6 oz. bread | 2 oz. cheese | |
| | 2 | 6 oz. bread | 1 oz. cheese | 7 oz. bread | 1 oz. cheese | 6 oz. bread | 1 oz. cheese | |
| | 3 | 8 oz. bread | 1 1/2 pt. gruel | 7 oz. bread | 2 oz. cheese | 6 oz. bread | 1 1/2 oz. cheese | |
| | 4 | 8 oz. bread | 1 1/2 pt. gruel | 12 oz. rice pudding | with vegetables | 6 oz. bread | 2 oz. cheese | |
| | 5 | 7 oz. bread | 1 1/2 pt. gruel | 1 1/2 pt. soup | 7 oz. vegetables | 3/4 lb. potatoes | | |
| | 6 | 6 oz. bread | 1 oz. cheese | 6 oz. bread | 1 oz. cheese | 6 oz. bread | 1 oz. cheese | 1 pt. broth |
| **Tuesday** | 1 | 6 oz. bread | 1 1/2 oz. cheese | 5 oz. meat | 1/2 lb. potatoes | 6 oz. bread | | 1 1/2 pt. broth |
| | 2 | 6 oz. bread | 1 oz. cheese | 16 oz. rice pudding | with vegetables | 6 oz. bread | | 1 oz. cheese |
| | 3 | 8 oz. bread | 1 1/2 pt. gruel | 8 oz. cooked meat | 3/4 lb. potatoes | 6 oz. bread | | 1 1/2 oz. cheese |
| | | 8 oz. bread | 1 1/2 pt. gruel | 2 pt. soup | 6 oz. bread | 6 oz. bread | | 2 oz. cheese |
| | 5 | 7 oz. bread | 1 1/2 pt. gruel | 14 oz. rice pudding | | 7 oz. bread | | 2 oz. cheese |
| | 6 | 6 oz. bread | 1 oz. cheese | 4 oz. meat | 3/4 potatoes | 6 oz. bread | 1 oz. cheese | 1 pt. broth |
| **Wednesday** | 1 | 6 oz. bread | 1 1/2 oz. cheese | 1 1/2 pt. soup | | 6 oz. bread | | 2 oz. cheese |
| | 2 | 6 oz. bread | 1 oz. cheese | 7 oz. bread | 1 oz. cheese | 6 oz. bread | | 1 oz. cheese |
| | 3 | 8 oz. bread | 1 1/2 pt. gruel | 7 oz. bread | 2 oz. cheese | 6 oz. bread | | 1 1/2 oz. cheese |
| | 4 | 8 oz. bread | 1 1/2 pt. gruel | 6 oz. pickled pork | with vegetables | 6 oz. bread | | 2 oz. cheese |
| | 5 | 7 oz. bread | 1 1/2 pt. gruel | 7 oz. bread | 2 oz. cheese | 3/4 lb. potatoes | | |
| | 6 | 6 oz. bread | 1 oz. cheese | 6 oz. bread | 1 oz. cheese | 6 oz. bread | 1 oz. cheese | 1 pt. broth |
| **Thursday** | 1 | 6 oz. bread | 1 1/2 oz. cheese | 5 oz. meat | 1/2 lb. potatoes | 6 oz. bread | | 1 1/2 pt. broth |
| | 2 | 6 oz. bread | 1 oz. cheese | 7 oz. bread | 1 oz. cheese | 6 oz. bread | | 1 oz. cheese |
| | 3 | 8 oz. bread | 1 1/2 pt. gruel | 1 1/2 pt. soup | 6 oz. bread | 6 oz. bread | | 1 1/2 oz. cheese |
| | 4 | 8 oz. bread | 1 1/2 pt. gruel | 12 oz. rice pudding | with vegetables | 6 oz. bread | | 2 oz. cheese |
| | 5 | 7 oz. bread | 1 1/2 pt. gruel | 5 oz. meat | 3/4 lb. vegetables | 7 oz. bread | | 2 oz. cheese |
| | 6 | 6 oz. bread | 1 oz. cheese | 4 oz. meat | 3/4 lb. potatoes | 6 oz. bread | 1 oz. cheese | 1 pint broth |
| **Friday** | 1 | 6 oz. bread | 1 1/2 oz. cheese | 1 1/2 pt. soup | | 6 oz. bread | 2 oz. cheese | |
| | 2 | 6 oz. bread | 1 oz. cheese | 16 oz. rice pudding | with vegetables | 6 oz. bread | 1 oz. cheese | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 3 | 8 oz. bread | 1 1/2 pt. gruel | 7 oz. bread | 2 oz. cheese | 6 oz. bread | 1 1/2 oz. cheese | |
| | 4 | 8 oz. bread | 1 1/2 pt. gruel | 2 pt. soup | 7 oz. vegetables | 6 oz. bread | 2 oz. cheese | |
| | 5 | 7 oz. bread | 1 1/2 pt. gruel | 1 1/2 pt. soup | 7 oz. vegetables | 3/4 lb. potatoes | | |
| | 6 | 6 oz. bread | 1 oz. cheese | 11 oz. meat dumpling | | 6 oz. bread | 1 oz. cheese | 1 pt. broth |
| **Saturday** | 1 | 6 oz. bread | 1 1/2 oz. cheese | 1 1/2 pt. soup | | 6 oz. bread | | 1 1/2 pt. broth |
| | 2 | 6 oz. bread | 1 oz. cheese | 7 oz. bread | 1 oz. cheese | 6 oz. bread | | 1 oz. cheese |
| | 3 | 8 oz. bread | 1 1/2 pt. gruel | 5 oz. bacon | 3/4 lb. potatoes | 6 oz. bread | | 1 1/2 oz. cheese |
| | 4 | 8 oz. bread | 1 1/2 pt. gruel | | | 6 oz. bread | | 2 oz. cheese |
| | 5 | 7 oz. bread | 1 1/2 pt. gruel | | | 3/4 lb. potatoes | | |
| | 6 | 6 oz. bread | 1 oz. cheese | 6 oz. bread | 1 oz. cheese | 6 oz. bread | 1 oz. cheese | 1 pt. broth |
| **Sunday** | 1 | 6 oz. bread | 1 1/2 oz. cheese | 5 oz. meat | 1/2 lb. potatoes | 6 oz. bread | | 1 1/2 pt. broth |
| | 2 | 6 oz. bread | 1 oz. cheese | 16 oz. meat pudding | with vegetables | 6 oz. bread | | 1 oz. cheese |
| | 3 | 8 oz. bread | 1 1/2 pt. gruel | 7 oz. bread | 2 oz. cheese | 6 oz. bread | | 1 1/2 oz. cheese |
| | 4 | 8 oz. bread | 1 1/2 pt. gruel | 2 pt. soup | 6 oz. bread | 6 oz. bread | | 2 oz. cheese |
| | 5 | 7 oz. bread | 1 1/2 pt. gruel | 5 oz. meat | 3/4 lb. vegetables | 7 oz. bread | | 2 oz. cheese |
| | 6 | 6 oz. bread | 1 oz. cheese | 16 oz. rice pudding | | 6 oz. bread | 1 oz. cheese | 1 pt. broth |

### 3.4.1 Methods for studying the diets of the workhouse

This study aimed to compare diets of workhouse inmates from before and after the 1834 Amendment. All seven menus were analysed according to their caloric intake as well as minerals and vitamins, to assess the maximum nutritional status of the workhouse inmate.

The fitness of an individual is intertwined with the nutritional status of the diets (Sharpe, 2012:1477), including adequate amounts of calories, minerals, and vitamins being consumed. A calorie is a measure of energy found within food that is needed to fuel the body for breathing, proper circulation, cell repair, and various other bodily functions (Abdus and Rangazas, 2011:636; Crawford, 1984:154; Heltberg, 2009:81). Minerals and vitamins are vital for essential functions such as bone formation, vision, circulation, and metabolism, and can also influence factors such as concentration and depression (CDC, 2013b).

Starvation is a phenomenon that has both physical (where the body begins to weaken and waste away) and psychological effects (i.e. preoccupation with food and poor judgment). A diminished nutritional composition of a starvation diet would typically result in a compromised immune system, which would make individuals more prone to metabolic conditions (Mokyr and Gráda, 2002:341) (see above).

*Table 3-8: Minimum levels of nutritional components necessary for healthy adults*

| Vitamin | Minimum Daily Recommend Value |
|---|---|
| **Vitamin A (IU)** | 3000 |
| **Vitamin C (mg)** | 16 |
| **Vitamin D (IU)** | 200 |
| **Vitamin E (mg)** | 15 |
| **Vitamin K (mcg)** | 120 |
| **Thiamine (mg)** | 1.2 |
| **Riboflavin (mg)** | 5 |
| **Niacin (mg)** | 15 |
| **Vitamin B6 (mg)** | 1.3 |
| **Folate (mcg)** | 400 |
| **Vitamin B 12 (mcg)** | 2.4 |

| Mineral | Minimum Daily Recommend Value |
|---|---|
| **Potassium (mg)** | 4700 |
| **Calcium (mg)** | 1000 |
| **Iron (mg)** | 8 |
| **Magnesium (mg)** | 400 |
| **Phosphorus (mg)** | 700 |
| **Sodium (mg)** | 2300 |
| **Zinc (mg)** | 11 |
| **Copper (mg)** | 0.9 |
| **Manganese (mg)** | 2.5 |
| **Selenium (mcg)** | 55 |
| **Fluoride (mcg)** | 4 |

Each workhouse diet has been broken down to their base components of caloric content as well as twenty-two essential minerals and vitamins. Each component was then compared to the modern minimum daily-recommended values (Table 3-8) (CDC, 2013b).

In this study, caloric values for both male and female adults were combined to determine an average recommended value for caloric intake in adults (Table 3-9). The menus given at the Union workhouse were supposed to be sufficient to keep inmates from starving as according to the principle of 'less eligibility' where the workhouse inmate was not to be receiving aid that would be greater than what independent labourers could afford outside the Poor Law institutions.

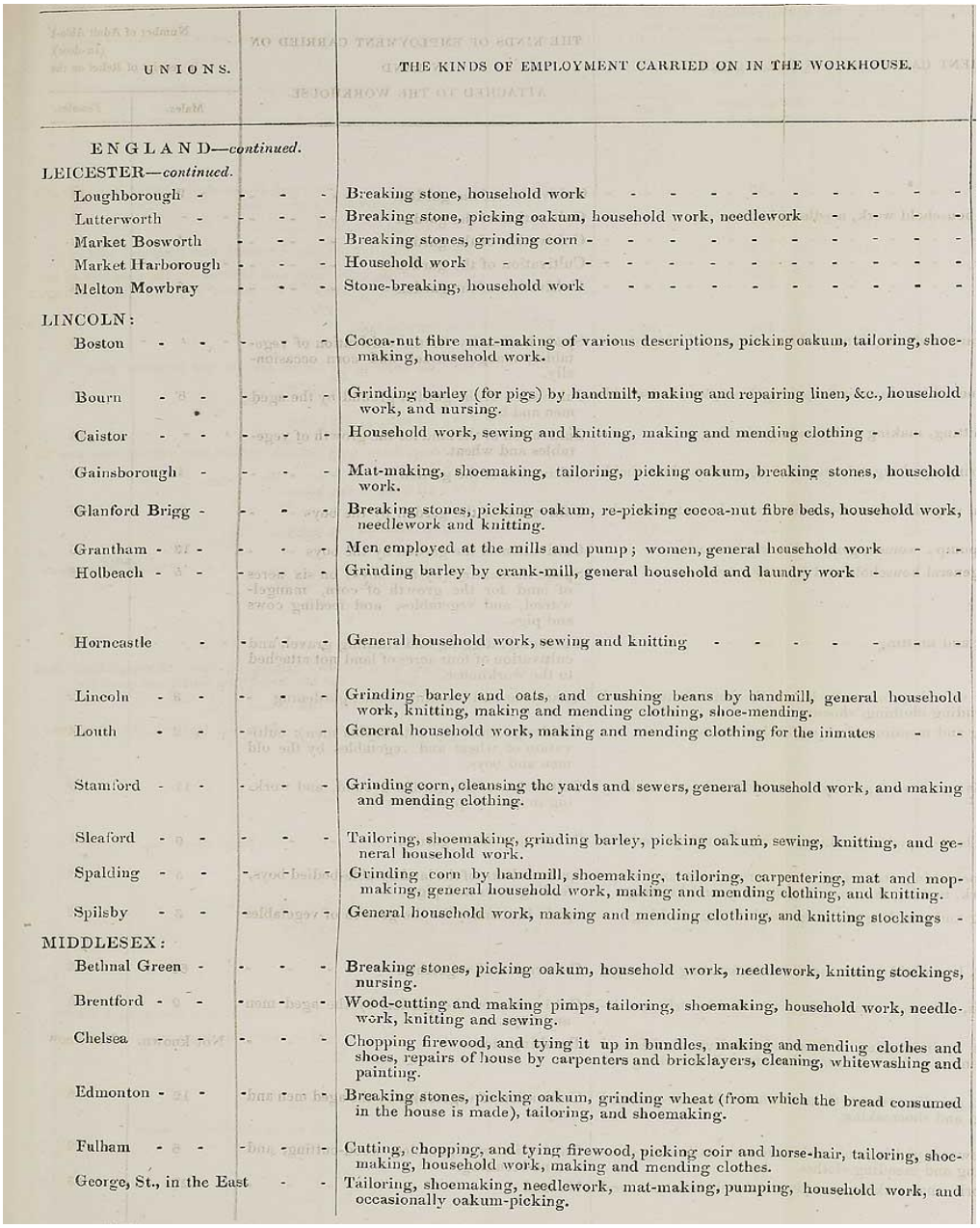
***Table 3-9: Recommended Caloric intake values for males and female, and the average of both (Clayton and Rowbotham, 2008:286).***

| | Female | Male | Average |
|---|---|---|---|
| **High** | 3500 | 4500 | 4000 |
| **Average** | 2950 | 3750 | 3350 |
| **Low** | 2400 | 3000 | 2700 |

*A. Labour associated with the workhouse*

As described in the previous chapter (Historical background), workhouse inmates under the New Poor Law were to undertake menial hard labour whilst inside the institution (Table 3-10). In conjunction

with the dietary breakdowns, the caloric expenditure of tasks are compared to the intake of both the Old and the New Poor Law diets. There are a few activities that were undertaken in both institutions (i.e. knitting and sewing, shoemaking, nursing), whilst there were some that were only an activity within the New Poor Law workhouses (i.e. stone breaking) (Figure 3:13).



| UNIONS. | THE KINDS OF EMPLOYMENT CARRIED ON IN THE WORKHOUSE. |
|---|---|
| ENGLAND—*continued.* | |
| LEICESTER—*continued.* | |
| Loughborough | Breaking stone, household work |
| Lutterworth | Breaking stone, picking oakum, household work, needlework |
| Market Bosworth | Breaking stones, grinding corn |
| Market Harborough | Household work |
| Melton Mowbray | Stone-breaking, household work |
| LINCOLN: | |
| Boston | Cocoa-nut fibre mat-making of various descriptions, picking oakum, tailoring, shoe-making, household work. |
| Bourn | Grinding barley (for pigs) by handmill, making and repairing linen, &c., household work, and nursing. |
| Caistor | Household work, sewing and knitting, making and mending clothing |
| Gainsborough | Mat-making, shoemaking, tailoring, picking oakum, breaking stones, household work. |
| Glanford Brigg | Breaking stones, picking oakum, re-picking cocoa-nut fibre beds, household work, needlework and knitting. |
| Grantham | Men employed at the mills and pump; women, general household work |
| Holbeach | Grinding barley by crank-mill, general household and laundry work |
| Horncastle | General household work, sewing and knitting |
| Lincoln | Grinding barley and oats, and crushing beans by handmill, general household work, knitting, making and mending clothing, shoe-mending. |
| Louth | General household work, making and mending clothing for the inmates |
| Stamford | Grinding corn, cleansing the yards and sewers, general household work, and making and mending clothing. |
| Sleaford | Tailoring, shoemaking, grinding barley, picking oakum, sewing, knitting, and general household work. |
| Spalding | Grinding corn by handmill, shoemaking, tailoring, carpentering, mat and mop-making, general household work, making and mending clothing, and knitting. |
| Spilsby | General household work, making and mending clothing, and knitting stockings |
| MIDDLESEX: | |
| Bethnal Green | Breaking stones, picking oakum, household work, needlework, knitting stockings, nursing. |
| Brentford | Wood-cutting and making pimps, tailoring, shoemaking, household work, needle-work, knitting and sewing. |
| Chelsea | Chopping firewood, and tying it up in bundles, making and mending clothes and shoes, repairs of house by carpenters and bricklayers, cleaning, whitewashing and painting. |
| Edmonton | Breaking stones, picking oakum, grinding wheat (from which the bread consumed in the house is made), tailoring, and shoemaking. |
| Fulham | Cutting, chopping, and tying firewood, picking coir and horse-hair, tailoring, shoe-making, household work, making and mending clothes. |
| George, St., in the East | Tailoring, shoemaking, needlework, mat-making, pumping, household work, and occasionally oakum-picking. |

***Figure 3-13: Examples of the Kind of employment within various union workhouses across England in 1852 (British Library, 2010).***

The calculations within this thesis have been done utilising 9.5 hours as it was stated within the New Poor Laws that inmates of the workhouse were to work 10 hours between March and September, and 9 hours between September and March. For the caloric expenditure values, an assumed weight of 150 pounds was utilised, and workhouse occupations were linked with modern activities (i.e. Breaking stone= masonry, concrete; Picking oakum= lifting things, 10-20 lbs with limited walking and resting, etc.) (CalorieLab, 2015).

*Table 3-10: Average activity undertaken in a workhouse in 1852 and the caloric expenditure associated (Anon., 1852; CalorieLab, 2015).*

| Activity | Hourly expenditure (kcal/hr) | Average day (kcal/day) |
|---|---|---|
| **Knitting and sewing** | 34 | 323 |
| **Grinding wheat** | 102 | 969 |
| **Shoemaking** | 102 | 969 |
| **Tailoring** | 102 | 969 |
| **Household work** | 136 | 1292 |
| **House repairs** | 170 | 1615 |
| **Gardening** | 204 | 1938 |
| **Nursing** | 204 | 1938 |
| **Picking oakum** | 204 | 1938 |
| **Whitewashing/painting** | 272 | 2584 |
| **Wood-cutting** | 340 | 3230 |
| **Breaking stones** | 408 | 3876 |

Like the diets, the values for expenditure are modern values (Anon, 2015a), and provide a useful indicator of caloric expenditure in workhouses. By providing estimated caloric expenditure and comparing the values to caloric intake, it is possible to compare the apparent health of workhouse inmates during the Old and New Poor Laws.

## 3.5 Potential Issues & Biases

The use of osteological and historical records in Post-Medieval populations presents a number of issues that may affect the study. As analysis has focused on osteological records from 5 different cemeteries, excavated at different times between 1985 and 2006. The criteria for identifying pathological conditions would have changed (i.e. scurvy) as the study of palaeopathology has continued to expand and methods have evolved. Furthermore, the recording of skeletons was performed by different archaeologists under difficult conditions. For example, excavation of Cross Bones was limited due to the scale of burial at the site, and the timescale of the rescue excavation (Brickley and Miles, 1999:5). Because of these issues, true prevalence rates cannot be assessed.

Along with these biases, the osteological paradox must also be acknowledged (Wood et al., 1992). The paradox informs us that there is a potential that individuals could have contracted any of the

conditions outlined above but could have died shortly afterwards leaving no evidence of osteological lesions (*ibid.*). The limited appearance of many conditions on the human skeleton along with the incomplete nature of the osteological record, especially in Christian populations, necessitate the use of crude prevalence rates.

Importantly, historical sources can help shed light on the health of Victorian populations. The use of birth and death registers as well as workhouse registers must however be considered alongside a number of biases. Misreporting of information, either by the recorder or the applicant, can result in inaccurate records (Blaug, 1963:157; Boulton, 2013:23; Levene, 2008:52). This will be discussed further in the limitations section (see Chapter Five: Conclusion).

There are also chronological issues that could not be avoided. As stated previously, this study focuses on the change in welfare before and after the 1834 Poor Law Amendment, but unfortunately only one of the cemeteries (City Bunhill) is dated to that time period. Both St Bride's and Cross Bones cemetery populations have been dated as beginning around 1800. In order to counteract this chronological issue, the burial records for those cemeteries (Ancestry, 2010b; Ancestry, 2010c) have been recorded and compared. In an attempt to counteract this chronological issue was undertaken by trying to establish cemetery phasing. Unfortunately, this was only accomplished for one (Broadgate) and the data was simply not available for the other four cemeteries.

## 3.6 Conclusion

This chapter has outlined the materials and methods used in the study, including the rationale behind site choice and analysis of historical sources including menus, rotas, and birth and death records. Four cemeteries can be associated with workhouse populations- St Thomas and Broadgate during the Old Poor Law and St Brides and Cross Bones during the New Poor Law. Three of these have associated historical documentation that indicate use by workhouses- Broadgate, St Bride's, and Cross Bones. The introduction of the 19$^{th}$ century cemetery population of City Bunhill also allows for comparative analysis of the sub-urban independent labourer and urban workhouse and pauper communities.

Documents including the discharge and admittance records of Shoreditch Union Workhouse were also introduced to discuss demographic changes within a union workhouse, including the cyclical nature of use within the principle of 'less eligibility'. The method of caloric analysis on the workhouse menus and the expenditure associated with the workhouse routine was also introduced, alongside possible pathological conditions typical of lower socioeconomic populations.

Chapter Four: Results will present the analysis of the workhouse diets, demography and cemetery populations using the materials and methods outlined above.

# Chapter 4 Results

This chapter will present the results of the historical and osteological analysis. Firstly, it will discuss the changes to the caloric composition of the different menus that were associated with the parish and union workhouses; alongside caloric expenditure associated with the workhouse regime. As stated previously, the union diets were established by the Poor Law Commission following the 1834 Poor Law Amendment Act. Results of the osteological analysis will then be analysed along with comparative assessment from historical and archaeological records. For the historical records, different lines of evidence will be examined, including length of stay within the workhouse, and the role of the workhouse as a form of lying-in hospital for pregnant women. Like the osteological records, the historical demography will also be analysed and described. Historical records and the corresponding osteological records will be compared and discussed.

## 4.1 Did the diets of the workhouse inmates deteriorate after 1834?

The single menu of the parish workhouse (Hackney workhouse) and the six menus that were created by the Poor Law Commission were compared. This was undertaken to determine what the caloric intake of the inmates of the workhouses pre- and post- the amendments to the poor laws would have been, and the potential impact on health. The menu from St John's was the only complete parish workhouse menu that was found during this study, though it cannot be said that this menu is the standard of parish workhouses as there is a paucity in the amount of literature detailing the day-to-day running of these institutions (Poynter, 1969:1) but it is likely to have been representative of the parish diets under the Old Poor Law. The parish menu and the average of the six union menus were compared to the caloric expenditure of various activities that inmates of the parish or the union workhouse would have undertaken.

### 4.1.1 Reformation of the Diets

The Poor Law Commission of 1834 created six menus (Chapter Three: Materials and Methods) to be utilised nationally in all union workhouses. Six menus were created to allow each union to serve the one that was most like the diet of independent labourers of the area. The mineral, vitamin and caloric

composition of one menu from a 1750 parish workhouse and six menus created by the Commission, were analysed to determine if there were substantial changes in nutritional content. A number of menus referred to generic food categories such as 'meat'. In such instances, the modern nutritional content was estimated on the basis of low quality examples, as this was more likely to have been served in the workhouse. As an example of low quality meat, the values for beef round steak were provided.

The caloric, mineral and vitamin values that have been utilised within this thesis were found on the Centre of Disease Control website (CDC, 2013a; CDC, 2013b) for the modern values of the recommended daily intakes in order for a healthy life and diet.

As outlined previously, a calorie (kcal) is a measure of energy found within food used to provide the human body with energy. The amount of daily caloric intake is dependent on three conditions: age, sex, and physical activity. If an individual is existing on a daily deficit of 500-1000 kcals per day (Keys et al., 1950a:69), the body will draw energy from other locations, such as stored fat. By utilizing body fat reserves, an individual would begin to lose weight, and as a result the immune system might start to suffer. A diet that contained 50% or less of the recommended daily-caloric intake is therefore defined as a starvation diet. The daily-recommended caloric values for active adults are 3000-4500 for males and 2400-3500 for females, with an average of 3350 calories per day for an active adult (Clayton and Rowbotham, 2008b:356).

Dietary minerals and vitamins are chemical elements that are also required by living organisms, some in trace amounts, for the maintenance of good health (Kaliamoorthi, 2013:69; Keys et al., 1950a:445). Minerals and vitamins are just as important as calories for the maintenance of good health. They assist with various systems within the body, i.e. vitamin D is essential for the mineralisation of newly formed bone, which results in rickets or osteomalacia within individuals when deficient (Brickley et al., 2005:395; Stuart-Macadam, 1989:215); while a lack of vitamin C in the body would result in scurvy, where there is a general weakening of the connective tissues within the body causing haemorrhages

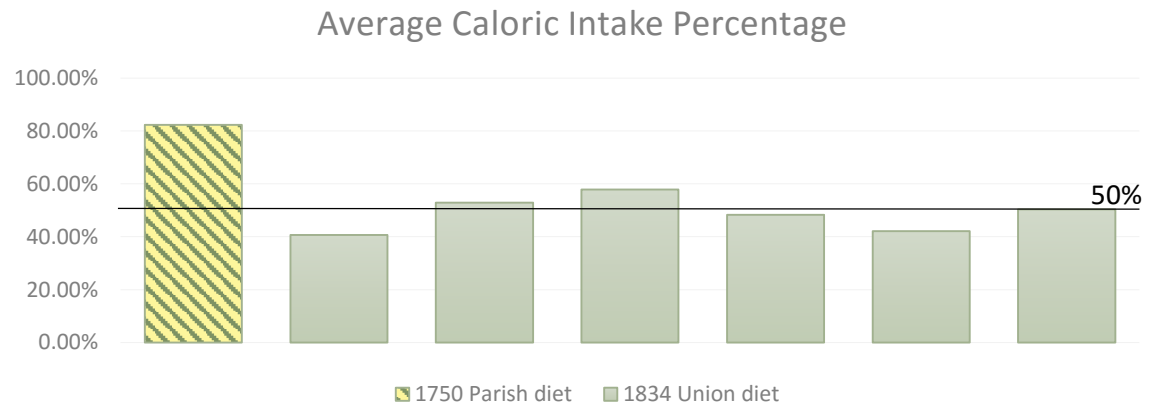
(Mays, 2013:5; Ortner et al., 1999:325). Various vitamins and minerals needed for good health are not created within the body and are dependent on diet (Brickley and Ives, 2008:41).

### 4.1.2 Nutritional Status of the Parish and Union Diets

#### *A. Caloric Value of the Menus*

At St John's Workhouse in the parish of Hackney in 1750 AD inmates were receiving a published diet that was somewhat monotonous, consisting of bread, butter, cheese, and beer. The majority of the diet was beer and bread [420 oz. and 112 oz. respectively], while the butter and cheese were small portions of the weekly diet [14 oz. and 28 oz. respectively]. The daily average caloric intake of the St John's Workhouse intake was calculated by determining the caloric values of all aspects of the menu (i.e. 112 oz. of the specified bread equals 1184 calories per day, etc.). The caloric composition of the various diets were then divided by the average recommended caloric intake for average adult to determine the average daily percentage of consumed calories. Making the average caloric intake of the St John's inmates 82% [(2758/3350)*100] of the average daily-recommended calories (i.e. 3350 kcal/day) (Figure 4-1).

***Figure 4-1: Average Caloric Intake of workhouse diets, with a starvation line.***




The union workhouse menus were more complex, consisting of: bacon, vegetables, various meat products, etc. Despite this varied diet, five out of the six union diets could be considered a starvation diet as the caloric consumption would be 50% or less (Figure 4-1) and the caloric composition of the sixth provides less than 60% of the recommended daily value. When compared to the parish diet

inmates, those in union workhouses would have been consuming 20-40% less depending on the menu that was being served. Workhouses in London, and particularly the City of London, would have served the third Poor Law menu which afforded the inmates the most calorically sound diet with 58% [1937.36 kcal/day] of the daily-recommended calories. The menu with the least caloric value that was served following 1834 was the first menu which would have provided inmates with 41% [1362.86 kcal/day] of the recommended daily caloric intake (Clayton and Rowbotham, 2008b:356; Johnston, 1985:114; Keys et al., 1950a:38).

### *B. Vitamin and Mineral Content of the Menus*

***Table 4-1: Comparison of the dietary minerals and vitamins from the parish menu to the Commission diet three.***

| Mineral | St John's Parish | Union menu Three | Vitamin | St John's Parish | Union menu Three |
|---|---|---|---|---|---|
| **Potassium** | x | | **Vitamin A** | x | |
| **Calcium** | x | x | **Vitamin C** | | |
| **Iron** | x | x | **Vitamin D** | x | |
| **Magnesium** | x | x | **Vitamin E** | | |
| **Phosphorus** | x | x | **Vitamin K** | | |
| **Sodium** | x | x | **Thiamine** | x | x |
| **Zinc** | x | x | **Riboflavin** | x | |
| **Copper** | | x | **Niacin** | x | |
| **Manganese** | x | x | **Vitamin $B_6$** | | |
| **Selenium** | x | x | **Folate** | x | x |
| **Fluoride** | x | | **Vitamin $B_{12}$** | | |

Minerals and vitamins were examined the same way as calories for the various diets, to determine if the diets were giving the inmates at least the recommended amount of the vitamin or mineral. The values of minerals and vitamins of each diet was also determined by breaking down all aspects of the menu into their mineral and vitamin composition, like the caloric composition discussed above. The more monotonous menu from the parish workhouse actually provided inmates with the recommended daily amount of ten of the eleven minerals, with the diet being deficient in copper only (Table 4-1). Likewise, the later union menu was also sufficient in most minerals a part from potassium and fluoride (See Appendix Two for the uses of these minerals and vitamins).

Menus from both the parish and union workhouses were deficient in many of the required vitamins, though the parish inmates were the better off, receiving vitamins A, D, Riboflavin, and Niacin. Both menus provided the inmates with sufficient amounts of thiamine and folate, though both menus lacked the minimum concentrations of vitamins C, E, K, $B_6$ and $B_{12}$ (Table 4-1).

#### *C. Breakdown of Caloric Intake by Sex*

There was no evidence that there was a different menu for females and males at either St John's Workhouse or in union workhouses (Hollen Lees, 1998:138). Therefore if we assume that both sexes were served the same menu, females would have been relatively better off due to generally smaller body size. Parish females would have been consuming 93% of the recommended daily value of calories, which is almost 30% more than later females would have been consuming in the union workhouse (66%). Parish males, while not consuming proportionally as many calories, were ingesting around 74% of the daily recommended amount. While, on average, the males of the union workhouses would have been subsisting at the starvation level with only 52% of the daily recommended values. Furthermore, it is likely that males in the union workhouses were more likely to be engaged in hard labour when compared to females (see below).

### 4.1.3 Caloric Expenditure and Intake

Both the parish and union workhouses required their inmates to undertake a variety of activities, some of which were strenuous and would have resulted in a high caloric expenditure. There was a shift in the nature of the activities undertaken between the parish and union workhouses. It is therefore important to consider calorie expenditure alongside calorie intake.

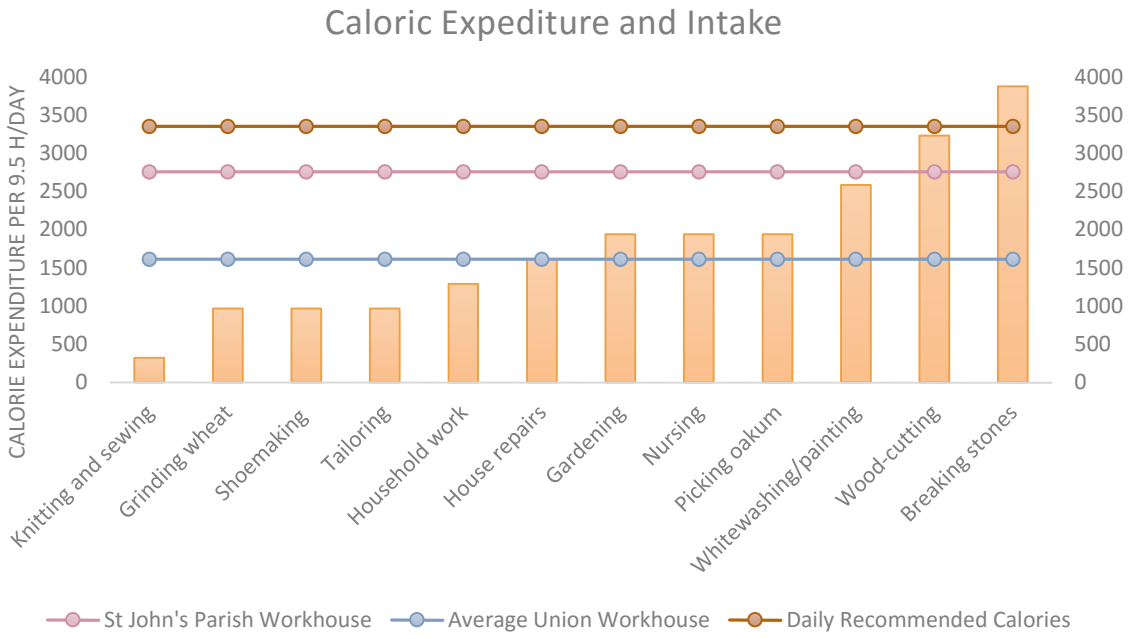
Analysis of the physical expenditure of calories alongside the average caloric values of the menus discussed above, suggests that many of the activities would have resulted in a large calorie deficit. Oakum picking and stone or bone breaking, which were the primary form of employment in union workhouses (Crowther, 1981:198; Longmate, 1974:72; Nicholls and Willink, 1898b:236; Simmons, 2011), would have resulted in a higher caloric expenditure than the intake supplied by the menus (Figure 4-2). Activities such as stone or bone breaking, which inmates were required to do for an

average of nine and a half hours a day, would have expended more calories than the recommended values to maintain health.

Oakum picking was an activity that has been highly associated with both the parish and the union workhouse (Boulton, 2007:134; Hindle, 2004:142; Hollen Lees, 1998:350). Utilising modern caloric expenditure values for if an individual would continuously lift objects between 10-20 lbs. with limited walking and/or resting (Anon, 2015a), the activity expends 1938 kcals/day, and would have exceeded the calorie intake of individuals on the union workhouse menu by about 300 kcal/day. For the parish inmates, this activity would not have exceeded the energy intake that was gained from the menu from St John's, and would have theoretically made them less susceptible to developing metabolic conditions and infectious diseases.

There is also the basal metabolic rate (BMR), which is the calories that the body burns while doing nothing, either physically or psychologically, for 24 hours, and is the minimum amount of energy that is required to maintain normal bodily functions (i.e. breathing and keeping the heart beating) (Floud et al., 2011:43; Harris and Benedict, 1918:371). BMR is typically the largest component of the total caloric expenditure during the day, and it has been proposed by Raymond Pearl (Hulbert et al., 2007) that an individual's longevity is inversely related to their basal metabolic rate, meaning that individuals with larger body size would have longer life spans (*ibid.*). Though it has been estimated that a diet that contained fewer than 800 calories would reduce an individual's BMR (*ibid.*), as this rate is different for every individual it was not considered within the context of this study.

***Figure 4-2: Caloric Expenditure and Intake of Parish and Union menus for an average work day of 9.5 hours (CalorieLab, 2015). The average caloric intake of St John's Parish and the Union workhouses were taken from Figure 4.1 and overlaid onto the average caloric expenditure of various activities likely to have been utilised within the workhouse.***




Whilst there is no clear division of labour by gender in the workhouse literature, union workhouses did list occupations that were more likely to have employed females. Activities such as infirmary nurses, household work, knitting and sewing would have led to a deficiency in caloric intake for both parish and union female inmates, though it would have been a smaller deficit compared to males engaged in heavier labour.

### 4.1.4 Key Points

- The parish workhouse inmates were consuming 82% of the daily recommended calories.
- The third 1834 Poor Law commission diet was affording the union workhouse inmates with 58% of the daily recommended calories.
- The average of the six 1834 Poor Law commission diets afforded the union inmates with 52% of their daily energy requirements.
- The parish workhouse provided 10/11 minerals and 6/11 vitamins; while the union workhouse provided 9/11 minerals and 2/11 vitamins.
- Parish females would have been afforded 93% of their daily recommended calories, while the males were afforded 74% of the daily recommended values.

- Union females would have been afforded 63% of their daily recommended calories, while the males were afforded 52% of the daily recommended values.
- Union workhouse inmates would have been engaged in heavy labour that would have expended more calories than they would have been consuming.

## 4.2 Did the demographic compositions of the workhouses change in the 19th century? A look at the osteological and the historical records

Based on historical research into the New Poor Law (Boulton and Schwarz, 2010; Boyer and Schmidle, 2009; Goose, 2006; Hollen Lees, 1998; Tanner, 1999), it is expected that the population within the union workhouse would have been a largely ageing population. This section will outline two different sources of demographic data: osteological cemetery data and historical records, of burial or death of individuals from the workhouse, as well as an admittance and discharge register.

### 4.2.1 Demographic information from the Osteological Records

The parish sample was comprised of a total of 343 individuals, the union sample a total of 692 individuals, whilst the independent labourer sample had a total of 239 individuals (Table 4-2).

*Table 4-2: Instances of pathology and no pathology by study samples.*

| | St Thomas and Broadgate | St Bride's and Cross Bones | City Bunhill |
|---|---|---|---|
| **Pathologies recorded** | 47.23% | 65.61% | 26.78% |
| **No Pathologies** | 52.77% | 34.39% | 73.22% |
| **Total** | 343 | 692 | 239 |

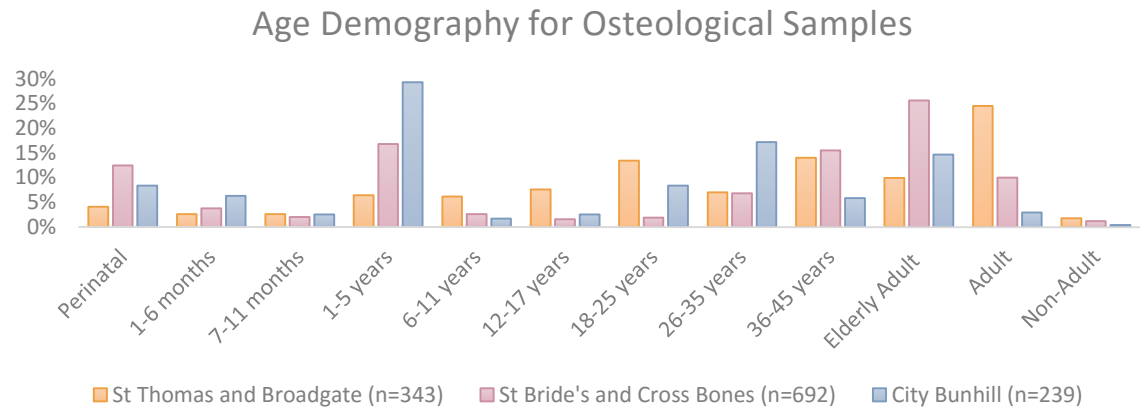
The union and independent labourer samples had higher percentages of perinatal infants, infants 1-6 months, and most notably children 1-5 years of age (Figure 4-3). Perinatal infants are most prevalent in the union sample compared to either of the parish or independent labourer samples. Infants of 7-11 months are just over 2% (3% of the parish; 2% of the union; 3% of the independent labourer) of all three samples. Children 1-5 years of age were the most prevalent of all non-adult age categories for the union and independent labourer samples (17% and 29 % respectively), and whilst this category was not the most frequent in the parish it still comprised 6 % of the sample. Adolescents (12-17 years)

are the best represented of the non-adult age categories for the parish sample (13%), whilst they were the least prevalent of all age categories in the union sample (2%).

Young adults (18-25 years) were the most frequent in the parish sample (13 %), however, they were poorly represented in the union (2%) or independent labourer (8%) samples. Young middle adults (26-35 years) were equally present in the parish and the union samples (7% in both), but were the most prevalent in the independent labourer sample (17 %). There is an increase in the prevalence of old middle adults (36-45 years) in both the parish and union, which still presented fairly equally between the two samples (14% and 15% respectively), while the independent labourer sample presented with fewer old middle adults (6%). Elderly adults (46 years onwards), were most prevalent of all age categories in the union sample (26%), which is an increase from the prevalence of the elderly in the parish sample (10%).

All three samples also contained a few individuals whose ages were indeterminable other than adult and non-adult. For the parish sample indeterminable adults were the most prevalent of all categories comprising almost a quarter of the sample (24%). Indeterminable non-adults comprised less than 2% of all three samples.

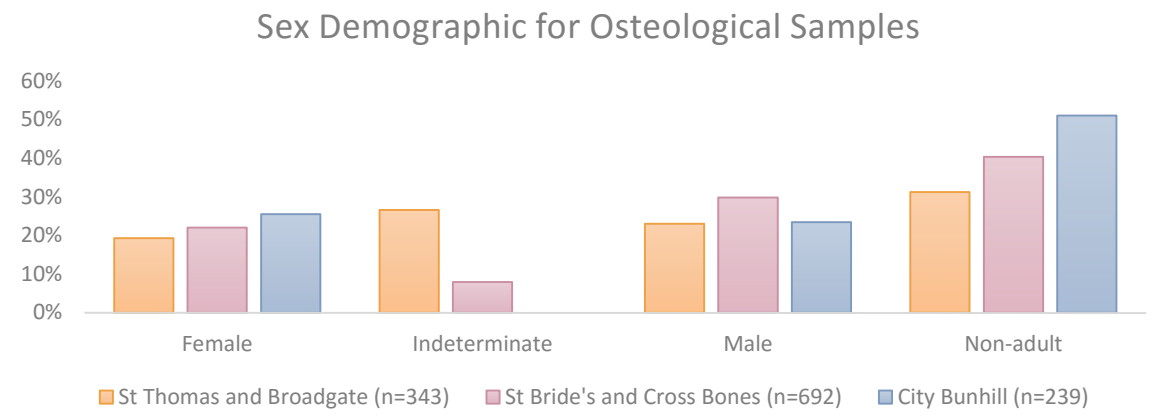
***Figure 4-3: Age demographic of osteological samples.***




Non-adults were least prevalent in the parish (31%) sample compared to the union (40%) and the independent labourer samples (51%) (Figure 4-4). Males were more frequent than females in the

parish (23% and 19% respectively) and the union (30% and 22% respectively) samples, while in the independent labourer sample females were more frequent than the males (26% and 23% respectively). There were also some individuals present in the parish and union samples whose sex was indeterminate, and in the parish sample they comprised a quarter of the sample (27%).

***Figure 4-4: Sex demographic of osteological samples.***

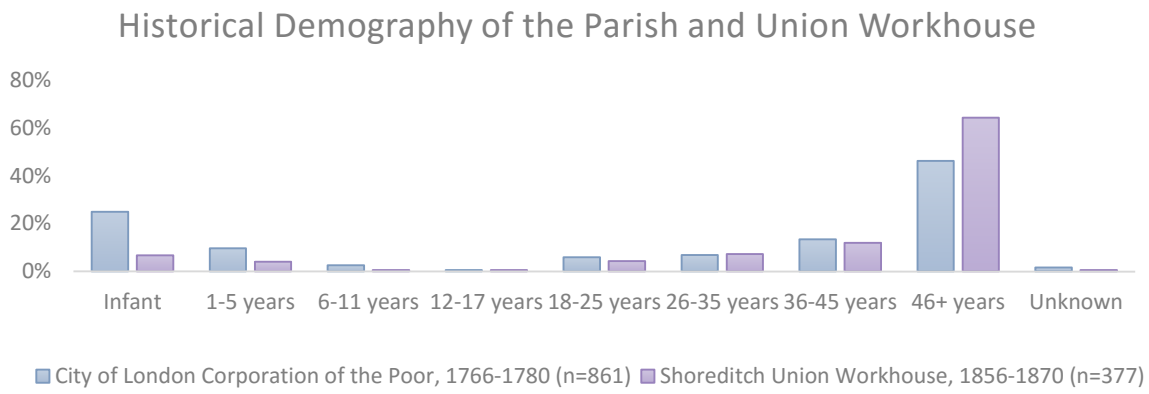



### 4.2.2 Historical demography from the City of London Corporation of the Poor and the Shoreditch Union Workhouse

The burial records from the City of London Corporation of the Poor parish workhouse (1766-1780) was comprised of 861 entries, whilst the record of admission and discharge for the Shoreditch Union Workhouse (1856-1870) included 377 deaths (Figure 4-5). A quarter (25%) of the parish records were comprised of infants (birth-11 months), however, infants were not as prevalent in the union record (7%). Of those infants that were recorded in the Shoreditch Union Workhouse, 75% (113/149) were born within the institution and only 16% (18) died at birth or shortly after. Children aged between 1-5 years comprised only 10% of the burial records, though were more represented in the parish record (10%) than in the union record (4%). Children aged 6-11 years represented less than 3% of both the parish (3%) and union (0.5%) burial records. Adolescents (12-17 years) were the least prevalent, comprising less than 1% of both the historical records. Elderly adults (46+ years) comprised more than half of the burial records from both workhouses, though were more frequent in the union workhouse (64%) than the parish workhouse (46%).

There were a 107 (6% of Shoreditch register) females recorded entering the Shoreditch Union Workhouse who were either pregnant or 'in labour at admittance'. There were 3 (3% of pregnant females) who did have a reason given for discharge, whilst there was one (1%) woman who died while in labour within the Shoreditch Union Workhouse.

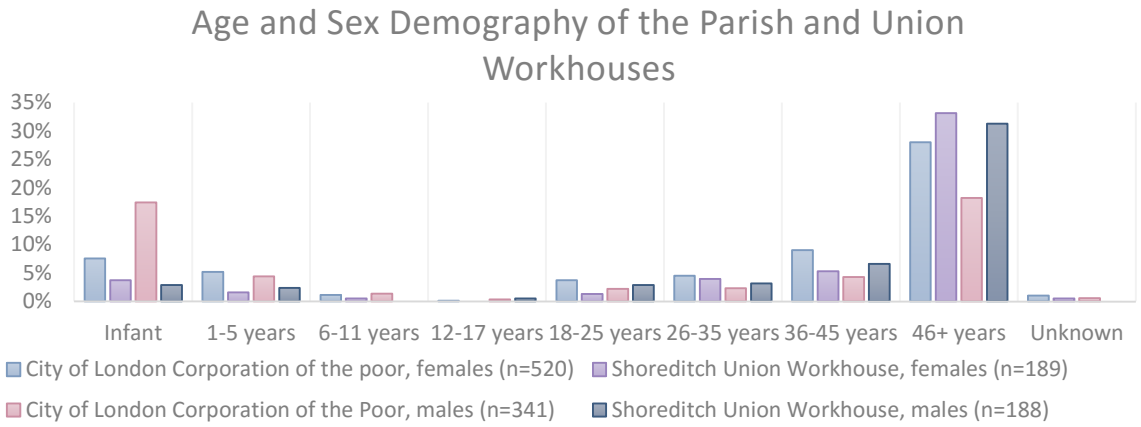
***Figure 4-5: Historical demography of the Parish and the Union workhouse.***




All age categories within the historical records could be analysed by sex, unlike the osteological record where only the adult sex ratio could be examined (Figure 4-6). Females comprised 60% of all burials recorded in the parish workhouse, while 40% were male. In the union workhouse records males and females were equally represented.

In the parish burial record, females were more prevalent than males in all adult age categories, whereas there was no age-related sex bias in burial records from the union workhouse (Figure 4-6). There was an increase in prevalence of both elderly males and females in the union workhouse when compared to the parish workhouse.

***Figure 4-6: Age and sex Demographic of the Parish and Union Workhouse, historical records.***




### 4.2.3 Cyclical Use of the Workhouse

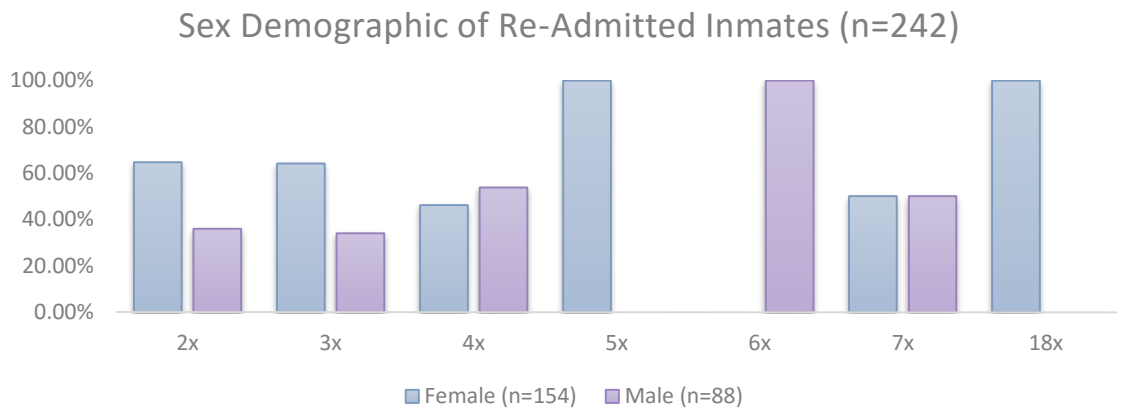
For the recorded 3224 individuals being admitted into the Shoreditch union workhouse, a number of different reasons were given for discharge, including: absconding, being sent to a different workhouse or industrial school, police action, or death. A closer analysis of 2189 individuals indicates that 11% were repeatedly admitted, with adults being re-admitted less often than children (6% of all recorded adult [n=1847] and 11% of all recorded children [n=1188]). The majority of individuals were admitted only once more (Table 4-3), however there was one individual recorded as entering the workhouse on eighteen separate occasions. The most common reasons given for discharge were ‘at own request’ (35%) or ‘left/removed by family’ (30%). Only 9% of the cyclical users of the workhouse died whist an inmate of the workhouse.

*Table 4-3: Final reason for discharge for individuals who were re-admitted multiple times into the Shoreditch Union Workhouse (Compiled by author).*

| Reason for discharge | 2x | 3x | 4x | 5x | 6x | 7x | 18x | Total |
|---|---|---|---|---|---|---|---|---|
| **Asylum** | 8 | 2 | - | - | - | - | - | 10 |
| **Brentwood Industrial School** | 9 | 8 | 2 | - | - | - | - | 19 |
| **Dead** | 14 | 5 | 2 | - | - | - | - | 21 |
| **Left/removed by family** | 61 | 7 | 5 | - | - | - | - | 73 |
| **Sent to hospital** | - | - | - | 1 | - | - | - | 1 |
| **Sent to different union** | 23 | 3 | - | - | - | - | - | 26 |
| **Police action** | 2 | - | - | - | - | - | - | 2 |
| **Sent to prison** | 1 | - | - | - | - | - | - | 1 |
| **Removed by Board** | 1 | - | - | - | - | - | - | 1 |
| **Service/apprenticed** | 2 | 1 | - | - | - | - | - | 3 |
| **At own request** | 49 | 27 | 4 | 1 | 1 | 2 | 1 | 85 |
| **Total** | 170 | 53 | 13 | 2 | 1 | 2 | 1 | 242 |

Three quarters of all re-admitted inmates were recorded just twice within the records for Shoreditch Union (Figure 4-7). Compared to all individuals within the record, females (5%) were more likely to have been re-admitted than males (2%) and comprised over half of all re-admitted inmates (64%). Females were twice as likely (5%) as males (2%) to have re-entered the workhouse three times. Males were slightly more prevalent at entering the workhouse four times when compared to females (3% and 2% respectively). There were very few individuals who re- entered the workhouse more than four times, and males and females were equally represented.

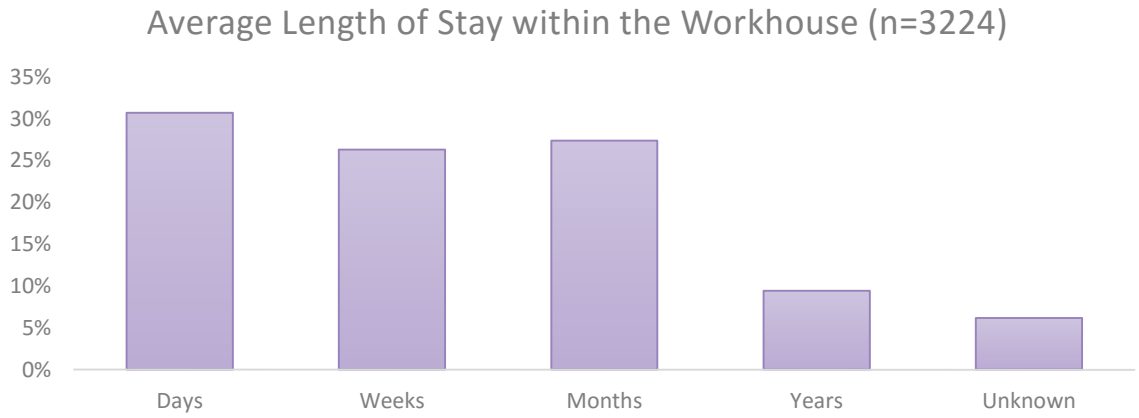
*Figure 4-7: Sex demographic of re-admitted inmates to the Shoreditch union Workhouse.*




### 4.2.4 Length of stay within the workhouse

The average length of stay of an inmate within the workhouse varied (Figure 4-8). The majority of the recorded inmates (31%) spent between one and five days residing in the workhouse. Whilst, 26% of re-admitted inmates spent between one and seven weeks in the workhouse and 27% spent between one and eleven months. Inmates were least likely to reside in the workhouse between one and thirty years (9%). There were also inmates whose length of stay was unknown, which comprised 6% of the record.

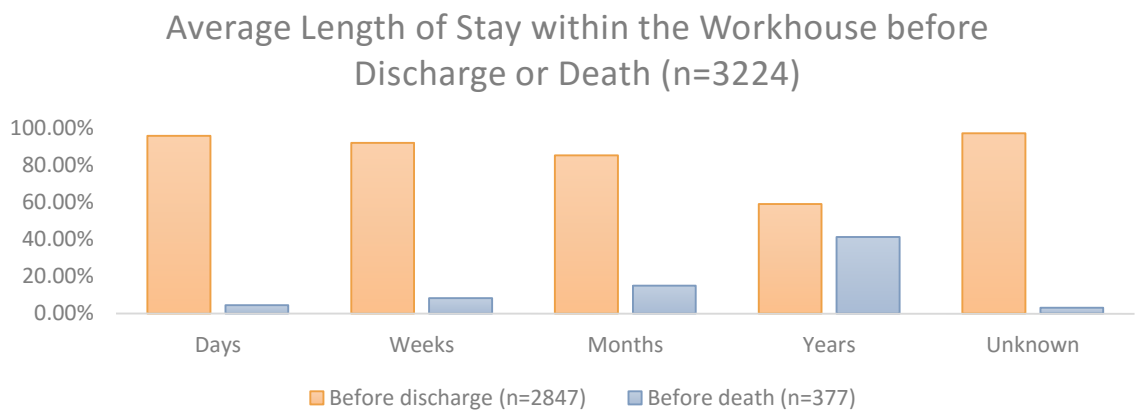
*Figure 4-8: Duration of stay within the Shoreditch Union Workhouse. Days (0-7 days), Weeks (1-4 weeks), Months (1-12 months), and Years (12 months and over).*




Inmates of the Shoreditch Union workhouse were more likely to have been discharged alive from the institution (Figure 4:9), especially if they were within the institution for between 1 day and 11 months.

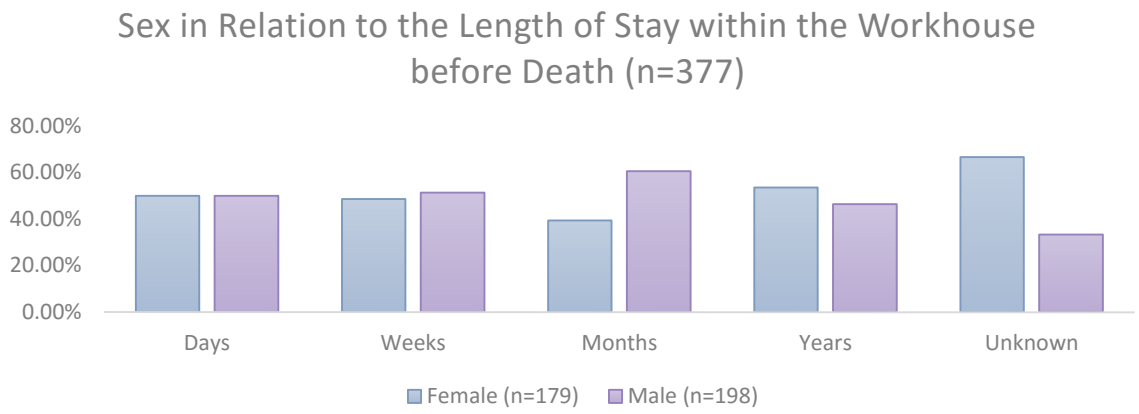
Analysis suggests that a longer duration of stay in the Union Workhouse would have increased the probability that an inmate would die within the institution. From all the inmates who were discharged from the workhouse, 33% of them left within a week, compared to 27% who left within one month. Of the inmates that did die whilst residing within the workhouse, the longer that they resided within the institution the probability of death increased. Of those inmates who resided within the workhouse between 1 and 11 months, 15% were likely to have died within the workhouse whilst 85% were discharged alive. If the residence was one year or longer, 41% of inmates were likely to have died within the workhouse, whilst 59% were alive at the time of their discharge.

***Figure 4-9: Length of stay before discharge or death.***




There is no indication of a gender correlation between duration of stay and mortality (Figure 4-10). Male and female inmates were equally recorded, 50%, staying within the workhouse between one day and 3 weeks. 60% of inmates who died within the workhouse between 1-11 months were male, while females comprised 40% of those recorded deaths. The percentage of females dying within the workhouse after one year was slightly higher than that of male inmates (54% female and 46% male). For those inmates whose length of stay prior to death is unknown was more likely to have been female than male (67% female and 33% male).

*Figure 4-10: Sex and duration of stay in the Shoreditch Union Workhouse.*




### 4.2.5 Key Points

- Osteologically, the number of recorded pathological conditions increased in the union sample (66%) compared to the parish sample (47%).
- Osteologically, children, 1-5 years of age, and elderly adults were more likely to be present in the union and independent labourer samples.
- Osteologically, children between 6-11 years and adolescents decreased in frequency in the samples of the union and independent labourer samples.
- Historically, infants and elderly adults were more frequently recorded as dead within the workhouse records.
- Infants were recorded within the parish workhouse register 3x more frequently than the union workhouse.
- Historically, children between 6-11 years and adolescents comprised the lowest frequency of both the parish and union workhouses.
- Males were more frequent in the union sample, whilst females were more frequent in the independent labourer sample of City Bunhill.
- Of the 242 analysed inmates being re-admitted into the union workhouse, the majority were only frequenting the workhouse twice.
- Females were more likely to be re-admitted into the workhouse compared to males
- Pregnant women were not usually recorded being admitted in the union workhouse
- Individuals who ultimately died within the union workhouse were more likely to have been residents of the workhouse for more than one year.

## 4.3 Are the historical and osteological records relating to the workhouses comparable?

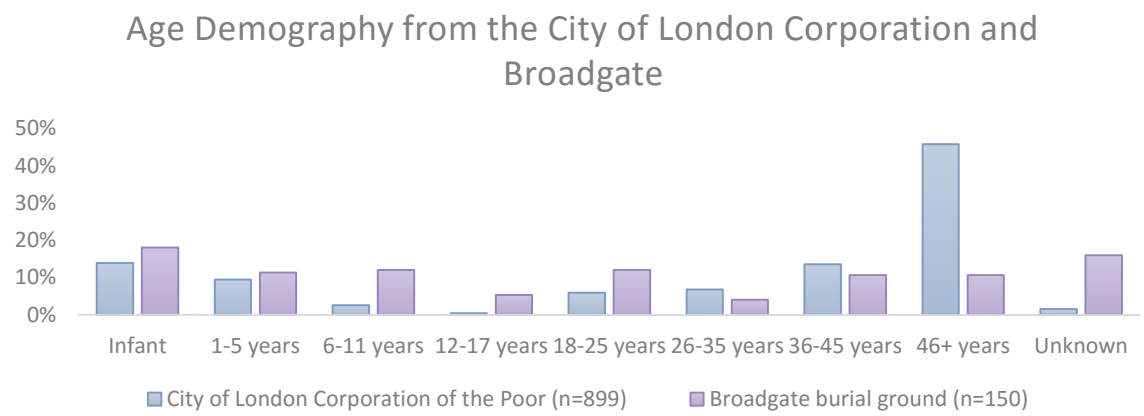
For three of the cemetery samples (Broadgate, St Bride's lower and Cross Bones) corresponding historical records (City of London Corporation of the Poor, St Bride's Parish burial records, and St Saviour's burial records) have been analysed with the aim of comparing the two data-sets.

### 4.3.1 Broadgate and London Corporation of the Poor

The osteological record for Broadgate burial ground was compared to the records of deaths associated with the City of London Corporation of the Poor parish workhouse. Adults comprised just over half (51%) of Broadgate's cemetery sample, whilst adults were far more prevalent historically with 72% of the record being comprised of individuals over 18 years of age (Figure 4-11). This difference between the records can be more easily seen when the category of adult is broken down even further.

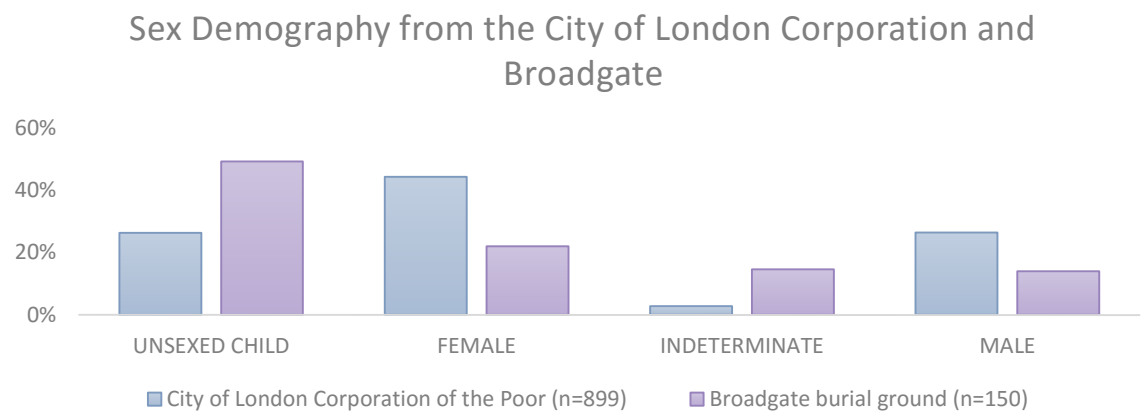
One of the most striking differences between the age compositions of the cemetery sample was the under-representation of the elderly age group with the cemetery. In the elderly (45+ years) age group, the skeletal sample indicates that they comprise only 11% of the sample, whilst the historical records show that the elderly comprised 46% of the record. Given that the elderly formed a substantial proportion of the adults in both the parish and union workhouses, the historical records are likely to be more accurate. There is a well-established bias in skeletal age estimation techniques, whereby older individuals are under-aged and generally under-represented and it is likely that this is the cause of the observed discrepancy (Gowland, 2007).

*Figure 4-11: Age demographics from the City of London Corporation of the Poor and Broadgate burial ground.*




Surprisingly, as they are traditionally viewed as being under-represented in cemetery sites due to poorer preservation, non-adults were far more prevalent in the cemetery sample (49%), compared to the historical records (25%) of deaths in the London Corporation of the Poor workhouse. The most striking contrast between the two records is related to the 6-11 years age category, which comprised 3% of the historical burial record and 12% of the analysed osteological sample. Adolescents (12-17 years) also present a large difference between the two, historically they comprised 0.45% of the record, whilst osteologically they represent 12% of the sample. Given that age estimation techniques for this age group are accurate another explanation for this discrepancy should be sought (See Chapter Five: Discussion).

*Figure 4-12: Sex demographics from the City of London Corporation of the Poor and Broadgate burial ground.*



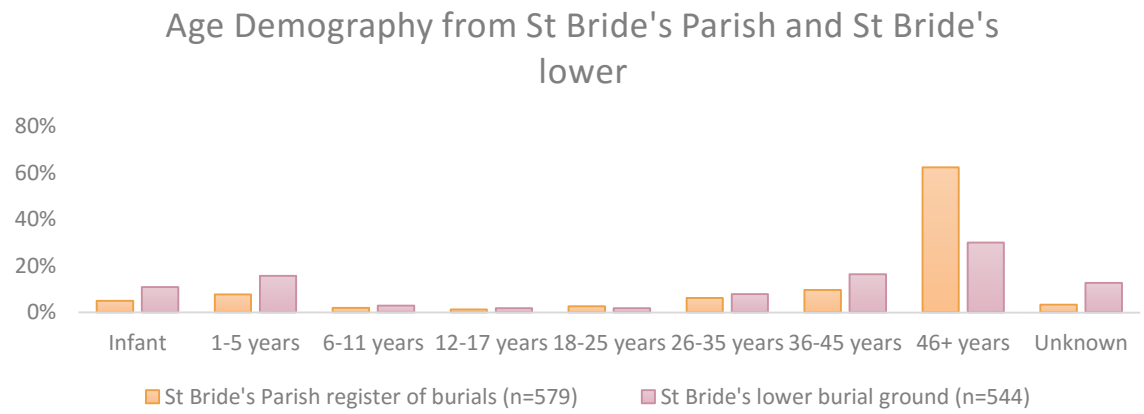

In the historical records, females (45%) were more strongly represented than males (27%) (Figure 4-12). This is also true of the skeletal sample, though the pattern is much less pronounced. It could be that the 'indeterminate' category contains more females than males. This would follow general taphonomic biases, in which the more gracile adult female skeleton tends not to survive as well as adult males (Bello and Andrews, 2006:5).

### 4.3.2 St Bride's lower and St Bride's Parish

The cemetery record for St Bride's lower churchyard was compared to the documented burials associated with individuals from the workhouse who were buried in St Bride's Parish in the lower churchyard. Adults were most frequently represented in both sample types, with 84% of the recorded workhouse deaths and 68% of the analysed skeletal sample being 18 years or older (Figure 4-13).

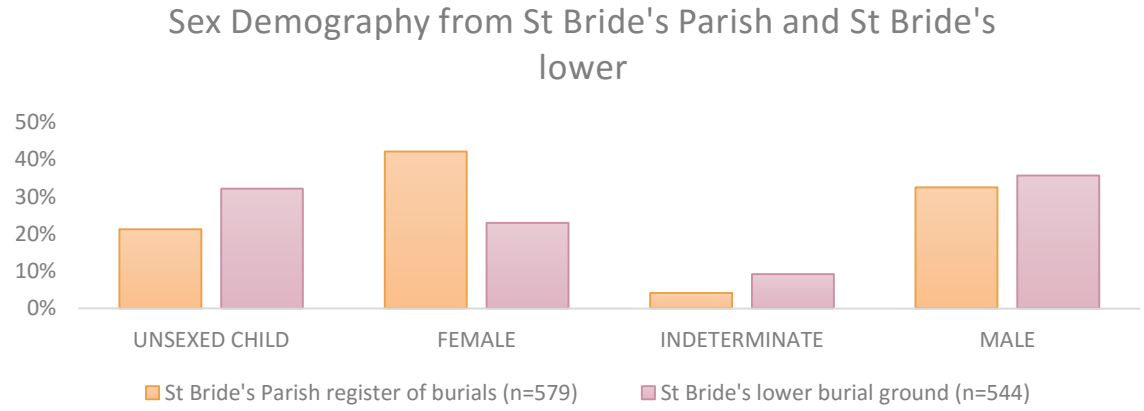
In both records young adults (18-25 years) were the least prevalent of all adult age categories, comprising only 2% of the osteological sample and 3% of the historical record. There is an increase in both young middle adults (26-35 years) and old middle adults (36-45 years) in both records. Elderly adults were the most frequently represented of all age categories in both records. Again, elderly adults are observed more frequently in the historical records (62%) when compared to the cemetery sample (30%).

*Figure 4-13: Age demographic from the St Bride's parish register of burials and St Bride's lower burial ground.*




As with the Shoreditch records, non-adults were over-represented (32%) in the skeletal sample when compared to historical burial records for those under 18 years of age (16%). Infants (birth to 1 year) were recorded twice as often in the osteological sample (11%) when compared to the historical record (5%), as were children 1-5 years of age. For the remaining non-adult age categories, the data-sets follow broadly similar patterns, showing remarkable congruence given the variation in the sources and the potential for taphonomic bias.

*Figure 4-14: Sex demographic from the St Bride's parish register of burials and St Bride's lower burial ground.*




Males are equally represented in the cemetery sample and the burial records (Figure 4-14), though in the historical record, there were considerably more females (42%) than in the cemetery sample. In contrast to the Shoreditch records, this disparity cannot by accounted for by taphonomic bias as there

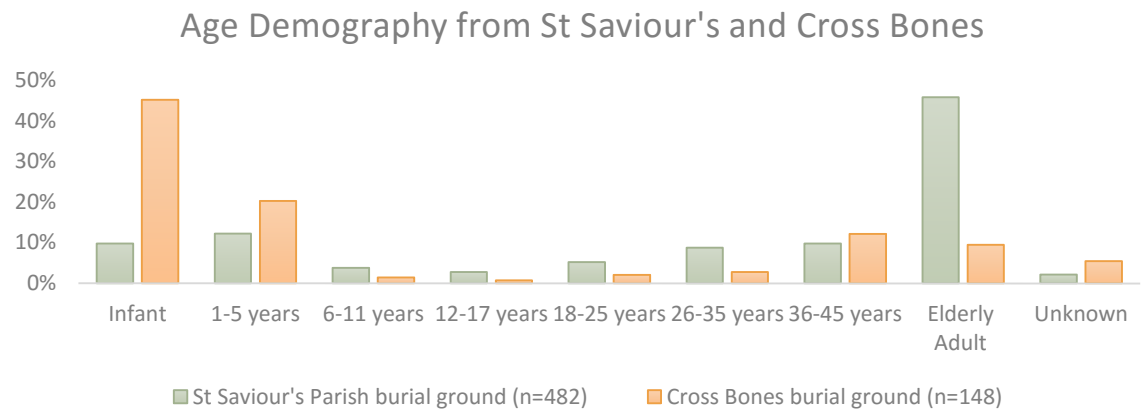
are only a small proportion of adults for whom sex could not be determined. In the cemetery sample for St Bride's lower, males (36%) were more prevalent that females (23%). Again, non-adults were over-represented in the cemetery samples when compared to the historical records.

### 4.3.3 Cross Bones and St Saviour's Parish

The osteological record for Cross Bones burial ground was compared to the burial records of individuals from the workhouse buried in St Saviour's Parish in the Red Cross Way burial ground. Adults are the most prevalent in the historical record comprising 80% of the total burials, this differs greatly from the osteological sample where only 30% of the sample are adults (Figure 4-15).

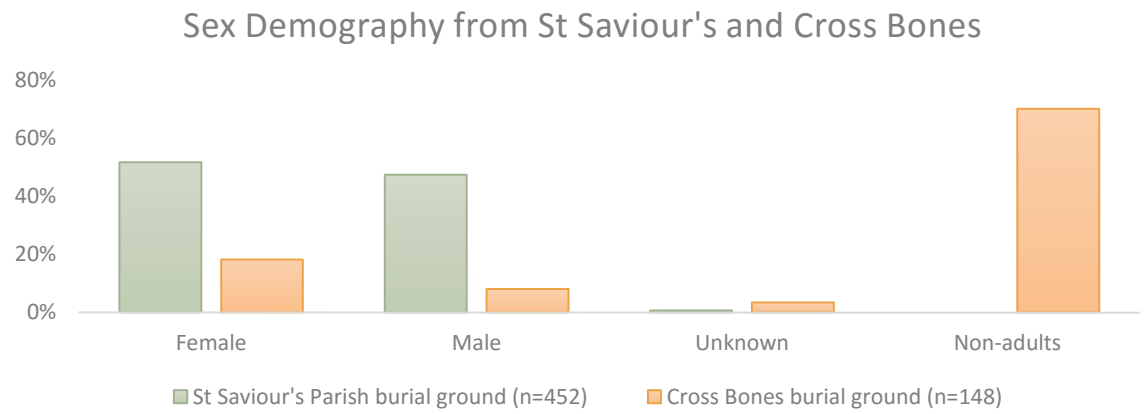
Young adults (18-25 years) were the least prevalent of the adult age categories in both records, though osteologically (2%) young adults were recorded less often than in the historical record (5%). There is a difference in the presentation of young middle adults (26-35 years) between the two records as osteologically they were recorded as 3% of the sample, whilst historically 9% of the records were comprised of young middle adults (26-35 years). Osteologically, old middle adults (36-45 years) were the most prevalent of all the adult age categories comprising 12% of the record, and 10% of the historically recorded burials. For the adult age categories, elderly adults (aged 46 years or older) again presented the biggest difference between the two records. The elderly adults had the highest prevalence of the historical record, comprising almost half of all burials (46%). Whilst elderly adults comprised only 9% of the analysed skeletal sample. There were individuals in both records whose age was indeterminable and these individuals comprised 5% of the osteological record and 2% of the historical record.

*Figure 4-15: Age demographic from the St Saviour's parish register of burials and Cross Bone burial ground.*




Interestingly, non-adults were, again, the most prevalent in the osteological sample, comprising 68% of the analysed skeletal sample, whilst historically non-adults comprised only 28% of the burial record. The majority of this discrepancy stemmed from the infant (birth-1 year) age category. This was the most highly represented age category from the osteological analysis (45% of the total osteological sample), which represents a stark contrast when compared with the historical record (10%) (Figure 4-15). Osteologically, children 1-5 years were present in 21% of the analysed cemetery sample, while historically children 1-5 years were half as prevalent comprising 12 % of the burial record. Otherwise, the patterns were broadly similar between the two different data sources.

*Figure 4-16: Sex demographic from the St Saviour's parish register of burials and Cross Bones burial ground.*




Based on burial records, females (52%) and males (48%) were equally represented (Figure 4-16). In the osteological analysis, females (18%) were twice as prevalent as males (8%).

### 4.3.4 Key Points

- Broadgate and City of London Corporation of the Poor:
    - Adults were more frequently recorded historically compared to the cemetery sample from Broadgate.
    - Elderly adults were under-represented osteologically (11%) compared to the historical record (46%).
    - Non-adults were more prevalent in the cemetery sample (49%) compared to the historical record (25%).
    - Females were more represented than males both historically and osteologically.
- St Bride's and St Bride's Parish:
    - Adults were more frequently recorded historically when compared to the corresponding cemetery sample.
    - Elderly adults were more frequently recorded historically (62%) compared to the cemetery sample (30%).
    - Non-adults were under-represented in the historical record (16%) compared to the corresponding cemetery sample (32%).
    - Females were considerably more prevalent in the historical record compared to the cemetery sample. While males are equally represented.
- Cross Bones and St Saviour's Parish:

  - Adults were more frequently recorded in the historical record compared to the cemetery sample.
  - Elderly adults were more frequently represented in the historical record (46%) compared to the cemetery sample (9%).
  - Non-adults were under-represented in the historical record (28%) compared to the cemetery sample (68%)
  - Historically, females and males were equally represented, while females were more frequently recorded in the cemetery sample.
- Generally, based on all three of these comparisons, elderly adults were under-represented in the osteological records, whilst being over-represented in the non-adult categories compared to the historical records.

## 4.4 Change in the Presence of Pathological Conditions

Based on previous results demonstrating the change in the menus being served to workhouse inmates, and the decline in the nutritional quality of the workhouse menu, together with the increasing physical demands placed on inmates, one would expect to see a decline in health in the union workhouse sample. This study examines the osteological evidence from five cemetery samples from London (Table 4-4): two span from the 16$^{th}$ into the early 18$^{th}$ century, two dating from the end of the 18$^{th}$ century into the mid-19$^{th}$ century, and the fifth which dates from 1833 to 1853. The cemeteries of St Thomas, Broadgate, St Bride's lower, and Cross Bones have links with London workhouses. The fifth cemetery, City Bunhill, was not associated with a workhouse but was used to provide comparative data against which to assess any differences between the health of the incarcerated poor and those existing outside of the workhouse.

*Table 4-4: Cemetery information.*

| Cemetery | Dates | Number of individuals presenting with pathologies | Study category |
|---|---|---|---|
| **St Thomas Hospital** | 1540-1714 | 137 | Parish |
| **Broadgate burial ground** | 1569-1714 | 25 | Parish |
| **St Bride's lower churchyard** | 1770-1849 | 325 | Union |
| **Cross Bones burial ground** | 1800-1853 | 129 | Union |
| **City Bunhill cemetery** | 1833-1853 | 64 | Independent labourer |

Of the 193 analysed skeletal individuals available for St Thomas' Hospital, 71% of the sample were recorded with evidence of pathologies (Table 4-5), which would have been expected from a cemetery that is associated with a hospital. The Broadgate excavation yielded 147 skeletal remains for analysis, though only 17% of the sample was recorded with evidence of the five pathological categories within this study. Of the 544 skeletal remains from St Bride's lower, 60% presented evidence of pathologies. The Cross Bones cemetery sample presented with the highest percentage (87%) of the sample with evidence of the five pathological conditions. City Bunhill yielded 239 skeletal remains, and only 27% of those individuals were recorded with evidence of pathology. These are the numbers that will be utilised in the study as the crude prevalence of the samples, which could present an issue as there are a number of individuals who have been recorded with more than one pathological condition.

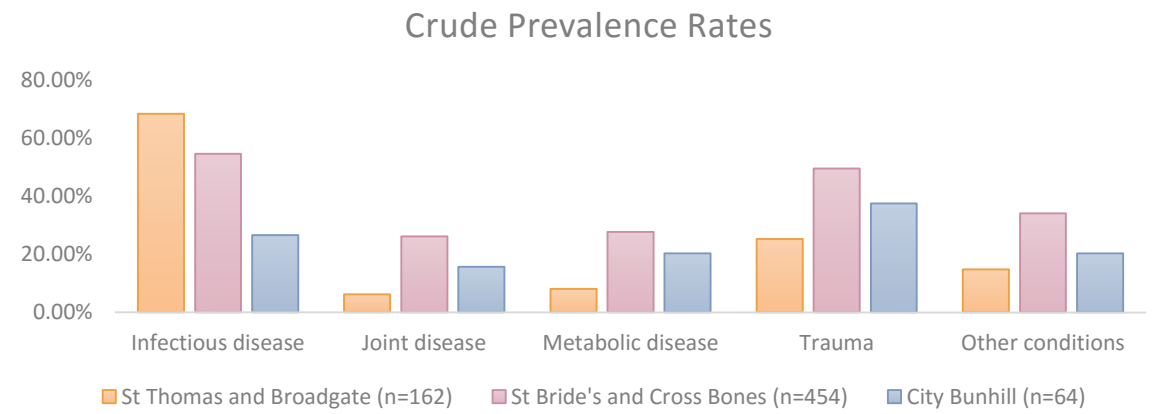
*Table 4-5: Percentage of samples with recorded pathological conditions.*

| Cemetery | Number of individuals with pathologies | Percentage of population with pathology | Total population |
|---|---|---|---|
| **St Thomas' Hospital** | 137 | 71% | 193 |
| **Broadgate burial ground** | 25 | 17% | 147 |
| **St Bride's lower churchyard** | 325 | 60% | 544 |
| **Cross Bones burial ground** | 129 | 87% | 148 |
| **City Bunhill burial ground** | 64 | 27% | 239 |

Overall, when the crude prevalence rates were examined, there was an increase in four of the five pathological categories over time. The prevalence of infectious disease decreased in the union

cemeteries, as well as in the 19th century independent labourer cemetery (Figure 4-17). Infectious disease presented in 69% of the parish cemetery sample, which decreased to 55% crude prevalence rate in the union cemetery sample. The decrease in metabolic conditions is most evident in the cemetery of City Bunhill, where only 27% of the sample had evidence of metabolic conditions. The other four pathological categories doubled in frequency amongst the union sample. This increase was not nearly as dramatic for City Bunhill (the non-workhouse cemetery) where there was only a difference of less than 20% between it and the parish sample. The crude prevalence rate indicates a change in the pattern and frequency of the five pathological categories.

***Figure 4-17: Crude Prevalence of pathologies.***




### 4.4.1 Infectious disease

The overall presentation of infectious conditions decreased in the 19th century cemeteries from 69% of the parish sample to 55% of the union sample and only 27% of the independent labourer sample of City Bunhill.

The recorded evidence of treponematosis (syphilis) decreased from 15% in the earlier parish sample to 4% in the union sample, and 3% in the independent labourer sample (Figure 4-18). This would indicate that inmates of the union workhouse would have been less likely to have been suffering from syphilis at the time of their deaths compared to any outdoor labourer as they were more likely to have been refused entry. The evidence for tuberculosis suggests that the independent labourer sample (3%) was most likely to have evidence of the condition compared to the parish sample (2%), though it was

most evident in the parish sample in which it comprised 4 % of the crude prevalence rate. Out of all 375 recorded instances of infectious disease there was only one individual from the union sample that had evidence of smallpox, the vaccination for which had been available since 1798 (Baxby, 1999:10).

***Figure 4-18: Instances of specific infection over time.***

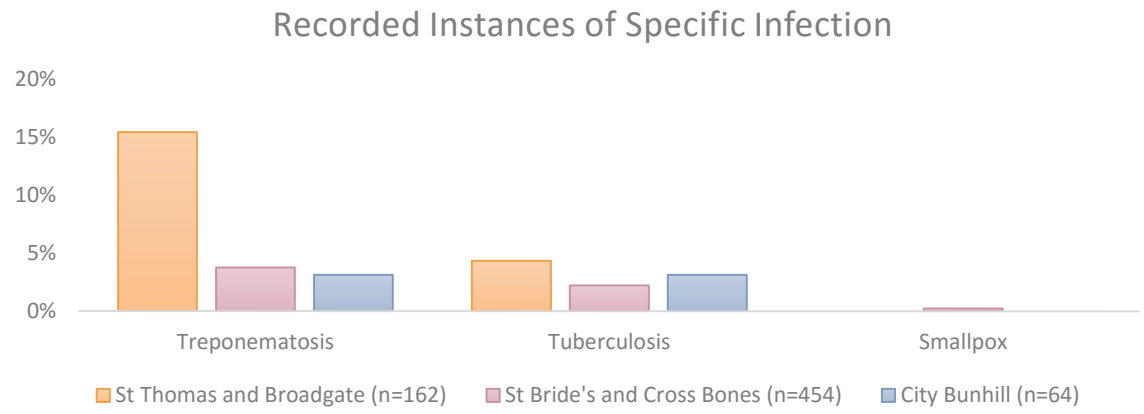
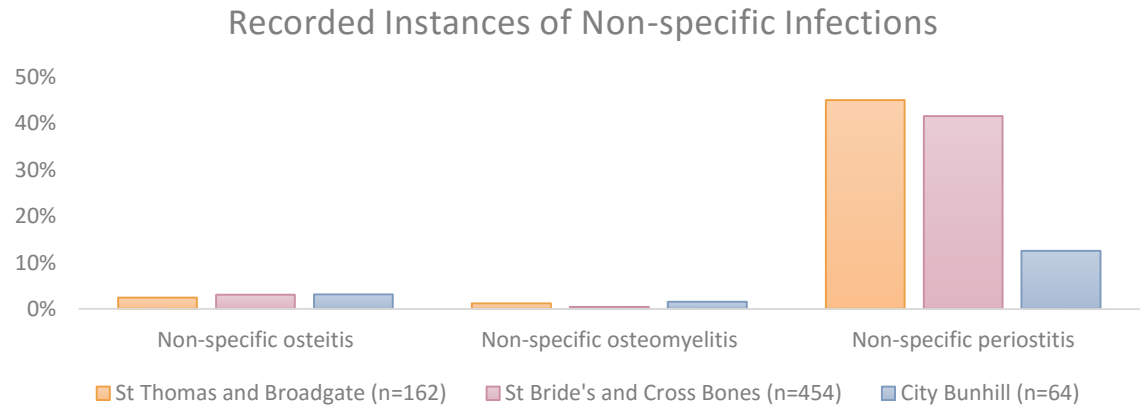
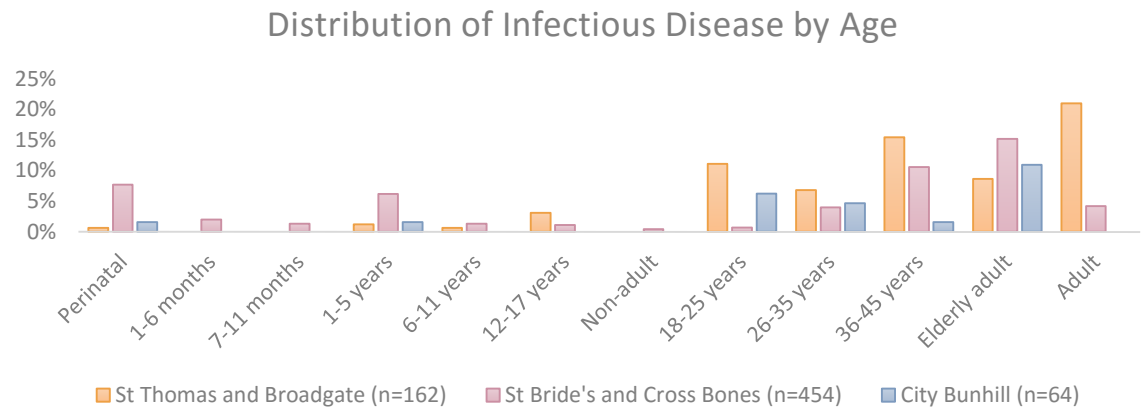



***Figure 4-19: Instances of non-specific infection over time.***




For all cemeteries, the most prevalent of all infectious conditions was non-specific periostitis (Figure 4-19). Again, periosteal new bone growth has many aetiologies but it has been kept in the infectious disease category as the Museum of London records it as an infectious condition. City Bunhill had the lowest presentation of the condition with 13% of individuals being recorded with evidence of non-specific periostitis. Periostitis was the most prevalent condition in the union workhouse with a total of 45% of all infectious conditions, with the union sample recording periosteal new bone growth for 42% of the crude prevalence rate.

***Figure 4-20: Distribution of age, Infectious disease.***

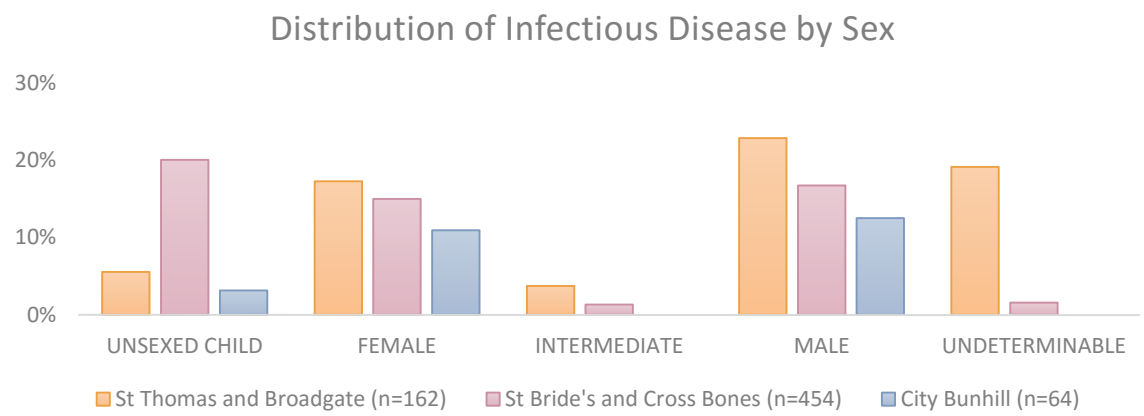



The majority of individuals recorded with infectious conditions were adult. However, the perinates from the union sample demonstrated higher rates of infection compared to the parish sample, as did children aged between 1 and 5 years (Figure 4-20). Elderly adults demonstrated the most evidence of infectious disease in the union workhouse and independent labourer sample, though this is to be expected as many infectious conditions will only manifest on the skeleton after a number of years. Of the parish sample, individuals aged between 36-45 years (23%) were more likely to have evidence of infectious disease.

Children (birth-17 years) demonstrated the most evidence of infectious conditions in the union cemetery sample, which comprised 20% of the crude prevalence rate. This was a higher prevalence than either the earlier parish sample (6%) or the contemporaneous independent labourer sample (3%) (Figure 4-21).

City Bunhill has the lowest percentages of both males and females with skeletal evidence of infection of the three cemetery samples, though there were more males than females (13% and 11% respectively). Females changed very little between the parish and the union samples, where females with evidence of infection comprised 17% of crude prevalence rate for the parish sample and 15% of crude prevalence rate for the union sample. There was a decrease in the prevalence of males with evidence of infection in the union sample (17%) from the rates in the parish sample (23%).

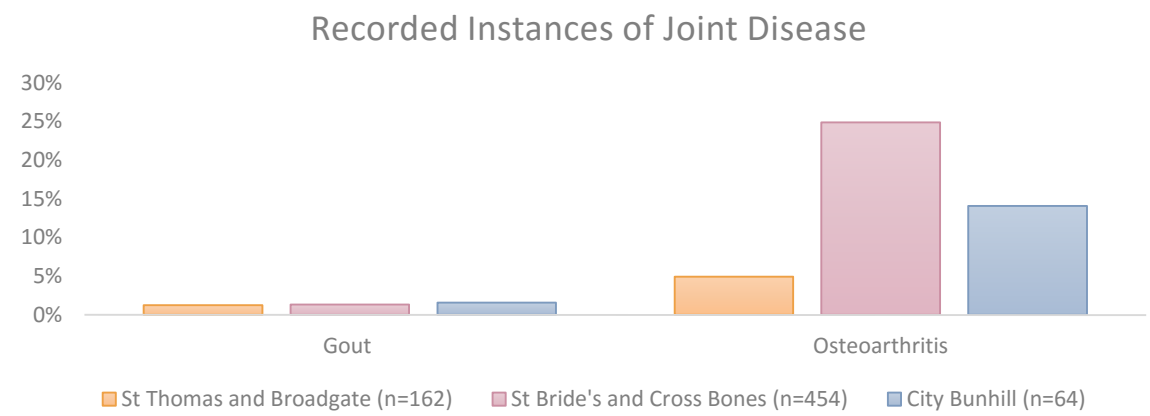
*Figure 4-21: Distribution of sex, Infectious disease.*




### 4.4.2 Joint Disease

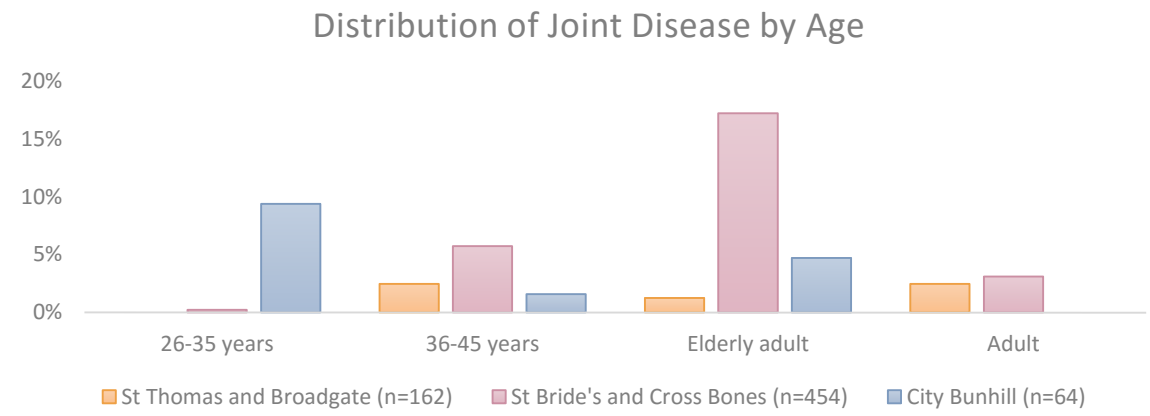
Overall, the prevalence of joint disease in the two 19th century cemetery samples increased from the earlier parish sample. The two conditions that were analysed within this study were osteoarthritis and gout (Figure 4-22). Of the two conditions, osteoarthritis was the most prevalent in all three cemetery samples, comprising 5% of the crude prevalence rate for the parish sample, and increasing to 25% of the union sample. City Bunhill also increases in prevalence, but osteoarthritis only comprises 14% of the crude prevalence rate. Gout was recorded as 1% of all joint disease in the parish cemetery and the union sample. Gout was more prevalent in the cemetery sample of City Bunhill though with 2% of the crude prevalence rate.

*Figure 4-22: Instances of joint disease.*




Joint disease was present only in adults in all three samples, but the most prevalent age category is different for all three cemetery samples (Figure 4-23), which is to be expected as these conditions are not known for affecting younger individuals. Elderly adults with evidence of joint disease comprise 17% of the crude prevalence rate. Which is an increase compared to the parish sample, as only 1% of the crude prevalence rate were elderly adults. Young middle adults (26-35 years) with joint disease were the most prevalent in the City Bunhill sample, comprising 9% of the crude prevalence rate.

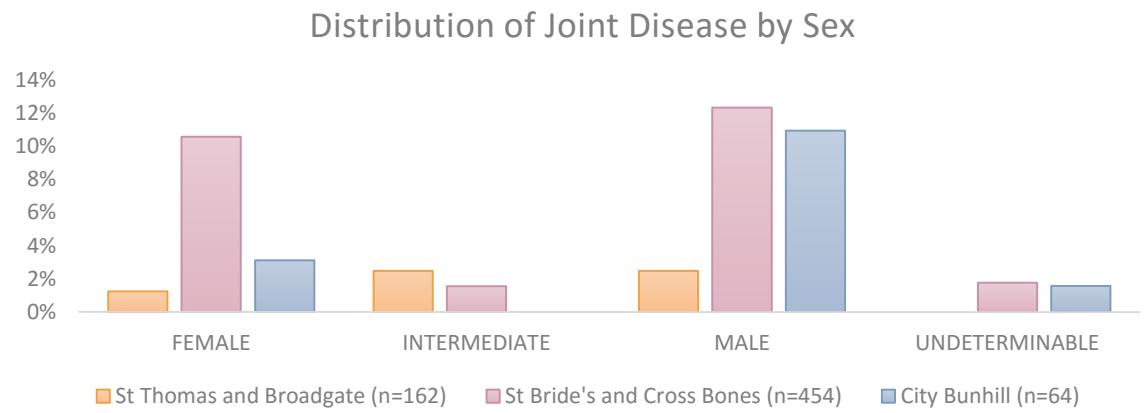
*Figure 4-23: Distribution of age, Joint disease.*




There are more males than females with joint disease in all cemetery samples (Figure 4-24). Though for the union sample the two sexes are within 1% of each other (11% female and 12% male), as were the males and females for the parish sample (1% female and 2% male). City Bunhill shows the largest difference between males and females, with males presenting as 11% and females comprising 3% of

the crude prevalence rate. The prevalence in females is greater for the union sample compared to either the parish or the independent labourer samples. There are also a few individuals whose sex was unable to be determined, either due to intermediate features or a lack of features, which also influence the presentation. However, there were no indeterminable individuals in the parish sample, and for the union and City Bunhill sample's indeterminable individuals with evidence of joint disease comprise just 2% of the crude prevalence rates.

***Figure 4-24: Distribution of sex, Joint disease.***

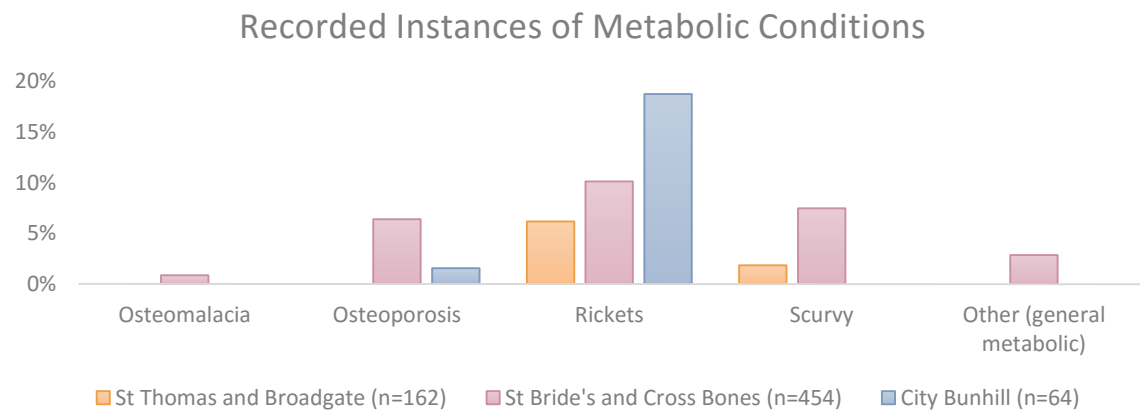



### 4.4.3 Metabolic conditions

Osteologically, there was an increase in the overall presence of metabolic conditions (Figure 4-17) in the 19th century cemetery samples. There are five recorded metabolic conditions, (rickets, osteomalacia, osteoporosis, scurvy, and other- general metabolic) that are present in the five cemeteries utilised in this study (Figure 4-25). Rickets was the most prevalent in all three samples, with the highest presentation being in the independent labourer sample of City Bunhill presenting with 19% of the crude prevalence rate. The parish sample is only recorded as demonstrating rickets and scurvy, and 6% of the sample had evidence of rickets. In the union samples rickets is still the most prevalent (10%), it is much lower than City Bunhill. However, the union sample also demonstrates osteomalacia, osteoporosis, scurvy, and generalised metabolic disorders. The independent labourer sample only demonstrates evidence of rickets and osteoporosis. The prevalence of osteoporosis is

lower in the independent labourer sample compared to the contemporaneous union sample, but the prevalence of rickets is much higher.

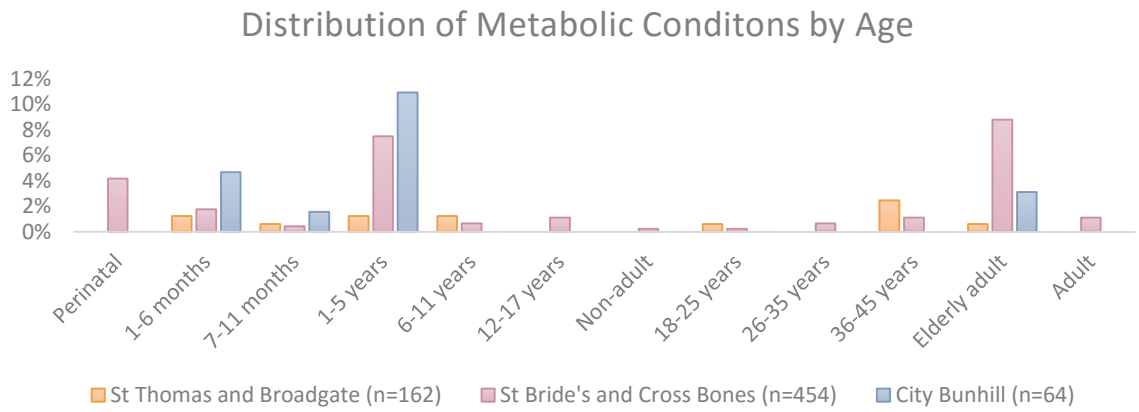
***Figure 4-25: Instances of Metabolic Conditions.***




Children had the highest prevalence of all three cemetery samples presenting with metabolic conditions (Figure 4-26 and Figure 4-27). Within the parish sample children between 1-6 months, 1-5 years and 6-11 years all demonstrated evidence of metabolic conditions at a rate of 1%, with a slight decrease in the prevalence in individuals aged 7-11 months (0.6%). The union sample was the only one of the three cemetery samples where perinatal infants were recorded with metabolic conditions (4%), and was the second highest age category of children behind individuals 1-5 years (7%). Whereas the independent labourer sample was largely children presenting with metabolic conditions, and children aged 1-5 years of age comprised 11% of the crude prevalence rate.

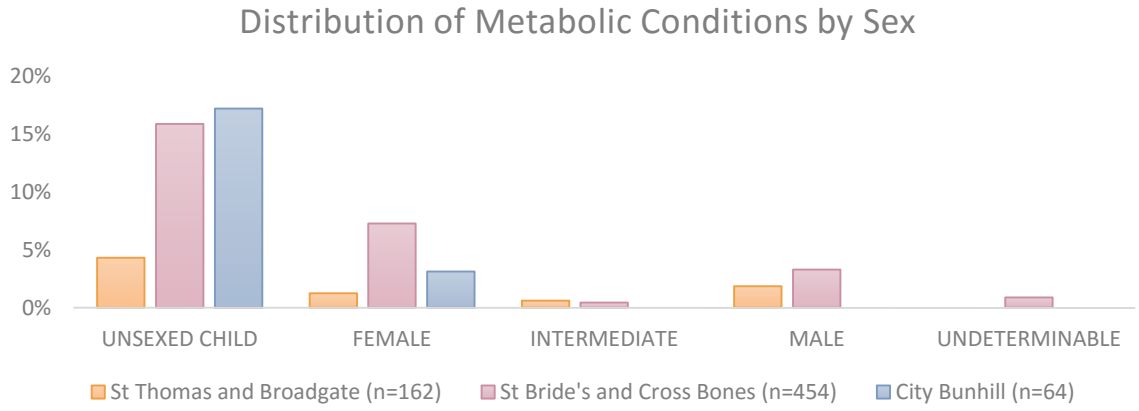
There are fewer adults presenting with metabolic conditions. The parish sample had more adults aged 36-45 years (2%), while the union and the independent labourer samples had more elderly adults presenting with metabolic conditions (9% and 3% respectively). Elderly adults were the only adults recorded with metabolic conditions in the independent labourer sample.

*Figure 4-26: Distribution of age, Metabolic conditions.*




There is an increase in the number of females presenting with metabolic conditions in the union sample (7%) when compared to both the parish and the independent labourer samples (1% and 3% respectively) (Figure 4-27). There is an increase in the prevalence of males from 2% of the parish sample to 3% of the union sample. Males did not present with metabolic conditions at all in the independent labourer sample.

*Figure 4-27: Distribution of sex, Metabolic conditions.*

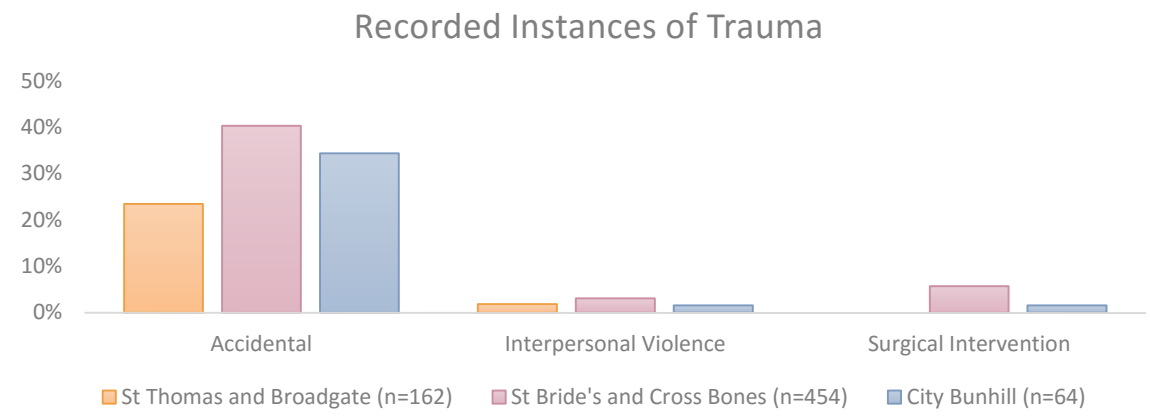



### 4.4.4 Trauma

Trauma is divided into three broad categories: accidental, interpersonal violence, and surgical intervention (Figure 4-28). Accidental trauma presented with the lowest prevalence in the parish sample with 24% of individuals showing evidence of accidental trauma, while the parish and the independent labourer samples are equal with their prevalence of accidental trauma at 2%. There is a

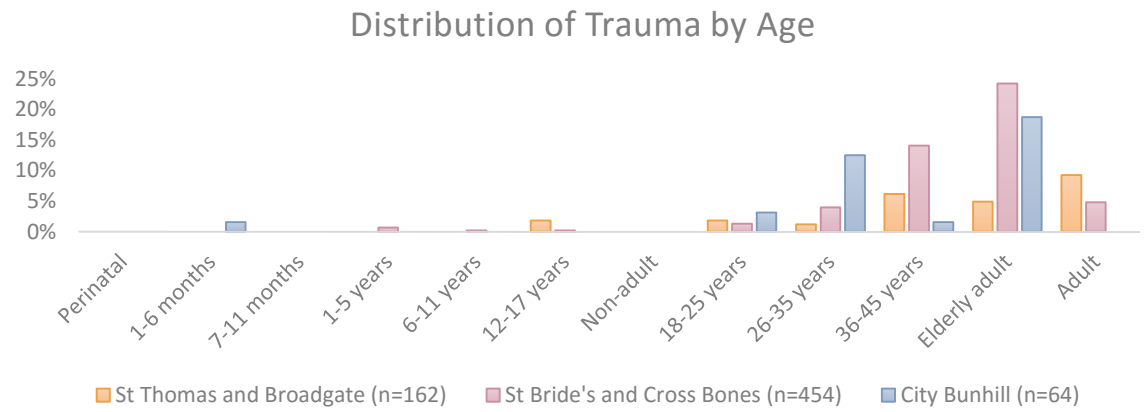
small increase in the evidence of interpersonal violence from 2% in the parish sample to 3% in the union, whilst City Bunhill presents with 2% of the crude prevalence rate. The parish sample has no evidence of surgical intervention (autopsy, craniotomy, dissection, etc.), which then appears in the union sample comprising 6% of the crude prevalence rate.

***Figure 4-28: Instances of trauma.***




Adults comprised the majority of all trauma, children comprised between 1% (union sample) and 2% (parish sample) of all instances of trauma (Figure 4-29). The children of the parish sample were more likely to have evidence of trauma between 12-17 years of age, whilst the union and the independent labourer samples had younger individuals with evidence of trauma. Adults aged 36-45 years were the most prevalent in the parish sample with evidence of trauma (6%), whilst in the union and independent labourer samples elderly adults were the most prevalent (24% and 19% respectively). A further 9% of the parish and 5% of the union adult samples exhibited evidence of trauma but they were classed as indeterminate for age.

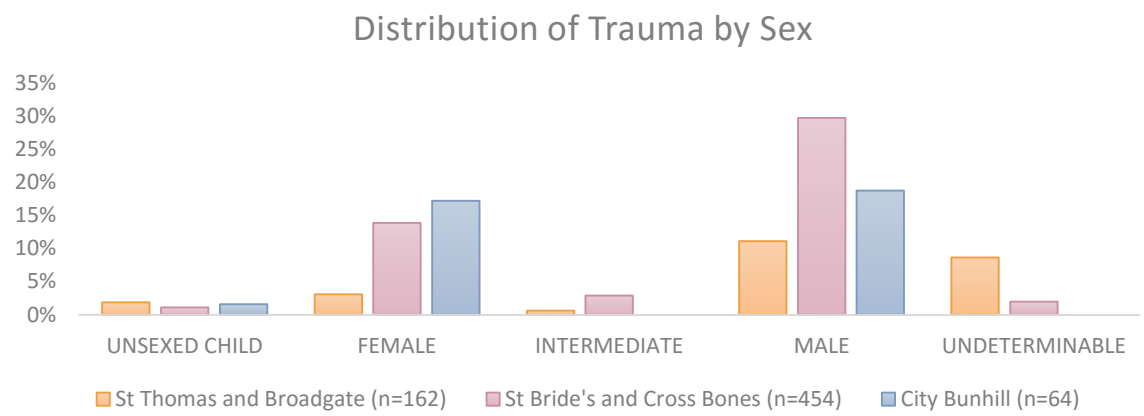
***Figure 4-29: Distribution of age, Trauma.***




Trauma was most prevalent in the three samples with males, comprising 11% of the parish, 30% of the union and 19% of the independent labourer samples (Figure 4-30). There was an increase in the number of both males and females between the parish and union samples. Though females in the independent labourer sample were recorded more often with instances of trauma (17%).

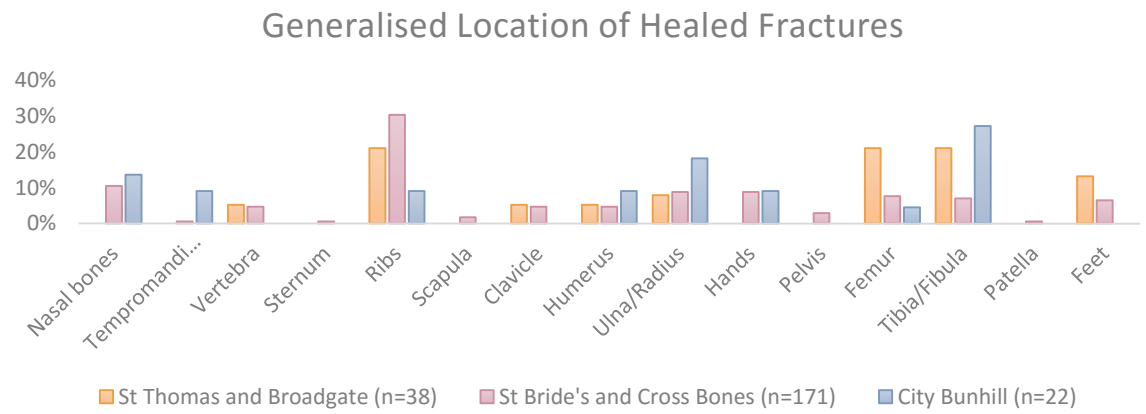
Males were more likely to have been recorded with instances of trauma in the parish sample compared to females, though there was a large percentage of indeterminable individuals also presenting with instances of trauma (9%). The gender division was the same in the union sample with more males presenting trauma, but in the independent labourer sample males and females were equally demonstrating trauma.

*Figure 4-30: Distribution of sex, Trauma.*




Healed fractures comprised the majority of all accidental trauma (100% of observed trauma in the parish and independent labourer sample, and 93% of the union sample). Individuals in the parish sample were recorded with healed fractures to the ribs and the upper and lower legs equally (21%) (Figure 4-31). Rib fractures increased in the union sample (30%) and were the most prevalent, but there was also an increase in the presentation of nasal fractures (11%). Fractures of the upper (humerus) and lower (ulna and radius) arm were also more prevalent in the union sample than those of the upper (femur) and lower (tibia and fibula) leg. The independent labourer sample had the highest prevalence of nasal fractures of all three samples (14%), though it was the fractures of the lower leg that was the most prevalent in the sample (27%). Clavicle fractures were equally present in the parish and the union samples, as well as vertebral fractures and fractures in the upper and lower arm.

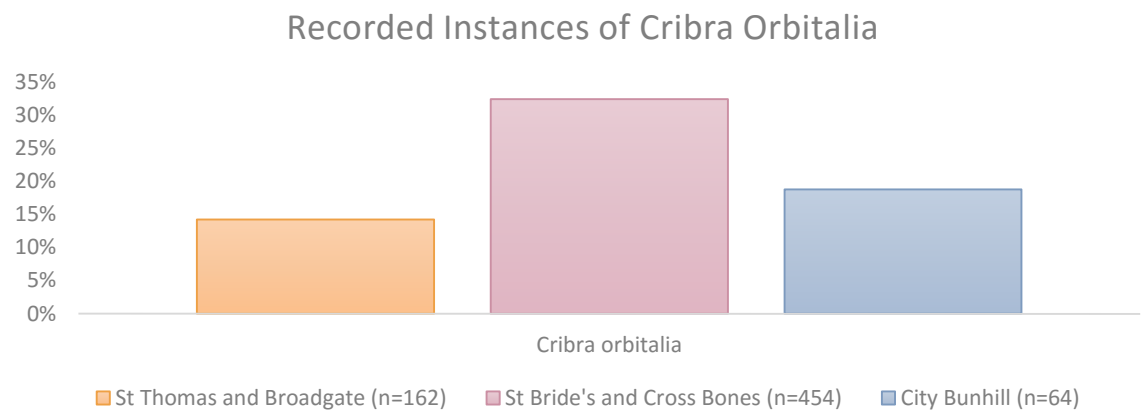
*Figure 4-31: General location of healed fractures.*




### 4.4.5 Cribra Orbitalia

All three samples presented with instances of cribra orbitalia pathological conditions (Figure 4-32). Evidence of cribra orbitalia comprises 14% of the crude prevalence rate for the parish sample. The union sample doubles that percentage, comprising 32% of the union crude prevalence rate. Evidence for cribra orbitalia is low for City Bunhill and closer to the parish presentation with 19% of the crude prevalence rate.

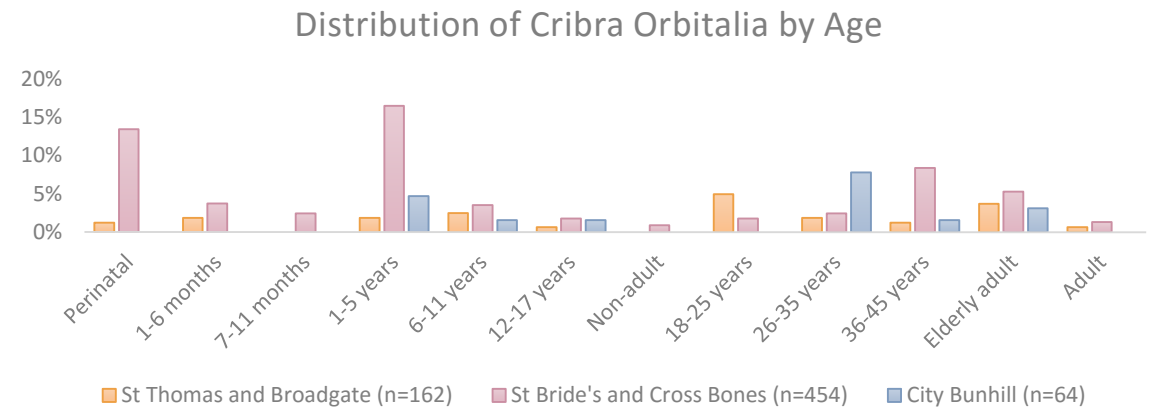
*Figure 4-32: Instances of Cribra Orbitalia.*




For the parish sample, evidence of cribra orbitalia was recorded with the highest prevalence in young adult (18-25 years) individuals comprising 5% of the crude prevalence rate (Figure 4-33). However, in the parish sample, perinatal infants (13%) and children 1-5 years (17%) were the most likely to have evidence of cribra orbitalia recorded. While old middle adults (26-35 years) in the City Bunhill sample

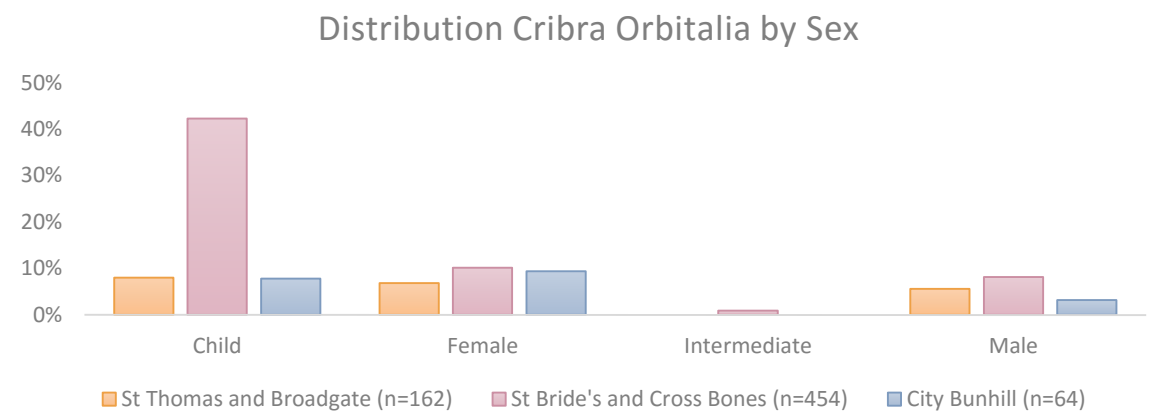
were more likely to have been recorded with evidence of cribra orbitalia comprising 8% of the crude prevalence rate. As cribra is typically a disease of childhood, they would have been residual in the adults and indicators of a period of stress in childhood.

***Figure 4-33: Distribution of age, Cribra Orbitalia.***




Cribra orbitalia was most prevalent in children in the union sample (42%) (Figure 4-34), though 8% of the crude prevalence rates for the parish and independent labourer samples were recorded with evidence of cribra orbitalia. Of the sexed individuals females were more prevalent in all three samples, seven per cent of the parish sample were female, with an increase in the prevalence of this condition on females in the union sample (10%) and the independent labourer sample of City Bunhill (9%). Males comprised less than 10% in all samples, but were the most prevalent in the union sample (8%). Males in the parish and independent labourer samples presented with a lower percentage, though the parish sample was twice as prevalent than the independent labourer (6% and 3% respectively).

*Figure 4-34: Distribution of sex, Cribra Orbitalia.*




### 4.4.6 Key Points

- Four out of five (joint disease, metabolic conditions, trauma, and other) pathological conditions increased in prevalence in the union cemetery.
- Infectious disease decreased between the parish and union workhouses.
- Treponematosis decreased from 15% in the parish sample to 4% in the union samples. Tuberculosis also decreased, though not as significantly.
- Infectious conditions were more frequently recorded on the remains of adults. Though there was a significant increase in the frequency of perinatal infants with infectious conditions.
- Osteoarthritis increased significantly between the parish and union samples.
- Rickets was the most prevalent metabolic condition in all three cemetery samples.
    - City Bunhill had the highest frequency of rickets, followed by the union sample and finally the parish sample.
    - Metabolic conditions increased amongst infants and young children in the union workhouse sample
- Accidental trauma increased in the union workhouse sample
- Surgical intervention is only present in the later cemetery samples.
- Males were more likely to have presented with evidence of trauma in the parish and union samples, though males and females were equally represented in City Bunhill.
- Of the healed fractures that were recorded, arms, legs, hands and ribs were recorded with more frequency than cranium, vertebral, or pelvis fractures.
- There was an increase in the frequency of the cribra orbitalia in the union sample

## 4.5 Chi-squared Results

Of the nine chi-squared tests that were run on the historical and osteological five resulted with non-significant results, whereas the final four tests were either significant or extremely significant (Table 4-6). There was no significant result to the statistical testing that was undertaken regarding the change in the number of elderly males and female in any combination of the historical and osteological records. The presence of males and females were significantly different between the historical records of the London Corporation of the Poor (1766-1780) and the Shoreditch Union Workhouse (1856-1870).

There is a statistical significance between the presence of adults and children within all the records that have been analysed within this study. The records dated prior to 1834 (St Thomas and Broadgate cemeteries and the deaths of inmates from the London Corporation of the Poor workhouse) resulted in no statistical significance between adults and children while the records after 1834 (Cross Bones and St Bride's cemeteries and Shoreditch Union workhouse) present an extremely significant result.

*Table 4-6: Chi-squared and p-values*

| Sample | Variables | *X*2 and P value | Result |
|---|---|---|---|
| **Males and females recorded historically** | London Corporation of the Poor Workhouse (1766-1780); The Shoreditch Union Workhouse (1856-1870) | *X*2=11.286 P=0.0103 | Significant |
| **Elderly males and females recorded in historical and osteological records prior to 1834** | London Corporation of the Poor Workhouse (F- 241, M- 157); St Thomas and Broadgate (F-13, M-17) | *X*2=3.423 P=0.3309 | Not significant |
| **Elderly males and females recorded in historical and osteological records post 1834** | Shoreditch Union Workhouse (F-125, M- 118); Cross Bones and St Bride's (F- 76, M- 89) | *X*2=1.139 P=0.7676 | Not significant |
| **Elderly males and females recorded in the historical records** | London Corporation of the Poor Workhouse (F- 241, M- 157); Shoreditch Union workhouse (F-125, M- 118) | *X*2=5.115 P=0.1635 | Not significant |
| **Elderly males and females recorded in the osteological records** | St Thomas and Broadgate (F- 13, M-17); Cross Bones and St Bride's (F-76, M- 89) | *X*2=0.076 P=0.9946 | Not significant |
| **Adults and children recorded historically** | London Corporation of the Poor Workhouse (A- 623, C- 324); Shoreditch Union workhouse (A-331, C- 44) | *X*2=67.584 P<0.0001 | Extremely significant |
| **Adults and children recorded osteologically** | St Thomas and Broadgate (A- 236, C- 107); Cross Bones and St Bride's (A- 413, C- 279) | *X*2=8.160 P=0.0428 | Significant |
| **Adults and children recorded in the historical and osteological records prior to 1834** | London Corporation of the Poor workhouse (A- 623, C- 324); St Thomas and Broadgate (A- 236, C-107) | *X*2=1.031 P=0.7937 | Not significant |
| **Adults and children recorded in the historical and osteological records post 1834** | Shoreditch Union workhouse (A-331, C- 44); Cross Bones and St Bride's (A- 413, C- 279) | *X*2=94.145 P<0.0001 | Extremely significant |

## 4.6 Conclusion

Under the Old Poor Law, inmates were consuming a sufficient amount of calories to keep them above starvation levels. The change in the workhouse menus with the introduction of the New Poor Laws presented inmates with diets that provided only 60% or less of the daily recommended calories, which in conjunction with the high caloric expenditure of the activities undertaken, would have led to a deterioration of health.

As the nutritional status of the diets of the union workhouse deteriorated, and the caloric expenditure of the workhouse activities increased, a variety of pathological conditions were expected to rise. Of the five categories, only four increased as expected. There was a decrease in the presence of recorded infectious conditions in the 19$^{th}$ century samples.

The demography of the workhouse did not change as expected, as the presence of males did not greatly increase in the workhouse after the New Poor Laws were enacted. There is a statistically significant increase in the prevalence of elderly adults from the St Thomas and Broadgate cemetery samples to the 19$^{th}$ century samples of St Bride's lower and Cross Bones. Elderly adults were more frequently recorded within the historical source when compared to the osteological sources. This evidence can be used to argue that the elderly were becoming an increasingly high proportion of the impoverished. This may represent the breakdown of the family unit with industrialisation (Boyer and Schmidle, 2009:254; Habakkuk, 1955:5; Hollen Lees, 1998:170; Longmate, 1974:143).

In the historical record, inmates that died within the workhouse were more likely to have been residing in the workhouse for a substantial length of time. This extended length residency in the workhouse, with the poor diets being provided and the heavy manual activity, should have increased the inmate's susceptibility to a variety of conditions.

# Chapter 5 Discussion

This chapter will evaluate and discuss the results in the broader historical and archaeological context in order to address the research questions outlined in Chapter One. The integration of the osteological and historical evidence aims to provide fresh insights into the repercussions of the changes instituted by the New Poor Laws for the health of London's poor. For workhouse inmates, these changes resulted in a decreased diet and an increase in manual labour. The changes to the poor law were the product of a shift in the social perception of the poor from 'deserving' to 'idle', which led to a demonisation of the destitute.

This chapter will interpret the results and contextualise them within a broader understanding of the lives of workhouse inmates within under both the Old and the New Poor Law systems.

## 5.1 How the Legal Changes Affected the Inmates Diet

Humans 'have a basic desire for energy and will eat to satisfy this need alone' (Horrell and Oxley, 2012:1359) and their health is intimately intertwined with the quantity as well as the quality of the food being consumed (Clarkson and Crawford, 2001:1). During the 19$^{th}$ century when the Commission was reforming the diets for the workhouse, nutritional science was still in its infancy, and the commissioners incorrectly believed that it was the quantity of food that was the most important aspect of a healthy diet. When medical practitioners attempted to submit dietary reform examples to the committee (Johnston, 1985:47), many of the Whig commissioners criticised their attempts as being too vague, and Prime Minister Lord Melbourne went so far as to state that 'medical men were only familiar with feeding the sick' and were not qualified to make contributions to the diet of healthy individuals (Miller, 2013:18).

It has been implied by the commissioners of the New Poor Laws that the dietary provisions of the Old Poor Law workhouses had been particularly unrestrained (Miller, 2013:6). The Old Poor Laws were considered to encourage the increasing rate of pauperism, supporting the poor in a life of idleness. Under the 'less eligibility' principle, the main function of the nationalised institutions operating under

the New Poor Law was to deter new potential paupers from becoming reliant on the union for aid (Johnston, 1985:5). Therefore, established guidelines for the new workhouse diets were designed to be bland and minimal. Furthermore, the diets could be subject to further reduction as a means of punishment, or at the discretion of the workhouse master and matron (Anstruther, 1973:102). When inmates did not consume all of the food served during meal times, most likely due to it being unpalatable, the menus were deemed sufficient (Johnston, 1985:33).

The menus changed vastly from the parish to the union workhouses (i.e. from the Old and New Poor Laws), superficially going from the very simplistic menu of bread, butter, cheese and beer, to a more complex one. One of the major changes to menus in 1834 was the addition of meat in various forms, from bacon to meat dumplings (Dunkley, 1981:130). This study, however, indicated that despite this increase in the variety of food, the quality of the menus suffered and inmates of the New Poor Law institutions would have been effectively consuming a starvation diet.

The parish inmate was given beer as a part of their diet, which was later replaced in the union workhouses with either altered tea or watered down milk (Wohl, 1983:53). This was as a result of the belief that the consumption of beer and spirits was contributing to the rise in the pauper classes (Clayton and Rowbotham, 2008a:283; Nicholls and Willink, 1898b:245). In addition, the new union workhouse was to be a place of moral reform, and it was believed that beer contributed to moral failures (Nicholls and Willink, 1898b:245). During the 19$^{th}$ century there was an increasing trend of altering foodstuffs by merchants in order to extend stores and gain more profit. This adulteration would have led to significant health issues (Bentley, 1971:100; Wohl, 1983:52). An example was the very common practice of adding alum to flour in the bread baked by London bakers. The addition of alum made the flour weigh more and made the bread appear whiter. Consuming alum would have caused damaged to bones by stopping the absorption of phosphate of lime (Snow, 2003:336). The tea being served to the pauper would have also contained either dirt or black lead in order to appear darker, whilst chalk was added to milk, which was also watered down (Garwood, 2011:43). These

alterations would have affected the nutritional content of the already deficient diet of paupers of the 19th century.

In 1858, W. B. Tegetmeier, an English naturalist and journalist of domestic science, wrote that the average labourer should 'eat daily nearly 2lb.s [of bread], the wife and growing boy above 10 years of age 1.25-1.5lb.s [of bread]…'(Picard, 2013:180). A few years later in 1863, Doctor William Guy reported that whilst the diets of Victorian prisons and workhouses were to be 'unattractive and monotonous', ultimately inmates required a better and more nutritious diet than the independent community to enable their bodies to undertake the required heavy manual labour (Guy, 1863:241). However, his study of the nutritional status of workhouse diets demonstrated that the able-bodied pauper would have received less food than prison inmates. The 'less eligibility' principle also served to create a class of people who would be unable to emancipate themselves from the poor rate as the mandatory labour and the Commission menus would create a cycle from which paupers would not be able to recover.

There have been a number of studies on the relationship between poverty during childhood and the development of cognition. A recent study states that children who are born into lower-socioeconomic families have smaller brain sizes and lowered cognitive abilities that would leave them vulnerable to the cycle of poverty (Reardon 2015). The effect of poor nutrition on brain as well as bodily development serves to perpetuate an underclass and by ensuring the 'biological inferiority' of the lower classes and reduced social mobility (Dowler & Dobson, 1997; Haddad, 2002; Heltberg, 2009; Kaliamoorthi, 2013; Nelson, 2000).

Two major recorded causes of death for the 19th century poor were either nutrition-related, or indirectly caused by poor nutrition (Hamlin, 1995:858). A nutritionally-related death was when 'the victim would succumb to nutritionally sensitive diseases brought on by impaired immunity, or to poisoning from inferior foods'. While indirect causes of death would be 'caused by the disruption of personal life…' (Mokyr and Ó Gráda, 2002:340) from a nutritionally unsound diet. Ultimately, the diet

affects not only the body weight of an individual, but also the biological systems that require calories, vitamins and minerals to function, and the promotion of an adequate immune system to protect the host from a multitude of diseases (Keys et al., 1950a:273, 1950b:1015). Based on the results of this study, the caloric composition of the New Poor Law workhouse menu would have contributed to an increase in the prevalence of various pathological conditions, including metabolic disease.

Developing countries still suffer from infection and malnutrition, and there appears to be a synergistic relationship between the two. Proliferate malnutrition increases the likelihood of infection-related mortalities (Bresnahan and Tanumihardjo, 2014:703; Oppenheimer, 2001:624; Scrimshaw and SanGiovanni, 1997:466; Smith et al., 2005:270), which could explain the decrease in the presence of infectious conditions with the osteological samples from St Bride's and Cross Bones. As has been stated previously, individuals who were living with a weakened immune system instigated by malnutrition, would not have been healthy enough to fight the infection long enough for an osteological response to occur (Wood et al., 1992).

### 5.1.1 The effects of starvation on the human body

The human body can withstand a shortage of food for a few weeks before any detrimental changes begin to occur (Keys et al., 1950a:5). A drop of body weight between 15-35% would not have any major physical lasting effects, but when the loss is increased to 35-40%, the human body struggles to function and begins to shut down (Keys et al., 1950a:18). As the body begins to divert energy to preserve vital systems, such as the circulatory and respiratory system, the immune system is compromised, leaving the body susceptible to infection.

When the caloric intake is diminished, the body will begin to utilise the fat stores of the body for energy, decreasing the overall weight of the individual. The modern average daily caloric intake for active individuals is around 2950 calories for females and 3750 calories for males, and clinically if intake is less than fifty per cent then the diet would be considered to be at starvation levels (Garner, 1997:830; Keys et al., 1950a:18; Price, 2012:1). For modern individuals, 'active' would equate to an

individual who would go jogging for 50 minutes per day, or who undertakes moderately physical employment like a waitress or postman (Grosvenor, 2012:45).

Parish workhouses under the Old Poor Laws functioned almost as a community 'safety net', which tried to prevent the starvation deaths of settled members of the parish (Richardson, 1987:178), and the simplistic menu offered to those receiving indoor relief allowed the inmates to consume 82% of the average recommended daily calories. By contrast, the menus afforded to the union inmates under the new poor law regime provided only half the required calories, at 48.10% of the average recommended daily caloric intake. This indicated that, on average, inmates of the union workhouse (when based purely on caloric *intake*) would have been suffering from starvation whilst inside the workhouse.

William Farr, a pioneering Victorian statistician and epidemiologist, published a report in 1839 that included 63 deaths from starvation. Of these deaths, 16 involved various forms of privation for London's lowest class, including inmates of the workhouse (Clayton and Rowbotham, 2008a:282; Hamlin, 1995:858). By utilising a broader sense of starvation, Farr was 'implying death by privation, the want of warmth, and of proper food at all ages…few die from the absolute want of food,… many die, or drag on a miserable existence upon insufficient, innutritious diet' (Hamlin, 1995:858), which was ubiquitous within the life of the pauper class of London. Farr's own analysis of a diet from a union workhouse indicated that inmates of the workhouse were being provided with only three quarters of the minimum requirements (Hamlin, 1995:858). Analysis of the diets undertaken in Chapter Four demonstrates that all six union workhouse dietary menus provided the inmates with between 41-58% of the average daily recommended calories (Figure 4-1). When Farr's findings were originally published, Edwin Chadwick, the secretary of the Poor Law Commission, perceived the findings as a serious threat to the validity of the New Poor Laws. In his opinion, the newly established workhouse diets were sufficient for maintaining health (Hamlin, 1995:857). Chadwick perceived Farr's criticism as a direct attack on the new policies themselves. Starvation was an 'increasingly emotive issue' for

Chadwick as it would suggest that the New Poor Laws were failing to support the poor and would have been a public embarrassment for the commission and Chadwick personally (Figure 5-1) (Hamlin, 1995:857; Miller, 2012:450).


***Figure 5-1: Just-Starve-Us Workhouse, 'Comic Song of the Workhouse', Illustrated by Robert Cruikshank (1782-1871), (Auber and Freeman, 1843).***

It was never the intention of the workhouse diets to cause starvation. An ill pauper was more likely to become a permanent burden on the poor rate (Botelho, 2004:74). However the 'first cause of hunger and malnutrition' was poverty (Johnston, 1985:96; Keys et al., 1950:18) and the diets in the workhouse were created to be worse than that of poor independent labourers in order to discourage repeated use of the workhouse. This study has determined that there were not many cyclical users of the Shoreditch Union Workhouse, which would support this statement. Those seeking aid were the poorest members of society and would have been the chronic users of the welfare system, and would have ultimately been surviving in a wretched state of semi-starvation.

*A. The change in inmate activity in the workhouse and the effect on caloric intake and expenditure*

Under the Old Poor Law, paupers provided labour in return for relief (Hilton, 2006:591) and parishes supplied flax, hemp, and wool (Halliday, 1861:312) so that 'all persons… shall be employed in task work' (Hollen Lees, 1998:142). Female inmates of the workhouse, both under the Old and New Poor Laws, were regularly employed as nurses in the workhouse infirmary, mending clothing, scullery or laundry work. Following 1834, Union workhouses employed their inmates with punitive hard labour

as it was believed that such work would reform moral failings (Crowther, 1981:196; Siena, 2010:120). For example, in the Southwell Workhouse in Nottinghamshire inmates were engaged in crushing bones, digging holes or breaking stones (Henriques, 1968:365; Hollen Lees, 1998:109; Longmate, 1974:56; Nicholls and Willink, 1898b:245). Thirteen to seventeen per cent of all recorded workhouse inmates during 1848-1870 were able-bodied adults who were expected to be put to work. Around 40% of inmates were children and 30-40% were aged or infirm, however, they too could be subjected to punitive regimens of hard labour being employed breaking stones and bones (Hilton, 2006:598).


***Figure 5-2: Stone breaking yard 1900, (Anon., 2015d).***

At various workhouses, male inmates were required to either break seven hundredweight (20 hundredweight= 1 ton) of stone, four pounds of unbeaten oakum, or eight pounds of beaten oakum per day in order to 'earn' their relief (Figure 5-2). The oakum was old ropes and cords that were provided to be painstakingly unravelled to be used as caulking in shipbuilding, and would have possibly left the hands of the workers bleeding and blistered (Mayhew and Binny, 1862:477). If they were unable to break stone or pick oakum, the inmates undertook nine hours of digging or pumping, cutting wood, or grinding corn. Female inmates, who were not employed as nurses or doing housework, were also required to pull oakum, but their quotas were lessened to two pounds of unbeaten or four pounds

of beaten oakum. Some workhouses also employed women, and children, to break stone (Anstruther, 1973:126; Mayhew and Binny, 1862:477).

The second most popular menial task for inmates of the union workhouse, and the parish workhouse, was oakum picking. Inmates were given tarred ropes that they were to unravel and pick apart for the rope to be used in shipbuilding (Kaplan, 1993:25; Simmons, 2011). Whilst not as physically strenuous as breaking stone, this task could be considered more tedious and backbreaking. Analysis of the change in diet and physical expenditure associated with oakum picking, (1938 kcal/day), suggests that inmates in the Parish workhouse were receiving enough calories to replenish the expenditure. In contrast, those in the new Union workhouse, were again spending more calories than they were consuming, though on average their diets allowed them to replenish 83% of their expended energy. Again, this is before taking the basal metabolic rates into consideration which would have expended more caloric energy and could have impacted the overall energy replenishment that the inmates were receiving.

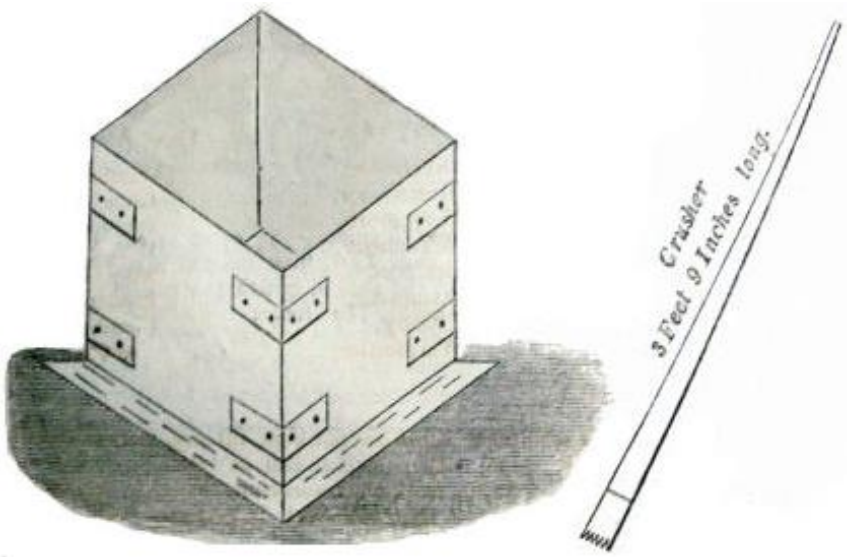



***Figure 5-3: Bone-crushing rammer utilised at Andover Workhouse, 1830s*** **(Anstruther, 1973:119).**

The bones and stones that were to be crushed by inmates of the workhouse were sold to be utilised as fertiliser, though the inmates never received any of the profit. Such labour was considered undesirable and therefore suitable for workhouse inmates. The smell of crushing bone would often

make workers ill, whilst bone fragments could fly up and scar the face (sometimes severely). Inmates were required to crush 100 pounds of bone or stone, using a rammer (Figure 5-3), which required three or more children to lift it (Anstruther, 1973:119). Bone or stone crushing was done for 10 hours a day during summer months from March to September, and nine hours during the winter months from September to March. The paupers at St John's workhouse in 1750, under the Old Poor Laws, would not have been employed crushing stone as it was only introduced as a form of employment in the 1820s, but if they had been, their caloric intake would not be enough to provide the energy required to undertake such a task as it would require 3876 kcal/day, and the diet was comprised of 2758 kcal/day (Figure 4-2). The average amount of calories provided from the union diet, 1611.36 kcal/day, would have been only enough to replenish 42% of the expended calories. If the paupers were unable to receive enough energy from their diets to replenish the expended energy they would be compounding the strain on the body that was already affected by the diminished diets, and various biological systems would begin to shut down. The body may begin to develop hypothermia as the body could no longer self-regulate heat, the heart muscles would begin to deteriorate, cognitive issues arising from the caloric and nutrient deficient diets, and noticeable and extreme weight loss (Keys et al., 1950a:84, 1950b:966; Sidiropoulos, 2007:22).

The previously described, caloric intakes do not take into account workhouses who failed to serve the full published menu. There are a number of recorded instances where the amount of food being served was reduced by the master of the workhouse, as a punishment or in an attempt to reduce poor rate applicants, or as a means of profiteering (Anstruther, 1973:102). The data discussed above, which resulted in a starvation diet, is therefore the 'best case scenario'' for those receiving the New Poor Law diets.

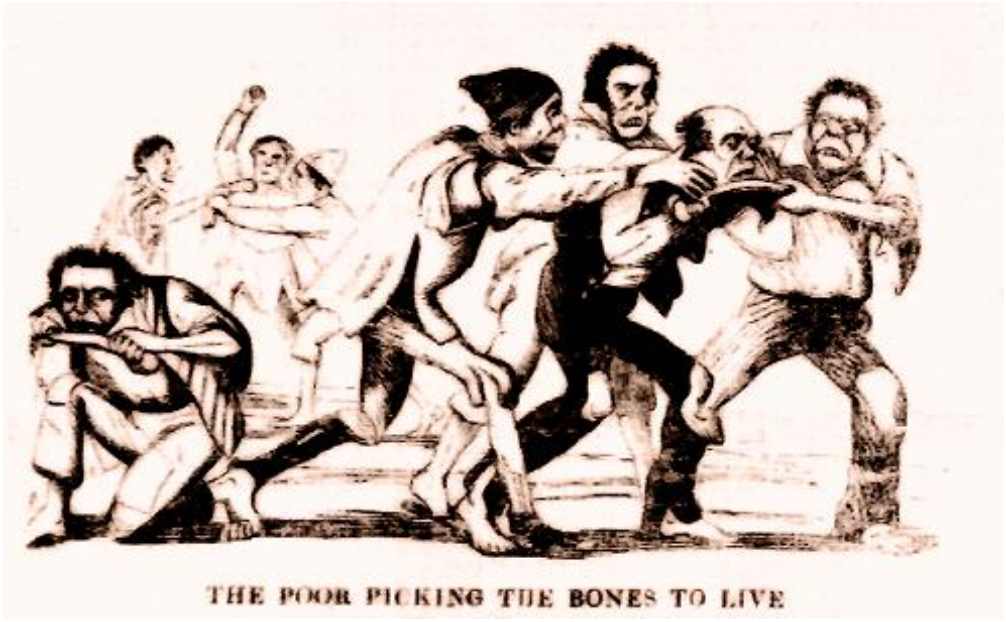



***Figure 5-4: Illustration that was printed in the Penny Satirist (6 September 1845) that depicts the inmates of Andover workhouse fighting over bones to eat.***

Perhaps one of the most infamous cases of a diminished Poor Law Commission diet occurred at the workhouse at Andover (Figure 5-4). Officially, the Union Workhouse of Andover served the third Poor Law diet, which provided the inmates with the highest amount of calories (58%). However, the master was defrauding the Poor Law Commission by purchasing poorer quality food and in smaller quantities, whilst keeping the profit for himself. It was revealed that inmates at Andover were hoarding and eating the decaying bones that were being provided for crushing. This was attributed to the 'depraved appetites of the paupers' and not originally perceived as the fault of the masters (Henriques, 1968:365). Men were reported by *The Times* to have been gnawing on the decaying marrow inside the cavities of the bones and left over flesh 'like animals'. A further inquest into the matter proved that the treatment of these inmates was extremely harsh and was done as an attempt to curtail the rising numbers of applicants (Anstruther, 1973:102). Ultimately, the commissions' inquest determined that bone crushing was no longer a suitable option for reformative employment in the workhouse (Fowler, 2007:9).

Without taking basal metabolic rates into consideration, which is the caloric expenditure of rest and is needed for all subconscious biological functions (i.e. breathing and keeping the heart beating), the union diets that were created following the 1834 Poor Law Amendment would have been detrimental to the overall health of the union workhouse inmate who was receiving this diet and employed in such tasks. The workhouses under the Old Poor Law would have been kinder to the parish inmate as the majority of the tasks would not have expended more energy than they were receiving. This disparity between the two menus would have contributed to the decrease in the overall health of the workhouse inmates under the New Poor Laws, and more generally the lowest of the socioeconomic social ladder, when compared to those receiving Poor Relief under the Old Poor Laws.

### *A.1 Time and the change in the presence of joint diseases*

The presentation of joint disease within this study increased almost fivefold moving into the 19th century, with osteoarthritis being the most commonly recorded joint condition (Jurmain and Kilgore, 1995:445). Osteoarthritis, as it has already been stated, is the disease of an ageing population, and could be also considered an indicator of Individuals who had been employed in heavy manual labour, as the repetitive and regular activity would put stress on the joints (Roberts and Manchester, 2010:143). Whilst there are multiple aetiologies considered to influence the presentation of osteoarthritis (Jurmain, 1999), for the cases within this study habitual activity is considered to have played a major role. Evidence of joint disease within the City Bunhill cemetery was most frequently associated with males when compared to females (11% and 3% respectively) (Figure 4-24). Males and females were more equally recorded in the parish and union samples, though males and females were recorded within the total union sample (12%and 11% respectively); however, elderly males and females only comprised 1% and 2% respectively of the entire parish sample.

### *B. The effects of vitamin and mineral changes in the diet*

As with calories, dietary minerals and vitamins are vital to maintaining proper health. Various systems require vitamins and minerals to function regularly, for example vitamin D is essential for the mineralisation of newly formed bones and if deficient could cause rickets or osteomalacia (Brickley et

al., 2007:8). Vitamin C deficiency results in a general weakness of the connective tissues within the body (Mays, 2008:9). Whilst Vitamin $B_{12}$ is needed for regenerating nerve and red blood cells and to help in the replication of DNA; Vitamin $B_9$ deficiency could lead to the presentation of anaemia as it is necessary for the production of red blood cells. Metabolic conditions as a consequence of nutritional deficiency could present osteologically due to the disruption caused to bone remodelling (Brickley and Ives, 2008:2; Ortner, 2003:383).

Analysis of the parish and the union menus in Chapter Four demonstrated that both were deficient in vitamin D, which for city dwellers during the Industrial revolution would have been even more problematic due to the heavily polluted atmosphere diminishing exposure to ultraviolet rays, the body's main source of vitamin D (Hardy, 1988:390; Mawer and Davies, 2001:155). The quantities of vitamin C provided was actually found to be in excess of the recommended daily amount by 100mg under the Old Poor Law menu of St John's, whilst vitamin C was on average deficient by 60 mg under the New Poor Law union menus. Overall, the diets being received by inmates in the parish and the union workhouses were deficient in many of the core nutritional vitamins (Table 4-1).

When the amount of nutritional minerals are taken into account, the parish diet afforded inmates with more than the recommended amount of all dietary minerals, whilst the union menu is deficient in two dietary minerals (vitamin C and fluorine). This deficiency in fluoride in the union workhouse diet would have affected the prevalence of caries in non-adults, which were not examined within this study. In contrast the parish diet resulted in almost twice as much of the minimum recommended amount of fluoride, which may have resulted in an excess of fluorine in the body. According to modern nutritional research by the World Health Organisation (WHO) an excess of fluorine could have adverse effects on the skeleton that could result in bone deformities. These effects can easily be mistaken as rickets or osteomalacia (WHO, 2003). However, they have concluded that further research needs to be conducted on the long term effects as they are still not well known (Shorter et al., 2010:270; WHO, 2003).

There were a variety of conditions that were believed to be endemic to the life of the poor (Jütte, 1994:74), including rickets, scurvy, syphilis and tuberculosis among others due to poor diets, diminished immune systems, and punitive heavy labour. Any osteological responses would only occur when starvation, and the resultant conditions were chronic (Keys et al., 1950a:218). However, these conditions were not restricted to the poor, especially rickets which would be commonly found in the higher classes as children were typically swaddled longer and stayed indoors (Picard, 2005:233).

### 5.1.2 The Change in the Presentation of Metabolic Conditions between the Old and New Poor Laws

Socioeconomic status has an effect on the presentation of metabolic conditions as a person's position in society influences their susceptibly to developing disease, either through biological predisposition or differential access to resources (Brickley and Ives, 2008:7-9). The presentation of various metabolic conditions in this study increased in the 19th century. The cemetery samples of St Thomas and Broadgate, which are associated with the Old Poor Law workhouses within this study, had fewer metabolic conditions recorded as present when compared to the New Poor Law associated cemetery samples of St Bride's lower and Cross Bones. Not only did the percentage of metabolic conditions increase by 7.52% between the two cemetery samples, but the variety of the conditions themselves expanded from only rickets and scurvy being recorded in the cemetery samples of St Thomas and Broadgate, to the inclusion of osteomalacia and osteoporosis, as well as other generalised metabolic conditions in St Bride's and Cross Bones (Figure 4-25).

There was a change in the prevalence of adults suffering from metabolic conditions from the 17th and 18th centuries through to the 19th century (Figure 4-26). Old middle adults (36-45 years) were more likely to have been recorded with evidence of residual rickets and scurvy during the 17th/18th centuries. Whereas, in the 19th century cemetery samples from St Bride's and Cross Bones, elderly adults (46 years+) were more prevalent, with evidence of osteoporosis, osteomalacia, residual rickets and scurvy. There were no recorded instances of osteoporosis or osteomalacia, diseases associated with adults, in the cemetery samples from St Thomas and Broadgate. This could indicate that adults were

suffering from metabolic conditions more in adulthood during the 19th century, or that recording criteria changed between the analyses of these cemeteries. However, the change in the prevalence of which adult age category was most present within the cemetery samples could be due to the increase in the numbers of elderly individuals (Figure 5-6) who were utilising the workhouse from the mid-19th century onwards as they eventually ran out of savings and had no choice but to look to the poor law for relief (Boyer and Schmidle, 2009:250). The use of the workhouse by the elderly will be discussed later in this chapter.

### *A. Rickets, Osteomalacia, and Osteoporosis*

The appearance of rickets in children, late [residual] rickets in adolescents and osteomalacia in adults, can be as a result of starvation, due to the deficiency of calories and vitamin D (Keys et al., 1950:222). The link between sunlight and vitamin D was not widely acknowledged until the 20th century, so the historical knowledge regarding the causes of such conditions have evolved from earlier notions, like that of Nicolas Culpeper in the 17th century, where he attributed the manifestation of rickets to the 'stupefaction of the spirit', due to excessive sexual activity of the parents (Picard, 1997:95). Culpeper (1616-1697) further observed that 'parents that are more strong and lusty and accustomed to labour seldom have rachitic children… this might be due to the coarse cloths and woolly integuments that poor babies were wrapped in, which made them scratch and bring blood to the skin, whereas rich babies lay quietly in soft linen cloths' allowing wealthier parents to engage in such activities without interruption. However, it was more likely that the children of poor parents spent more time outside in the open air, while rich children were kept. swaddled indoors (Picard, 1997:96). The habits of the wealthy would make the presentation of rickets more common in the wealthier classes during the 17th and 18th centuries. By the 19th century, due to the pollution in the cities and the increase in child labour in factories, rickets would have been more closely associated with the poorer classes; the wealthier classes would have been able to leave the polluted city to go to the surrounding suburban areas, which would have potentially increased their exposure to sunlight (Flanders, 2012:175; Szreter and Mooney, 1998:94).

As the population of England increased there was a shift, particularly in the South, from the majority of families eating home cooked and unadulterated foods, to utilising shops for pre-prepared everyday products, i.e. getting bread from the bakers (Horrell and Oxley, 2012:1355; Snow, 2003:336). Indeed in the south of England by 1750 there was around one shop for every 30-40 people, lending credence to Napoleons statement that England was 'a nation of shopkeepers' (Hilton, 2006:13). By 1839 there was an increase in the reported cases of rickets being recorded amongst the poor and middle classes (Snow, 2003:336). The famous epidemiologist John Snow did not accept the belief that rickets was caused by: vitiated air, want of exercise and nourishing food, and scrofulous (tuberculosis) taint. He argued that the number of individuals exhibiting 'distortion of the legs' in towns of the north of England that also had over-crowding and 'other evils' was considerably less than in London. What was noticed was that families in the north, where there was no increase in cases of rickets, were still baking their own bread at home (due to the availability of cheap coal) as opposed to southern families who were more likely to purchase their bread from the local baker. Bakers routinely utilised alum in their dough as a leavening agent, which also made the bread whiter. He believed that the alum in the baker's bread was causing rickets by causing a deficiency of phosphate of lime [$Ca_3(PO_4)_2$], or bone phosphate of lime, which occurs naturally in the skeleton. Upon experimentation he determined that the adulteration of the bread was the ultimate cause of the increase of rickets as the alum decomposed the phosphate of lime from wheat (Snow, 2003:336). Snow eventually concluded that the London children of the lower classes were more likely to develop rickets as their diets were comprised of mostly adulterated shop-bought bread. Whilst the presence of rickets marginally increased in the cemeteries of St Bride's and Cross Bones, osteoporosis and osteomalacia increased as well. Evidence of osteoporosis and osteomalacia were both recorded with the highest frequency in the union samples (3% and 0.5% respectively) when compared to the parish (0% for both) and City Bunhill (1% and 0% respectively) samples.

Osteologically, the prevalence of rickets marginally increased throughout the Post-Medieval period due to industrialisation as air pollution increased and the living conditions within the city degraded (Lewis, 2002:221), though the sample from City Bunhill presented with the highest frequency of recorded evidence of rickets with 16%. City Bunhill had the highest frequency of children aged 1-5 years of age recorded with evidence of metabolic disease. In clinical studies there is a higher prevalence of osteomalacia in females between the ages of 20 and 40 years which could be indicative of closely spaced pregnancies, which would ultimately create a higher biological demand on the body's resources (Brickley et al., 2007:69). This statement agrees with the findings of this study as the union cemetery sample had the highest frequency of both elderly adults and female individuals (Figure 4-26 and Figure 4-27). The health of the mother also has an impact on perinatal infants as they are receiving their nutrition in utero and would have developed symptoms of metabolic conditions if the mother was also deficient. As the union workhouse sample of St Bride's and Cross Bones had the highest frequency of perinatal infants recorded with metabolic conditions, which could only have developed in utero, this evidence also supports the previous findings.

### *B. Scurvy*

The human body does not naturally produce vitamin C and a deficiency would result from diminished metabolic levels. Whilst the primary source of vitamin C is fresh fruits and vegetables, fish and dairy goods also provide enough vitamin C to sustain the human body (Mays, 2008:180). The body requires vitamin C to produce collagen, and a deficiency would result in a weakness of connective tissues within the body. Though osteologically, lesions associated with scurvy would only start to occur once vitamin C was reintroduced into the body (Geber, 2012).

The resulting weakness in the connective tissues would result in haemorrhaging along the walls of blood vessels, typically along muscle attachment sites. Unrestrained scurvy is a killer due to haemorrhaging into the heart muscle or the brain (Clarkson and Crawford, 2001:146). Outside forces can also hasten the development of scurvy, such as heavy physical labour (Clarkson and Crawford, 2001:149). Scurvy was recorded twice as often in the union cemetery sample (4%) compared to the

parish sample (2%) (Figure 4-25). This increase in the presence of scurvy in the union sample corroborates findings of a decrease in dietary vitamin C within the 1834 Poor Law diets. Scurvy has been associated with famine populations (Geber and Murphy, 2012:516), and while the populations within London were not suffering from a famine, they would have been receiving a starvation diet.

However, the osteological manifestations of scurvy are often fairly subtle and easy to overlook, the diagnostic criteria for scurvy has changed multiple times (Kozlowski and Witas, 2012:409; Ortner et al., 1999:329). This could have impacted this study as these cemetery samples were recorded and analysed as different times.

#### *C. Cribra Orbitalia*

Cribra orbitalia has a number of aetiologies, including poor diet (Gowland and Redfern, 2010:22), and could manifest due to iron-deficiency anaemia, scurvy (Geber and Murphy, 2012:4), or as evidence of vitamin $B_{12}$ deficiency (Walker et al., 2009:113). Each one of these aetiologies can be linked to a poor diet. There is an increase of the presence of cribra orbitalia in both cemetery samples from the 19$^{th}$ century (Figure 4-32). This study has also indicated that union workhouse menu would have been deficient in vitamin $B_{12}$. As cribra orbitalia is more regularly associated with environmental stress, and more closely to poor diet, this study indicates the poor diet of the union workhouse inmate as well as the increase in heavy caloric expenditure would have placed a larger amount of stress on the immune systems of the lower socioeconomic classes. Evidence of cribra orbitalia was twice as more likely to have been recorded in the union workhouse sample when compared to the parish sample.

### 5.1.3 The influence of poverty and the presence of infectious conditions

People do not typically die of starvation alone, but from the infectious diseases that take advantage of the decline in the body's immune system (Mokyr and Ó Gráda, 2002:339). 'Hunger and disease interact in complicated ways, some through the human body and some through the fabric of human society' (Mokyr and Ó Gráda, 2002:339). Individuals living in areas of overcrowding or poor sanitation would have a greater risk of contracting an infection.

It has been estimated that by the 1850s there were as many as 250 voluntary hospitals across Britain, but within the charters- children and pregnant women, the infectious, the chronically ill or the destitute were excluded from gaining admittance as in-patients and receiving medical care (Garwood, 2011:80). The only alternative was workhouse infirmaries, which ultimately became a crucial centre for medicine for the poor (Siena, 2010:6). These infirmaries were staffed by nurses who were themselves inmates. Generally poor and unskilled medical care was exacerbated by the medical officers taking on private patients 'in order to supplement their own meagre poor law salaries' (Stewart and King, 2004:79). Care and treatment in the early to mid-19th century workhouse infirmary was 'almost half a century' behind voluntary hospitals, due to the infirmary being understaffed, unqualified, and ill-equipped (Price, 2012:12-14).

Voluntary hospitals refused the admittance of those with syphilis as a rule, and it was not uncommon for syphilitics to also be refused rooms at public houses (Siena, 2004:251-253). The stigma associated with syphilis would have meant that many sufferers would have turned to the workhouse, which was the only place left for assistance. This perpetuated the opinion that the workhouses were the 'receptacles of the idle, the unclean, and the abandoned' (Siena, 2010:9-11). Despite this belief, the osteological analysis in this study indicates that there was a drop in the number of individuals with the presence of treponematosis (syphilis) in the later 19th century. The pathognomonic osteological response to syphilis only occurs in individuals who had been living with the condition for many years. It is possible that many more individuals may have died whilst suffering from the disease, though it was not chronic enough to elicit a response in the bones (Wood et al., 1992).

Consumption, or tuberculosis, was one of the most prevalent causes of death in the Post-Medieval period. Its spread was exacerbated by poor nutrition and overcrowding (Roberts and Cox, 2003:338), as malnutrition and tuberculosis 'seem to go hand in hand, and seems to increase during times where food is limited [i.e. famines]' (Keys et al., 1950b:1015). Though, like syphilis, the physical evidence for tuberculosis in the skeleton samples decreased into the 19th century.

Infectious conditions overall in the osteological samples for this study dropped by 25.91% moving into the 19th century (Figure 4-18), and the recorded drop of specific infection could indicate that, whilst the medical care available within the workhouse, their infirmaries were not as advanced as those of voluntary hospitals. Inmates still had access to medicine and limited care that outdoor labourers did not (Boulton et al., 2013; Richardson & Hurwitz, 2012). This is potentially corroborated by the osteological analysis as City Bunhill presented with the highest prevalence of infectious disease when compared to St Bride's and Cross Bones. However, as has been stated numerous times previously, this is a study of individuals who managed to survive their infection long enough for an osteological response to occur.

## 5.2 Instances of trauma and the influence of time

Work-related or accidental trauma would have been a major factor in the life of poor labourers (Stewart and King, 2004), and osteologically there was a slight increase in the frequency of accidental trauma being recorded within the entire cemetery sample of St Bride's and Cross Bones (union workhouse). The highest increase was in the cemetery of City Bunhill (Figure 4-28). If an injury was too severe, the affected individual would not be able to work for any extended amount of time, and the workhouse was the only recourse. There were more children and women joining the industrial work force to earn money for their families, but factories would pay them less in wages compared to males (Hilton, 2006:122). Whilst women and children were cheaper to employ, males were the most likely to have presented with any form of trauma, healed or unhealed, and they would have been employed in more strenuous and hazardous labour. Most notably within the union workhouse where they were mostly employed breaking stones and bones for nine to ten hours a day.

St Bride's and Cross Bones were more likely to have been recorded with evidence of healed rib fractures, three times higher than City Bunhill, and a third higher than St Thomas and Broadgate (Figure 4-31). Healed fractures of the leg (femur, tibia, and fibula) and feet were more likely to have been recorded within the cemetery sample of St Thomas and Broadgate, which could relate to more manual employment. Whereas hands and lower arms presented with more frequency in the cemetery

sample of St Bride's and Cross Bones. This change in the location of healed fractures could relate to the change in employment towards more factory workers during the industrial revolution. The hand fractures could also relate to more pugilistic endeavours, even though these fractures were not recorded as interpersonal violence by the original recorders. These hand fractures, as well as an increase in frequency of healed nasal bones fractures (especially within the City Bunhill sample) and rib fractures, would seem to agree with this assessment.

For the cemetery samples of St Bride's lower and Cross Bones, as well as the independent working class sample of City Bunhill, 50% of all instances of trauma were recorded on the remains of elderly adults (46 years+), though as the fractures were healed the age at which these were incurred is unknown. As stated previously, the majority of the recorded trauma was accidental, indicating that whilst the lower socioeconomic populations were not likely to have died from their trauma, life was hard and not without periods of stress.

### 5.2.1 Surgical Intervention

A new form of trauma began to appear in the 19th century, which was surgical intervention, which had previously not been recorded in the earlier cemetery sample (Figure 4-28). This included evidence for post-mortem dissection practices, autopsies and craniotomies. Following the Anatomy Act of 1832, those dying in a public institution could have been given to medical institutions for dissection, which on top of the stigma that plagued the living poor, also led to a fear of dying within public institutions (Hilton, 2006:359).

The act was passed to curtail the rise in grave robbing and claimed that any individual who remained unclaimed by family and friends would be sent to the medical schools as the 'fittest persons in society for dissection [were] those who died friendless' (Hilton, 2006:598; Laqueur, 1983:123). For the Victorians, who believed in the Great Resurrection (Corinthians 15:51-52, 2011), this increased the stigma attached to the workhouse due to the uncertainty of your final resting place and the condition of the body (Hilton, 2006:598). Occasionally, there were inmates who were sold to the school even if

there were family and friends to claim the remains for burial as it was a lucrative opportunity for the workhouse staff (Higginbotham, 2013:14).

The individuals who were recorded with evidence of surgical intervention in the cemetery sample of St Bride's and Cross Bones were mostly adults, though one adolescent presented evidence of a craniotomy. Males were more frequently recorded with evidence of post-mortem surgical intervention (6% of all recorded trauma instances), which is recorded more often when compared to females (2%). Of these individuals with surgical intervention from St Bride's and Cross Bones (26 individuals), a third were elderly adults (32%) which would have been expected as the workhouses were slowly becoming homes for elderly individuals during the Victorian period. Again, this aspect of the study supports the historical evidence relating to the 1832 Anatomy Act, and it supports the hypothesis that elderly adults were increasing in frequency within the union workhouse sample.

## 5.3 Did the life of the inmate of the Union Workhouse get worse?

The above discussion has examined how the nutritional status of the diets that were offered within the institutions differed between the Old and New Poor Laws, and the effect on the prevalence of metabolic and infectious disease observed in skeletal remains. Analysis here has demonstrated a correlation between the increase in metabolic conditions and the decrease of calories, minerals, and vitamins in the diets. There was an unexpected decrease in the presence of infectious diseases, though this may well relate to the paradoxical nature of skeletal evidence in this regard. In other words, it could reflect an increase in the frequency of deaths from acute infections, before the bones are actually involved, as has been discussed previously (Wood et al., 1992). Overall, the health of the poor appears to deteriorate during the 19$^{th}$ century. It is possible that this is directly related to the harsher conditions within the Union workhouse and attitudes towards the poor, and it also likely reflects a broader trend of decreasing health for London's poor during this period.

## 5.4 How does the Demography Change between the Old and New Poor Laws within the Osteological samples

The Old Poor Law was less concerned with the sex of the poor, but with the age of those receiving aid. Under the Old Poor Law regime, female recipients were treated equally to males, and if healthy and able, were required to work to maintain themselves (Hollen Lees, 1998:56). However, overseers of the poor were more willing to give aid to single mothers or widows than they were to single fathers or widowers (Goose, 2006:351; Hindle, 2004:263; Hollen Lees, 1998:56) as there was a belief that women were paupers because of either the weakness of their husbands, or unrestricted sexuality and a lack of virtue. There was a notable change within the demography of the cemetery samples of the sexed individuals over time. Within the parish and union samples, females (19% and 22% respectively) were recorded less often than males (23% and 30% respectively), though within the City Bunhill sample, females were 3% more likely to have been recorded within the cemetery sample compared to males (Figure 4-4). The workhouses under both periods therefore seemed to be dominated by males, or at least those dying within the workhouse were primarily male.

The New Poor Laws led to a breakdown of the nuclear family unit. Once admitted, families were separated by sex and age into different sections of the workhouse (Picard, 2013:94). For those who entered the workhouse, this tearing-apart of family units was considered 'worse than the gruel, the uniform, the regulation haircut, the delousing, the degrading and mind-numbing drudgery' (Hilton, 2006:596). Such conditions were likely to put off mothers and their children applying to enter the workhouse.

### 5.4.1 Bias between male and female inmates?

In contrast to the cemetery evidence discussed above, historical studies have stated that workhouses were believed to have a large female demographic, with 3 females to every one male admitted (Siena, 2010:10) and leading historians to believe that workhouse populations were disproportionately female. This statement is supported by a chi-squared test which supports that there is a significant relationship between the number of males and females recorded in the historical records, $x2$ (3,

n=1238)= 11.286, p= 0.0103. The analysis within this study has indicated that, osteologically, the males/female ratio does not change substantially, within all the cemetery samples (Figure 4-6). However, between the cemeteries of the 19th century, there was a 7% increase in the frequency of recorded males in the poorer cemeteries compared to the independent cemetery. While, City Bunhill presented with the highest frequency of females within the cemetery sample, which does indicate that independent labouring families were actively choosing to keep elderly females within the home as females had a higher domestic value and could help around the house (Boyer and Schmidle, 2009:260).

*A. Pregnant and unmarried mothers*

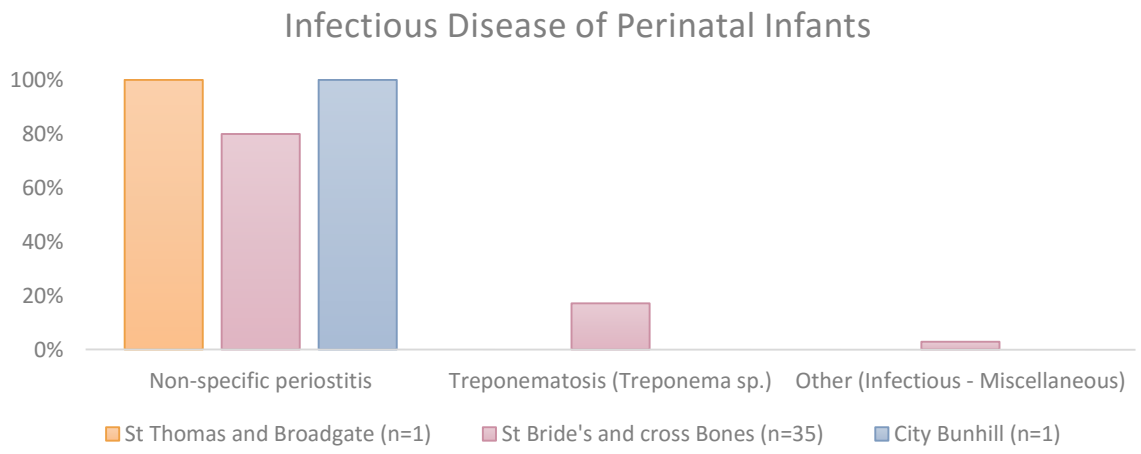
The authors of the New Poor Laws disapproved of the ability of unmarried mothers to make a claim on any man as the father of their child and receive maintenance from them, as they perceived it as an abuse of the system, and prompted a tightening of the bastardy laws (1834). It removed any burden of responsibility from fathers, as the mother was seen as the primary offender. Officials believed that these women were having children out of wedlock as 'a single illegitimate child is seldom any expense [the poor rate or father provided], and two or three are a source of positive profit' (Hilton, 2006:354). There was also the belief that once a 'pregnant [poor] female discovered she could live and eat well in the workhouse at parish expense, she would continue to do so' (Hollen Lees, 1998:141).

Pregnant women admitted into London union workhouses were given the diet of able-bodied adults, though there were some workhouses that punished unmarried mothers with more dietary restrictions, possibly by providing only a portion of the menu or by serving them only bread (Johnston, 1985:149). In the 19th century, pregnant women would turn to the workhouse as it was standard procedure for voluntary hospitals to deny women admittance as laid out in their charters, though occasionally there were women briefly treated in the outpatient wards (Levene et al., 2012:17). This left them little choice but to use the workhouse infirmary as a form of laying-in ward. The admittance records for Shoreditch Union Workhouse during the 19th century shows that while women did enter into the workhouse either pregnant or in labour, they were a very small percentage of all females

being admitted into the workhouse population. The small number of woman, for Shoreditch Union, contradicts the assertions of Poor Law officials that women were entering the institution as a form of cheap maternity care.

Analysis of perinatal infants within osteological samples can also increase our knowledge of the health of their mothers. Within the osteological samples, perinatal infants increased from 4% of the recorded individuals in St Thomas and Broadgate to 12% of the recorded individuals in St Bride's and Cross Bones and 8% of the City Bunhill cemetery sample. Of the 37 recorded perinatal infants, the majority (95%) were recorded within the cemetery sample of St Bride's and Cross Bones. Some of these infants had evidence of congenital syphilis or non-specific periostitis (Figure 5-5).

***Figure 5-5: Infectious diseases of the perinatal infants in the osteological samples.***

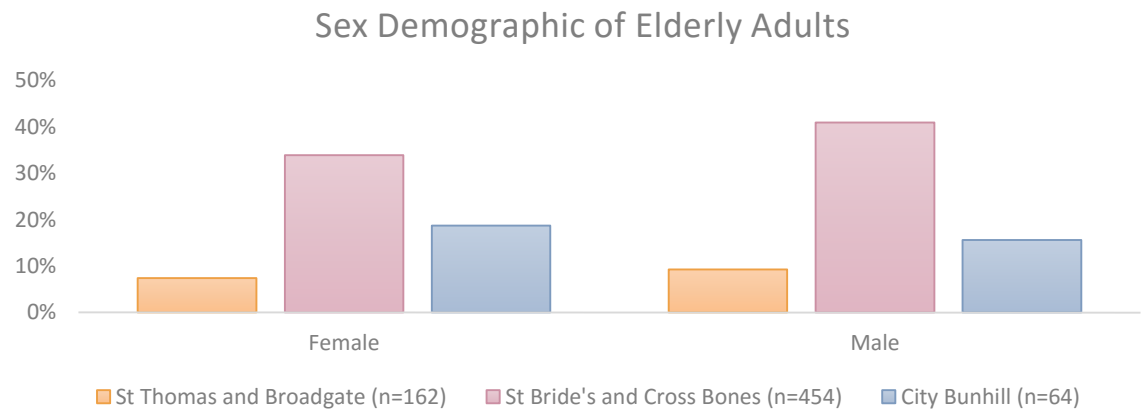



Of those with evidence of non-specific periostitis, 54% were recorded with evidence of endocranial lesions, which have been related to the presentation of tuberculosis, further evidence of syphilis or scurvy (Lewis, 2004; Mays, 2008; Shields, 2012; Zahareas, 2011). As these infants would have been too young to have contracted any of the stated conditions environmentally they provide a useful proxy for maternal health.

### 5.4.2 Elderly Inmates

The 19th century workhouse population was historically regarded as an ageing population (Boyer and Schmidle, 2009:271), which is also evident by the increase in the overall numbers of elderly adults present in the osteological samples (26% in St Brides and Cross Bones), and especially the historical records (64% in the City of London Corporation, 62% in the St Bride's parish and St Saviour's parish). By the middle of the 19th century, the workhouse was the home for 12.4% of all elderly women in England, though the percentage of male inmates became more prevalent through the 19th into the 20th century (Boulton and Schwarz, 2010:226). This swing towards a larger prevalence of elderly male inmates could be linked to the perceived greater 'economic utility of females' in the home. Elderly women were removed from the workhouse by their families as they could help with childrearing and maintaining the home, whilst males had limited domestic abilities and would ultimately be more of a hindrance (Horrell and Oxley, 2012:1362). Osteologically, this bias toward elderly male individuals being left in the workhouse is not clear-cut as thehistorical evidence, as males are only higher in frequency within the St Bride's and Cross Bones sample by 7% (Figure 5-6). The independent cemetery of City Bunhill does have a slightly higher representation of elderly females compared to males (19% and 16% respectively), indicating that elderly females were spending their last years outside the workhouse. Skeletal analysis of older individuals is however hampered by methodological problems which result in their under-ageing as well as greater difficulties in estimating sex of individuals in older age (Gowland, 2007; Walker, 1995).

*Figure 5-6: Demographic of elderly adults.*




### 5.4.3 Children and Adults

The life expectancy of 19th century Londoners at birth, changed drastically depending on the social class of the individual. For the lower class labourer in Bethnal Green the life expectancy was only 16 years, whilst a high class gentlemen's was 45 years (Clayton and Rowbotham, 2008c:354; Harding, 2002:19; Picard, 2005:220). This vast difference could be linked to the fact that children of the poor were more likely to die before their sixth year (Hilton, 2006:248). Such figures were confirmed by the osteological record, revealing that the majority of all children from City Bunhill, St Bride's lower and Cross Bones were largely younger (perinatal-five years) (Figure 4-3). All four historical records (London Corporation of the Poor, Shoreditch Union Workhouse, St Bride's Parish Burial Register, and St Saviour Red Cross Way Burial Register) confirm a demographic bias towards children under the age of six years. Though Shoreditch Union workhouse, unlike the other three historical records and the osteological evidence, indicates that infants (birth to one year) were the most vulnerable (Figure 4-5). This again reflects the earlier statements relating to the general health of the infants that were recorded within the cemetery samples. The perinatal infants were recorded with possible congenital conditions that would have been passed on from their mothers.

All other registers concur with the accepted mortality tables (Alter, 2004:269; Hilton, 2006:441; Riley, 1997:248) as a majority of the children died between one and five years. The decrease in the number of burials of children over the age of six years for the later cemetery samples could be due to the

common practice of Poor Law Boards sending children away to industrial schools, where younger children would be taught industrial skills that would be considered beneficial for them in the future (i.e. woodwork for boys, domestic activities for girls), and apprenticeships for the older children (Levene, 2008:48; Levene et al., 2012:17). Such a practice has the effect of removing children from the 'corrupting' influence of the older inmates, and to lessen the financial burden on the Union. Most pauper apprentices were sent outside of London to work at factories around England (Honeyman, 2007).

### 5.4.4 How did the demography of workhouse inmates change from the Old to the New Poor Laws?

As discussed above, the key demographic shift in workhouses during the 19th century was the increase in the proportion of the elderly, as there would have been no guaranteed state pension during the early 19th century. Elderly individuals comprised 45% of the City Bunhill sample whose sex was determined, which is more frequent than either the parish or the union samples (15% and 19% respectively) (Figure 5-6). Of the elderly individuals whose sex was able to be determined, females were the most frequently recorded in the parish sample of St Thomas and Broadgate (9%) and the independent sample of City Bunhill (26%), when compared to the males within the records (6% and 19% respectively). Though males were slightly more frequently recorded than females within the union sample of St Bride's and Cross Bones (10% and 9% respectively).

When the City Bunhill sample is compared to the St Bride's and Cross Bones sample, there does indeed seem to be an emphasis of elderly females within the independent sample agreeing with the belief of historians that elderly females has a higher domestic value for their families. Families of independent labourers were actively choosing to leave elderly males within the workhouse compared to elderly females.

## 5.5 How do the Osteological and Historical Records compare?

Osteological records can be biased due to a range of taphonomic and methodological factors. As a consequence, they are often considered to be only a poor reflection of the living population from

which they were derived. Likewise, historical records suffer from biases relating to human error, either on the part of the original recorder, the individuals being recorded, or by the researcher, as well as incomplete documentation. By utilising these different sets of records in tandem, a fuller impression of the demographic profile of London's poor can be gained.

### 5.5.1 Length of Stay in the Shoreditch Union Workhouse

Length of stay of the workhouse inmate is important to the interpretations of this study. Individuals would need to have been in the workhouse for some time if the osteological evidence for pathologies were to be attributed directly to the workhouse system and the change in the poor laws. The historical evidence was interrogated in order to determine how long 19$^{th}$ century inmates were residing within the workhouse. Historians believe that the first days of admittance into a union workhouse were the most fatal and that 'the risk of death fell continuously with increasing length of stay in the workhouse' (Boulton et al., 2013:79). The increased time of residence as a Union workhouse inmate would have potentially increased the probability of metabolic and infectious conditions to manifest on the skeleton as they were employed in manual labour, and fed a diet that was not nutritionally sound. Historically, children were frequently being discharged from the workhouse after being routinely sent to Brentwood Industrial School within days or weeks of admission, typically for the reasons discussed above (Table 4-3).

When the length of stay within the workhouse was analysed, it was determined that the majority of inmates were only staying within the workhouse for a short period of time before ultimately being discharged, if they were discharged alive. Inmates who died within the workhouse were more likely to have been a resident for longer than one year. This would have increased the length of time that they were subjected to the poor diet and heavy labour, and ultimately increased the length of time for pathological conditions to produce an effect on the skeletons.

### 5.5.2 Cemeteries and Records linked, do they agree or present differing evidence?

The presentation of the inmates of the parish workhouse, both historically and archaeologically, agree that females were the most likely to be recipients of the Old Poor Law. The demographic profiles of

the two data sets are broadly similar, except in the case of elderly adults, perinatal infants and children aged 6-11 years (Figure 4-11). The historical record has a higher frequency of elderly adults recorded dying within the workhouse, but it is four times as more frequent than in the osteological sample. This could be due to elderly adult skeletons being more fragile and not being recovered, and limitations in our aging methods (Wood et al., 1992).This discrepancy could also be due to a number of these individuals who were recorded dying within the City of London Corporation of the Poor workhouse being buried elsewhere, but there is no remark written within the record to determine if they were. It was just a record of the undertakers removing the bodies from the workhouse to be buried. Only a number of children were demarcated as being buried elsewhere.

The same pattern was evident between the St Bride's parish burial record and the St Bride's lower burial ground osteological sample (Figure 4-13). Elderly adults were the only age category where the two records most noticeably did not agree; there were twice as many elderly adults compared to the osteological sample. Unlike the City of London Corporation of the Poor death register, the record associated with St Bride's is the parish record of burials in the lower churchyard. So these two records for St Bride's should relay the same population, as they are indeed the same location. As stated within Chapter Three, the individuals who have been analysed in the St Bride's parish were all individuals who died as inmates of the workhouse.

The records of St Saviour's parish burial record and Cross Bones burial ground have three age categories where there is a disagreement in the presentation of the individuals (Figure 4-15). Osteologically, Cross Bones is comprised of a higher number of infants and children 1-5 years old, whilst 60% of the burial record was comprised of elderly adults. This discrepancy could be due to the circumstances surrounding the excavations of the Cross Bones. During excavation, a large number of skeletons were removed by contractors instead of archaeologists and were not kept so that the Museum of London was unable to analyse them (Brickley and Miles, 1999:20; Harris, 2013:162). So it could be considered that the St Saviour's parish burial records within this study which is comprised of

all individuals who were recorded as being buried in the cemetery located on Red Cross Way, and whose final residence was written as the workhouse, could be considered a more accurate representation of the demography of the area.

However, overall these different data sets presented broadly similar demographic profiles.

## 5.6 Conclusion

The nutritional status of the workhouse inmate diminished following the 1834 Poor Law Amendment and a variety of nutritionally related conditions increased in prevalence as a result in the cemetery populations of lower socioeconomic status. Cribra orbitalia increased in frequency in the 19th century samples, which was expected as poor nutrition would have added an enormous amount of stress on various biological systems (immune system included), thus making inmates more susceptible to suffering from metabolic diseases. Joint disease increased in frequency in the union workhouse osteological sample, which could be related to the ageing workhouse population or to occupational stresses related to the heavy labour that was required of the union workhouse inmate. Surgical intervention in the way of autopsies and craniotomies were not present within the parish workhouse sample, but was present in the cemetery samples from the 19th century. This increase in surgical intervention is related to the passing of the 1832 Anatomy Act as medical establishments were now receiving their cadavers for study from the workhouse.

Infectious diseases decreased in prevalence, which could be due to the evolution of the workhouse infirmary during the mid-1850s into a place where the poor would have to rely on to receive medical care. However, given the synergistic relationship between poor nutrition, poverty and infectious diseases it seems likely that infectious diseases did not decrease in prevalence with the New Poor Laws, but instead that inmates simply died from infections before their bones were affected (Wood et al., 1992).

The historical and archaeological records demonstrate broadly similar patterns in demography, though there is a difference in the number of elderly adults in all the datasets. These individuals are

recorded with greater frequency in association with these cemetery samples, which is not the case for the osteological records. As it has been explained previously, this could be due to the fact that the skeletons of elderly adults are less likely to preserve as well as younger adult age categories (Bellos and Andrews, 2006:6). There is a very small difference between the presentation of the elderly males and females in the samples of City Bunhill, and St Bride's and Cross Bones, which could be argued that this is evidence of an active choice by the independent labouring families to actively keep the elderly females within the home with them as they have a domestic value that would make them valuable.

The following chapter will summarise and conclude this thesis, while also presenting avenues for future research and the limitations of this study.

# Chapter 6 Conclusion

This chapter will summarise the key findings and conclusions of this thesis, with reference to the original research questions outlined in Chapter One: Introduction. The limitations of this study will also be acknowledged, including biases within the osteological and historical records. Finally, the contemporary relevance and influence of the 19th century Poor Law reforms for government policy and perceptions of the poor will be discussed, highlighting the cyclical nature of societal attitudes. This thesis has also illuminated a number of other potentially fruitful avenues for further research, not only through osteological analysis, but also through a comparative discussion of modern and historical attitudes towards the poor.

## 6.1 Revisiting the Research Questions

A number of research questions were outlined relating to the diet and health of London's poor and these will be briefly addressed below.

**How did the quality and composition of workhouse diets before and after the 1834 amendment change?**

The nutritional status of the workhouse menu established for the union workhouse following the 1834 Amendment declined when compared to the parish workhouse diet of St John's Workhouse in 1750. All six menus that were created by the commission would be considered a clinical starvation diet as they provided no more than 51% of the recommended average daily intake. The poor caloric value of these menus would have had a detrimental impact on the health of individuals, especially when compared to the high caloric expenditure associated with menial and hard labour, where inmates would have expended more energy than they could consume. The caloric expenditure of the labour that was typically required of the inmates of the union workhouse would have been difficult to recover from even for individuals who were receiving the recommended amount of calories (3350kcal/day). This diminished caloric intake would have contributed to the diminished health status of London's poorest citizens.

1. **Is there a correlated increase in pathological conditions that would have been associated with poor diet and poor living conditions?**

There was an increase in the prevalence of metabolic conditions into the 19th century. This may indicate that individuals were consuming a diminished nutritional diet, which would have made them vulnerable to disease. This analysis concurs with wider research on London's poor, which identifies the diminished health of the poor during the 19th century (Fissell, 1989; Pinhasi et al., 2006; Roberts & Cox, 2003; Tanner, 1999).

In contrast to metabolic conditions, instances of infectious disease decreased in 19th century cemetery samples. As outlined in Methods and Materials (Chapter 3), it was expected that cases of infectious disease would have increased due to poor living conditions. This decrease may be as a result of the evolution of medical care, including the workhouse infirmary throughout the 19th century (Boulton & Schwarz, 2014; Richardson & Hurwitz, 2012; Siena, 2013; Tomkins, 2013), or as previously, result of individuals who died before an infectious disease would present osteologically (Wood et al., 1992). Finally, trauma due to surgical intervention (i.e. autopsy and craniotomies) increased into the 19th century, which can be linked to the introduction of the 1832 Anatomy Act which utilised 'unclaimed inmates' as material for medical schools (Durey, 1976; Fowler and Powers, 2013:1; Hurren, 2012; Mitchell et al., 2011).

2. **Is there a change in the demography of the skeletal collections of the 19th century (St Bride's and Cross Bones) compared to the earlier collections (St Thomas and Broadgate)?**

Overall, the lower socioeconomic groups of the 19th century had a higher prevalence of pathologies compared to their 17th/18th century counterparts, which can be linked to poor living conditions and diets (questions 1 & 2). Compared to cemetery samples prior to the 19th century, there are higher numbers of perinatal infants and children aged between 1-5 years being buried within Victorian cemeteries. In contrast to the increased numbers of middle-old adults being recorded in 17th/18th cemetery samples, elderly individuals were twice as prevalent within 19th century samples of St Bride's and Cross Bones. Although this study has shown that Union workhouses provided poor menus and

diets, they did aid elderly individuals, despite the removal of Outdoor relief. Demographic analysis of workhouse populations utilising historical and osteological data sets (question 4) supports the long term use of workhouses by the elderly, who had no other form of income.

Evidence of an increase in prevalence of elderly females within the independent labourer sample of City Bunhill may also suggest that females were less likely to have been left in the workhouse, because of their domestic value (Boyer and Schmidle, 2009:270; Ottaway, 2013:45; Tanner, 1999:194). This is further highlighted by a slight increase in the burial of elderly males in workhouse cemeteries during the 19th century, who would have been more likely to have died in the workhouse (question 4).

3. **Is there a difference in the demography of the skeletal collections of the 19th century (St Bride's and Cross Bones) compared to the independent labourer cemetery (City Bunhill?**

The cemetery samples for St Bride's and Cross Bones, and City Bunhill exhibits broadly similar demographics. The mortality spikes that occur within these cemetery samples for non-adults, that were not present within the parish cemetery sample, occur most frequently at birth (perinatal infants) and for children 1-5 years of age, agreeing with the accepted mortality profile of the 19th century poor within London (Hilton, 2006:441). The two sample populations differ in respect to the mortality profile of the adults that have been recorded. City Bunhill, the independent poor cemetery sample, has a higher frequency of young middle adults (26-35 years), which would concur with the mortality profile of the poor and the life expectancy from birth of the 19th century lower socioeconomic classes within London (*ibid.*). Whereas the union workhouse sample of St Bride's and Cross Bones had a higher frequency of elderly adults recorded could indicate that the elderly members of society were more likely to have entered the workhouse during their final years as there was no state pension and 'outdoor relief' was prohibited under the New Poor Law.

4. **Do the historical and archaeological records present similar demographics?**

The historical and archaeological records demonstrate similar demographics, though there are higher instances of elderly individuals being recorded historically than those found archaeologically. This is likely as a result of biases within the archaeological record (see below) and serves to highlight the

complementary nature of using historical and osteological records. There is also a discrepancy in the prevalence of children in the archaeological record when compared to historical records of burial. This may be as a result of unrecorded burials within cemeteries, as many of the grave pits remained open until filled (Connell & Miles, 2010; Miles et al., 2008a).

5. **Utilising the Shoreditch Union Workhouse register of admissions and discharges, is it possible to determine cyclical use of the workhouse?**

Cyclical use of the workhouse was identified within the Union workhouse. On average, the majority of users were only admitted into the workhouse twice, it was possible to determine that some utilised the workhouse up to eighteen times. While, deaths within the workhouse were not noted as a main cause of discharge, those who died tended to have resided in the institution for longer than a year.

## 6.2 Limitations presented throughout study

As noted in Chapter 3, a number of limitations have affected the study of workhouse populations. Indeed, whilst it has been established that four of the five cemeteries were used as burial places for workhouse inmates, they were also utilised by other members of London's poor. The populations studied are therefore likely comprised of independent poor as well as workhouse inmates. Nevertheless, through the detailed study of historical burial records, the cemeteries can be associated with workhouse populations and can serve, through comparative analysis, as a proxy for understanding the impact of workhouse reform.

### 6.2.1 Nutritional Limitations

In the analysis of workhouse menus, modern nutritional values were used to study caloric intake (CDC, 2013a; Clayton & Rowbotham, 2008a, 2008b, 2008c). Given this, such values were taken as the maximum possible caloric intake, which suggests that inmates may have been receiving a further diminished diet. Furthermore, as discussed in Chapter 6, historical recorded instances in which restricted menus were served to inmates suggest that there was no guarantee that inmates were receiving the full menus recommended in the law.

### 6.2.2 Osteological Limitations

As has been stated briefly (Chapter Three: Materials and Methods), the delayed appearance of pathological conditions on human bone impacts the recording of disease in cemetery populations (Mann and Hunt, 2005:50; Ortner, 2003:113). Individuals may have therefore succumbed to the disease before pathological conditions affected the bones, and they may have also died as a result of non-visible associated conditions (Wood et al., 1992). Osteological study is also restricted by the discrepancy between the pathological and clinical literature. For example, the distribution of lesions on the dry bone bear little resemblance to the clinical literature and the presentation of the lesions on living bone (Mann and Hunt, 2005:50). There have also been changes in the criteria in identifying pathological conditions, which would affect the recording of prevalence of diseases within the archaeological records (i.e. scurvy). Issues could arise due to observer error in the analysis of conditions on the bone, and this could be due to lighting or the recorders knowledge and experience (Armelagos et al., 2014:9; Hirsch and Mogle, 1976; Mays, 2013, 2008).

### 6.2.3 Historical Limitations

The nature of the historical record also introduces a number of limitations that were considered during the study. The lack of surviving historical sources relating to the Parish workhouses and Old Poor Laws contrasts to the wealth of material associated with the Union Workhouse. Parochial records have been lost or are incomplete and are also non-standardised (E. Miller, 2012:319). Furthermore, incomplete record keeping within Union Workhouse populations must also be acknowledged. Historically, individuals may have lied or may not have known their birth date and year (Van der Merwe et al., 2010; Rogers et al., 2012). Records may have also been falsified in order for individuals to gain admittance or to avoid work (Boulton, 2000:52).

Illegibility of the original recorders handwriting also made the records difficult to decipher age or name. Sex was also unrecorded in workhouse documentation, requiring analysis to focus on forename as an indicator of sex. Importantly, those individuals with an unrecorded forename, illegible forename, or with a unisex name (i.e. Jamie or Francis) were recorded as having an unknown sex. A number of

forenames have also changed gender during the modern period (i.e. Ashley), which was also taken into account during the study.

## 6.3 Cyclical Nature of Welfare

The cyclical nature of the use of government assistance and the opinions of society continue to be seen in the later welfare policies of the 20th and 21st centuries. While institutionalisation of the poor was no longer required and the workhouse was removed from the fabric of society by 1930, the ideas that accompanied these policies remain.

### 6.3.1 The Creation of the Welfare State (1942-1980)

The Labour and Conservative parties created a coalition following the election of 1940, and during the Second World War. One year following the election in 1941 Arthur Greenwood, the Labour MP, created an inter-departmental committee that would begin surveying Britain's existing social insurance, and the associated services (Barnett, 1996:26). The resulting report to come from this survey was The Beveridge Report of 1942, which identified the five 'giant evils' in society as squalor, ignorance, want, idleness and disease (Beveridge, 1942:6). It was largely complied by William Beveridge, an economist, and it was a promise to reward British citizens who had suffered sacrifices during the war (Abel-Smith, 1992:7). It recommended, like the Old Poor Laws, that there should be a national, and compulsory, rate which would reintroduce the concept of community welfare (Brown, 1990:34). The initial reaction within Parliament to the report was divided. There were some who viewed the lack of 'means-tested' benefits as an 'impracticable financial commitment' (Barnett, 1996:27) and the publication of the report was postponed. However, after the victory of the Labour party in the election of 1945, the report was finally published, and pledged to remove these great evils from society and to begin implementing policies that would provide for the people of the United Kingdom 'from the cradle to the grave' (Beveridge, 1942; Brown, 1990). This was realised with the 1948 National Assistance Bill. It was then that the government reformed the welfare laws again, for the first time since the creation of the New Poor Laws a century earlier. A number of union workhouses were transitioned into hospitals or elderly care homes, which was easily implemented as large

portions of the population in the union workhouses were already elderly (Anon, 2008). The new Welfare State, unlike the Old Poor Laws, introduced the concept of 'abolishing want' and to remove poverty from 20th century society (Mencher, 1967:358).

### 6.3.2 Thatcherism and the Age of Austerity (1980-Present)

The creation of a Welfare State had a significant impact on government spending, which influenced reformation of welfare policies during the 1980s, and has since been referred to as 'Thatcherism' (Hills, 1998). Reinforced by public opinion and like the New Poor Laws, welfare reform aimed to 'roll back the state' (Hills, 1998:1) and fix what T. E. Utley, editor of *The Telegraph* during the 1980s, perceived as 'an arrangement under which we all largely cease to be responsible for our own behaviour and in return become responsible for everyone else's' (Oborne, 2011). Those who were in need of aid, once again became the focus of public opinion and were once again demonised as 'scroungers…lazy, a drain [on public resources] who aren't playing their part' (Anon, 2013).

More recently, the 2012 Welfare Bill, introduced further changes to the welfare state, in order to save £18 billion from the annual welfare budget (*ibid.*). A report from the Joint Committee on Human Rights warned that changes enacted by this bill would affect the benefits of disabled peoples and their independence (Duncan Smith et al., 2015). Furthermore, early reaction to the bill noted that changes would have had a 'cumulative impact', forcing people from their homes (Anon, 2013; Field, 2011; Hills, 1998; Oborne, 2011).

### 6.3.3 The Cyclical Nature of Welfare

The Age of Austerity and the New Poor Laws share a number of interesting comparisons, including the cyclical nature of public opinion and government policy. The implementation of the welfare state was seen to have created a population of paupers who were led to think that they had a social right to claim aid (Hilton, 2006:338). Furthermore, the focus of media attention on the use of aid by foreign migrants and Asylum Seekers (Gentleman, 2015), has led to a further demonisation of lower socioeconomic groups, which has culminated in political pressure for reform (*ibid.*).

This brief discussion of welfare policies, demonstrates periods of cyclical repetition. The introduction of the welfare state, like the Old Poor Laws, placed the care of the destitute within the wider community. These policies, which aimed at eradicating the poor without blame, contrast to the combative language and social opinions during the late 20th and early 21st centuries. Within this Age of Austerity, like the early 19th century, previous welfare policies have been deemed too lenient, which has allowed for the destitute to become a new class of 'professional poor' (Brown, 1990; Hills, 1998; Lindert, 2012; Pierson, 1996). This fear of a benefit culture, including migrant workers, is reinforced by the media and public opinion that share clear similarities to those who implemented the New Poor Laws in 1834.

## 6.4 Possible future research

This cyclical nature of welfare identifies a number of novel avenues of research. The modern concern of immigration and foreign aid, was also seen as an issue for welfare during the 19th century (Feldman, 2003:95). By studying the demographic and nature of immigrant populations that received poor relief and used the workhouse, a wider understanding of the role of migrants during the New Poor Laws can be gained. Furthermore, comparing modern and Victorian attitudes to lower socioeconomic groups, including migrants and the itinerant poor, through analysis of historical and sociological studies, may also provide a valuable insight into the wider social perception of the poor, which cannot be gained through isolated archaeological study.

In terms of osteological analysis, studies of dental disease and stature can help to identify the impact of poor living conditions, and minimise the impact of the 'osteological paradox. Studying dental disease in this context, may provide a better understanding of the health impacts of dietary changes that have been identified as part of this study. Stature, as an indicator of environmental stress (i.e. pollution and diet) may also provide further insights into the health of industrial populations. Changes in stature can be seen through the enlistment procedures of the British army, who were forced to lower the minimum height requirements for enlistment as men and boys from urban areas were

shorter than their rural counterparts (Alter, 2004:266; Floud et al., 1990:60; Horrell and Oxley, 2012:1355).

Building upon the results of this research, a comparative study of other urban centres across Britain will also contextualise the impacts of the Poor Law changes. As noted in Chapter 2, the New Poor Laws were implemented at different periods across Scotland and Ireland and therefore may have a contrasting impact on the health of the poor. Furthermore, the comparison of results of this study to studies of lower socioeconomic groups found in contemporary urban areas of America and the British Empire, will also allow for a wider study in the overall treatment of the world's poor during the 19th century.

## 6.5 Final Remarks

This study has successfully managed to integrate historical and archaeological records to extend our knowledge of the diet and health of London's poorest citizens, including workhouse inmates. Whilst archaeological analysis has often focused on workhouse architecture, the overall health and status of the poor has received little contextual study. It has been shown that changes introduced as a part of the New Poor Laws had a direct impact on the demography and health of workhouse inmates, which was reinforced by wider social perceptions of the poor, who also suffered from deteriorating living conditions. Despite this, workhouses continued to aid the elderly and also provided care in their infirmaries, which formed the foundations for later hospitals. These changes, alongside the Old Poor Laws, served as a foundation of the welfare state, which continues to be relevant today in this age of austerity.

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## 7.1 Parliamentary Papers

Poor Law Commission, 1836 *Parliamentary Papers 1836,* XXIX

Poor Law Commission, 1839 Fifth Report, *Parliamentary Papers 1839*, XX

## 7.2 Ancestry.co.uk records

City of London Corporation of the Poor workhouse:

> **Source Citation**: Board of Guardians; List of those who died in the workhouse, 1766-1780; Reference Number: MS 03178
>
> **Source Information**: Ancestry.com. London, England, Poor Law and Board of Guardian Records, 1430-1930 [database on-line]. Provo, UT, USA: Ancestry.com Operations, Inc., 2010.

St Bride's Parish, Fleet Street burial records:

> **Source Citation**: Call Number: *P69/BRI/A/015/MS06551/001*
>
> **Source Information**: Ancestry.com. *London, England, Deaths and Burials, 1813-1980* [database on-line]. Provo, UT, USA: Ancestry.com Operations, Inc., 2010.

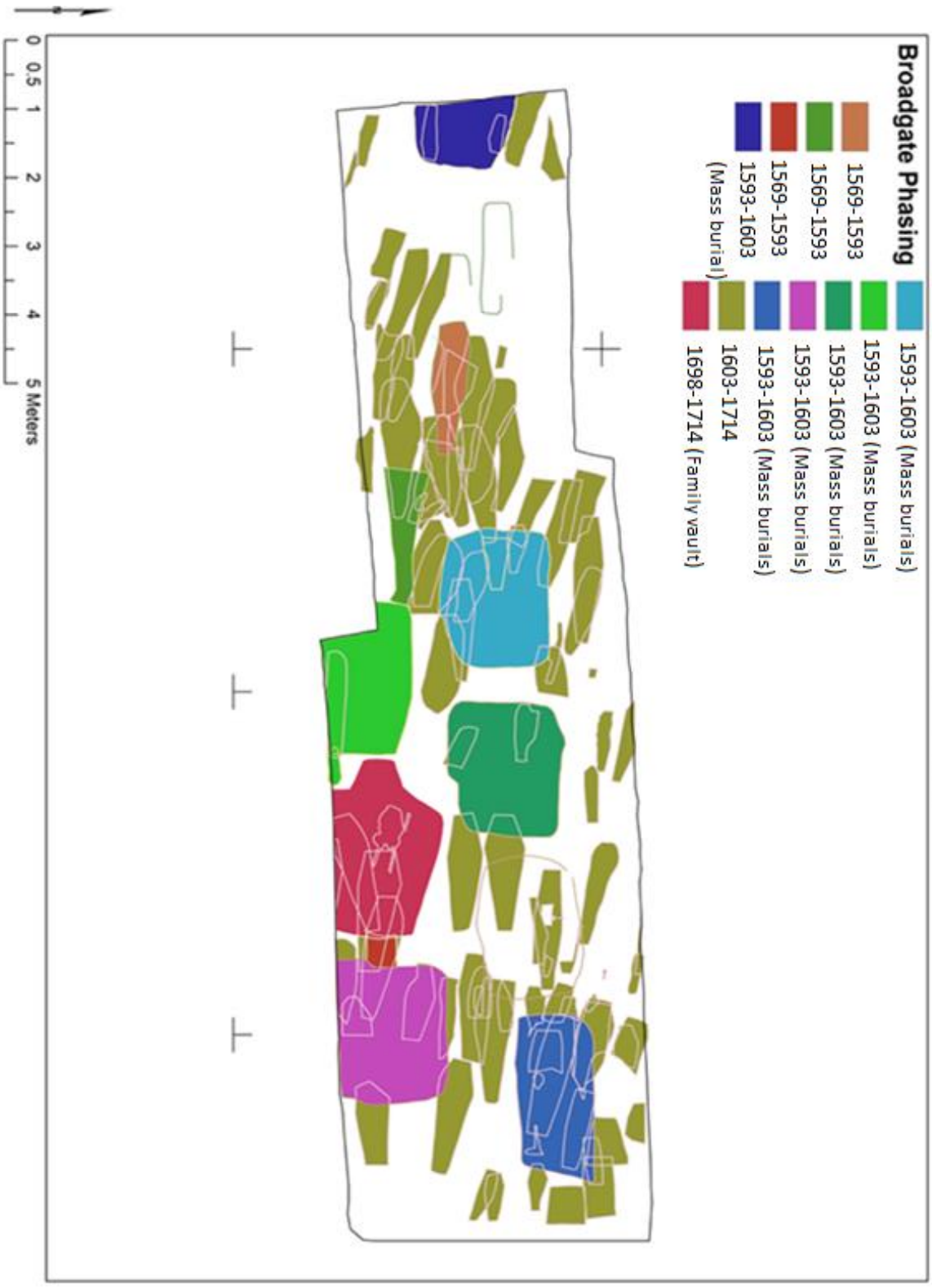
St Saviour's Parish, burial records, Red Cross Way:

> **Source Citation**: Call Number: *p92/sav/3088*
>
> **Source Information**: Ancestry.com. *London, England, Deaths and Burials, 1813-1980* [database on-line]. Provo, UT, USA: Ancestry.com Operations, Inc., 2010.

Shoreditch Union Workhouse, Kingsland Road, record of admissions and discharges:

> **Source Citation**: Board of Guardians; Records of Workhouses and Institutions Workhouse, Kingsland Road, 1856-1870; Reference Number: SHBG/139/001
>
> **Source Information**: Ancestry.com. London, England, Poor Law and Board of Guardian Records, 1430-1930 [database on-line]. Provo, UT, USA: Ancestry.com Operations, Inc., 2010.

# Appendix 1 Broadgate Phasing Plan




(Dyson et al, 1987)

## Appendix 2 Vitamin and Mineral uses, effects of deficiency and dietary sources

| Vitamin | What the Vitamin does | Effects of vitamin deficiency | Good food sources |
|---|---|---|---|
| **Vitamin A (beta carotene)** | Helps to keep eyesight and promote the growth of healthy skin, hair, bones and teeth. Helps in cell reproduction and aids to strengthen the immune and reproductive systems. The body uses beta-carotene and converts it to vitamin A. | Night blindness, dry skin, poor bone and teeth growth and development. | Soy milk (and other dairy products)<br>Carrots<br>Spinach<br>Green peas<br>Tomato juice<br>Watermelon<br>Sweet potatoes<br>Pumpkins<br>Cantaloupe<br>Sunflower seeds<br>Fish liver oils<br>Liver<br>Lean ham<br>Mango<br>Broccoli<br>Lean pork chops<br>Egg yolks |
| **Vitamin $B_1$ (thiamine)** | Used by the body to help convert carbohydrates into energy. Helps to keep the normal function of the nervous system, muscles heart and digestion. | Less concentration, loss of appetite. Weakness, exhaustion and fatigue. | Lean Pork<br>Legumes<br>Yeast<br>Bananas<br>Fish (most)<br>Liver<br>Nuts and seeds<br>Potatoes<br>Sweet potatoes<br>Peas<br>Watermelon<br>Avocado<br>Poultry<br>Whole-grain and fortified cereals |
| **Vitamin $B_2$ (riboflavin)** | Important for growth in the body. Assists skin, nails and hair to grow. Helps to prevent sores and swelling of mouth and lips. Aids in | Itching and irritation of lips, eyes, skin and mucous membranes. | Eggs<br>Fish and shellfish<br>Fortified cereals<br>Meat<br>Poultry |

| | | | |
|---|---|---|---|
| | reproduction and cell regeneration. Also aids in the releasing of energy from carbohydrates. | | Dairy products<br>Kiwi<br>Avocado<br>Broccoli<br>Turnip greens<br>Asparagus<br>Spinach |
| **Vitamin $B_3$ (niacin)** | Helps to release energy from carbohydrates. Aids in the functioning of the digestive system, nerves and | Depression, diarrhea, dizziness, fatigue, halitosis, headaches, indigestion, insomnia, limb pains, loss of appetite, low blood sugar, muscular weakness, skin eruptions, and inflammation. | Beef liver<br>Peanuts<br>Chicken, White meat<br>Tuna<br>Salmon<br>Almonds<br>Mushrooms<br>Corn<br>Mango<br>Lentils |
| **Vitamin $B_9$ (Folate/Folic acid)** | Helps produce and maintain red blood cells and the nervous system. Essential for mental and emotional health as it helps to maintain normal brain functions. | Anaemia and a reduction in growth rates. Other subtle symptoms may include digestive disorders such as diarrhea, loss of appetite, and weight loss can occur, as can weakness, sore tongue, headaches, heart palpitations, irritability, forgetfulness, and behavioural disorders | Dark green vegetables<br>Dry beans<br>Peas<br>Lentils<br>Enriched grain products<br>Fortified cereals<br>Liver<br>Orange juice<br>Wheat germ<br>Yeast |
| **Vitamin $B_{12}$** | Needed for nerve cells and red blood cells, and to make DNA | Demyelination and irreversible nerve cell death. Symptoms include numbness or tingling of the extremities and an ataxic gait. | Dairy products<br>Eggs<br>Cereals<br>Soy based products<br>Liver<br>Beef<br>Clams |
| **Vitamin C (ascorbic acid)** | Important in the production of collagen in the body - helps the connective tissues and organs. Can act as an antioxidant to help protect the body from free radical. | Scurvy (though rarely seen today), which causes bleeding and inflamed gums, loose teeth and poor, wound healing. | citrus fruits (oranges, grapefruits, lemons, limes)<br>Berries<br>Melons<br>Tomatoes<br>Potatoes |

| | | | |
|---|---|---|---|
| | | | Green peppers |
| | | | Leafy green vegetables |
| **Vitamin D** | Helps to promote the absorption of calcium and phosphorus levels in the body. Helps to maintain and form strong and healthy bones. | Rickets and osteomalacia. Rickets results in soft bones and skeletal deformities | Liver |
| | | | High-fat fish |
| | | | Fish oils |
| | | | Egg yolk |
| | | | Fortified cereals |
| | | | Fortified milk |
| | | | Sunlight |
| **Vitamin E** | An antioxidant that protects your cells against the effects of free radicals, which are potentially damaging by-products of energy metabolism. | Intestinal disorders - cystic fibrosis, pancreatitis, and cholestasis. Prevent the absorption of dietary fats and fat-soluble nutrients. | Margarine |
| | | | Nuts and seeds |
| | | | Peanuts and peanut butter Vegetable oils |
| | | | Wheat germ |
| | | | Whole-grain and fortified cereals |
| **Vitamin K** | Helps to control blood clotting in the body and is essential for synthesizing the liver protein that controls the clotting | A shortage of this vitamin may result in nosebleeds, internal haemorrhaging. | Broccoli |
| | | | Brussels sprouts |
| | | | Cabbage |
| | | | Leafy green vegetables |
| | | | Mayonnaise |
| | | | Soybean |
| | | | Canola |
| | | | Olive oils |
| **Mineral** | **What the Mineral does** | **Effects of mineral deficiency** | **Good food sources** |
| **Calcium** | Strengthens the bones and teeth. Also needed to help regulate the heartbeat and help muscle and nerve functions. | Its minor deficit can affect bone and teeth formation. | Milk (and other dairy products) |
| | | | Leafy green vegetables |
| | | | Salmon |
| | | | Sardines |
| | | | Turnips |
| | | | Tofu |
| | | | Almonds |
| | | | Broccoli |
| **Copper** | Important for nerve functioning, red blood cell formation and maintaining energy levels through iron absorption. Also good for healthy bones and the immune system. | Anaemia, hair problems, dry skin, vitamin C deficiency | Beans |
| | | | Raisins |
| | | | Chocolate |
| | | | Nuts |
| | | | Meat |
| | | | Shellfish |

| | | | |
|---|---|---|---|
| **Fluorine** | Helps to make bones and teeth stronger. Improves resistance to cavities. | Weak teeth and bones. | Gelatine desserts |
| | | | Salt water fish (salmon) |
| | | | Tea |
| | | | Fluoridated water |
| **Iron** | Helps the blood and muscles carry oxygen to the body. | Tiredness and lethargy, feelings of weakness, insomnia, palpitations. | Liver |
| | | | Red meat |
| | | | Egg yolk |
| | | | Legumes |
| | | | Whole/enriched grains |
| | | | Dark green vegetables |
| **Magnesium** | Helps muscles work, aids metabolism and aids bone growth. | Fatigue, numbness, poor memory, muscle twitching and irritability, tingling, rapid heartbeat. | Whole grains |
| | | | Nuts |
| | | | Legumes |
| | | | Apricots |
| | | | Bananas |
| | | | Soy beans |
| | | | Green leafy vegetables |
| | | | Spinach |
| **Manganese** | Helps bone growth and cell production. | Rarely documented but one case showed in a patient a decrease in serum cholesterol, depressed growth of hair and nails, scaly dermatitis, weight loss, reddening of his black hair and beard and impaired blood clotting. | Whole grains |
| | | | Fruit |
| | | | Vegetables |
| | | | Tea |
| | | | Egg yolk |
| **Potassium** | Essential for nerve function, muscle contraction and maintenance of fluid and blood pressure in the body. | Depression, fatigue, hypertension, decreased Heart Rate | Oranges |
| | | | Bananas |
| | | | Peanuts |
| | | | Beans |
| | | | Potatoes |
| | | | Spinach |
| **Selenium** | Helps to prevent damage to cells and aids in the functioning of the thyroid gland. An antioxidant for the body. | Poor heart function, osteoarthropathy, mental retardation | Brazil nuts |
| | | | Tuna |
| | | | Eggs |
| | | | Grains |
| | | | Chicken |
| | | | Shellfish |
| | | | Fish |
| **Sodium** | | | Table salt |

| | | | |
|---|---|---|---|
| | Helps to regulate water in the body's blood and tissue | Fatigue, apathy, and nausea as well as cramps in the muscles of the extremities. | Dairy products |
| **Zinc** | Helps wounds to heal and aids taste and smell sensory. | Growth retardation, hair loss, diarrhea, delayed sexual maturation and impotence, eye and skin lesions, and loss of appetite. | Whole wheat |
| | | | Peanuts |
| | | | Poultry |
| | | | Eggs |
| | | | Legumes |
| | | | Beef |
| | | | Shellfish |

(CDC, 2013a;2013b)