

**Food and Nutrient Intake in Low-Income Families: A  
Comparative Study**

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The candidate confirms that the work submitted is her own except where work which has formed part of jointly authored publications has been included. The contribution of the candidate and the other authors to this work has been explicitly indicated below. The candidate confirms that appropriate credit has been given within the thesis where reference has been made to the work of others.

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## Abstract

This thesis aims to gain a greater understanding of nutritional health in 19th-century England to facilitate a critical analysis of modern food policies in the UK. By identifying changes to nutritional health both beneficial and detrimental in the past, the factors involved in those changes can be explored as potential methods by which modern diet-related health can be improved. However, before any inferences can be drawn from 19th-century dietary sufficiency, the realities of nutrient intake for wealthy and low-income families in England during that century must first be established, an area of research which has received limited attention. As a result, this thesis is centred heavily on historical and archaeological methods and evidence.

Through this research, four main areas were highlighted from the historical and archaeological evidence as approaches which could improve current diet-related health concerns in the UK. The first is diet during childhood with a focus specifically on breastfeeding practice and its promotion to all citizens of the UK, including school children. The second is the regulation and protection of school meals available to children in the UK, most importantly the continuation of free school meals for low-income and “just about managing” families. The third is a new and carefully addressed reduction of sugar in all processed food and drink products, with attention paid to closing the “loop holes” introduced with new policies. The fourth is a new approach to the development and management of policies concerning health in the UK, where new plans include targets, methods of measuring success, and both accountability and transparency.

## Table of Contents

<b>Chapter 1 Introduction.....</b>	<b>13</b>
1.1 Aims.....	14
1.2 Chapter overview .....	15
<b>Chapter 2 Literature Review .....</b>	<b>22</b>
2.1 Present Nutritional Health.....	23
2.2 Historical Nutritional Health.....	26
2.3 Osteoarchaeological data .....	31
2.4 Gaps in the previous research .....	33
<b>Chapter 3 Nutritional health and Modern Policy .....</b>	<b>40</b>
3.1 Malnutrition .....	40
3.2 Obesity .....	42
3.3 Vitamin D, calcium, and phosphorous.....	43
3.4 Vitamin C.....	46
3.5 Iron.....	48
3.6 Other Vitamins.....	49
3.7 Other Minerals .....	52
3.8 Modern Nutritional Health Policies .....	55
3.9 Summary of Chapter .....	61
<b>Chapter 4 Historical Context: Developments Towards Social Policy .....</b>	<b>63</b>
4.1 The Old Poor Law.....	64
4.1.1 Malthus .....	65
4.1.2 Adam Smith and <i>Laissez Faire</i> .....	67
4.1.3 Jeremy Bentham and the Philosophical Radicals .....	68
4.1.4 John Stuart Mill .....	70
4.1.5 Revolutionaries.....	71
4.2 The New Poor Law and Social Policy .....	74
4.2.1 Sir Edwin Chadwick and the New Poor Law .....	75
4.2.2 Nassau William Senior .....	76
4.2.3 Gathorne Hardy .....	77
4.2.4 The New Poor Law: Theory and Reality.....	78
4.3 Chapter Summary .....	79

<b>Chapter 5 Methods and Data .....</b>	<b>81</b>
5.1 Archaeological Data.....	81
5.1.1 Chelsea Old Church, London .....	83
5.1.2 St Brides Fleet Street, London.....	84
5.1.3 St Brides Lower, London.....	85
5.1.4 Cross Bones, London.....	85
5.1.5 St Martins-in-the-Bull Ring, Birmingham.....	86
5.1.6 Newcastle Infirmary, Newcastle.....	87
5.1.7 Coronation Street, South Shields.....	88
5.1.8 Socio-economic Status .....	88
5.2 Osteoarchaeology: The study of human remains .....	90
5.3 Methods in osteological analysis .....	91
5.3.1 Metabolic conditions .....	101
5.3.2 Potential limitations in osteological analysis.....	107
5.4 Nutritional Epidemiology: The study of population health .....	110
5.4.1 Methods behind diet and nutrition surveys.....	112
5.4.2 Implementation of diet and nutrition surveys.....	114
5.5 Potential Limitations .....	117
5.6 Historical documentary research.....	118
5.6.1 Reconstruction of Diet.....	119
5.6.2 Average height.....	122
5.7 Chapter summary .....	129
<b>Chapter 6 Results: Nutritional data Analysis.....</b>	<b>130</b>
6.1 Results of Nutrient Intake and Metabolic Pathology .....	130
6.1.1 Interpretation .....	134
6.2 Historical Evidence for Nutrient Intake .....	136
6.2.1 Vitamin D Deficiency.....	137
6.2.2 19th-Century Infant Feeding .....	142
6.2.3 Weaning.....	148
6.2.4 Early Childhood.....	150
6.2.5 Later Childhood .....	157
6.2.6 Discussion.....	172
6.3 Modern Policies: Young Child and Infant Feeding .....	174
6.3.1 Vitamin D .....	175
6.3.2 Breastfeeding .....	178

6.3.3	Diet for Young Children.....	193
6.4	Chapter Summary .....	196
<b>Chapter 7 Results: Height Data .....</b>		<b>197</b>
7.1	Results of 19th-Century Height Analysis .....	197
7.1.1	Interpretation .....	206
7.2	Historical Evidence for Social Policy and Childhood Health.....	209
7.2.1	Wealth.....	211
7.2.2	Disease.....	212
7.2.3	Home .....	216
7.2.4	Workplace.....	218
7.2.5	Diet .....	223
7.2.6	Discussion.....	239
7.3	Modern Policy: School Meals.....	242
7.3.1	Free School Meals .....	243
7.3.2	The Healthy Child Programme.....	248
7.3.3	Healthy Schools Rating Scheme .....	252
7.4	Chapter Summary .....	253
<b>Chapter 8 Results: Historical Dietary Reconstruction .....</b>		<b>254</b>
8.1	Historical Dietary Reconstruction.....	255
8.2	Comparison of Historical and Modern Diet.....	267
8.3	Modern Legislation: sugar .....	271
8.3.1	Update to Sugar Tax and the Childhood Obesity Plan.....	274
8.4	Chapter Summary .....	276
<b>Chapter 9 Public Health Policy Implementation .....</b>		<b>277</b>
9.1.1	Poverty Relief.....	278
9.1.2	Sanitation.....	293
9.1.3	The Factory Acts .....	299
9.1.4	The Inspector and 19th Century Legislation .....	304
9.2	Inquiries and Surveys.....	307
9.3	The Government's Plan for Action- Brave and Bold?.....	308
9.4	The Plan for Inaction .....	313
9.4.1	The Unexamined Policy .....	315
<b>Chapter 10 Conclusion .....</b>		<b>326</b>
10.1	Fulfilment of Aims.....	326
10.2	Infancy .....	327



10.3 Childhood.....	327
10.4 Sugar and Fast Food.....	329
10.5 Political Responsibility .....	330
10.6 Historical Nutritional Health: Future Research .....	331
10.7 Final Remarks .....	332

## Figures

<b>Figure 1.1 Visual representation of the proportions of morbidly obese, obese, overweight, normal weight, and underweight people per 100 adults in England (Baker 2017: 4).....</b>	<b>13</b>
<b>Figure 4.1 Contentious gatherings in the London region, 1758-1834 (After Tilly 2010) .....</b>	<b>72</b>
<b>Figure 5.1 Sites of the seven cemeteries across England. 1-4 are Cross Bones, St Brides Fleet Street, St Brides Lower, and Chelsea Old Church, 5 is St Martin's-in-the-Bull Ring, 6 is Newcastle Infirmary, and 7 is Coronation Street. ....</b>	<b>82</b>
<b>Figure 5.3 Coffin plate from Chelsea Old Church (Cowie et al. 2008, 34) .....</b>	<b>84</b>
<b>Figure 5.4 Anatomical illustration showing the right pelvis with the auricular surface (red) and pubic symphysis (yellow) (after Gray and Carter (1858)) .....</b>	<b>93</b>
<b>Figure 5.5 Sexual dimorphism in the adult pubic bone of the os coxa (Buikstra and Ubelaker 1994) .....</b>	<b>96</b>
<b>Figure 5.6 The greater sciatic notch and the classification of sex for its width, where 1 is female, 2 is probably female, 3 is indeterminate, 4 is probably male, and 5 is male (Buikstra and Ubelaker 1994) .....</b>	<b>97</b>
<b>Figure 5.7 Cranial morphology showing sex determination features. 1 is female, 2 is probably female, 3 is indeterminate, 4 is probably male, and 5 is male (Buikstra and Ubelaker 1994).....</b>	<b>98</b>
<b>Figure 5.8 Age at which the fusion of the epiphyses occur (Buikstra and Ubelaker 1994) .....</b>	<b>99</b>
<b>Figure 5.9 Adult tibia and femur demonstrating the appearance of bone deformity present in residual rickets. Gratitude to The Museum of London Centre for Bioarchaeology for the use of this image. ....</b>	<b>102</b>
<b>Figure 5.10 Localised region of porosity in the left orbital roof indicative of cribra orbitalia .....</b>	<b>103</b>
<b>Figure 5.11 Image of enamel hypoplasia in an individual excavated from Exeter .....</b>	<b>103</b>

<b>Figure 5.12 Image portraying retraction of alveolar bone in the maxilla of an individual excavated from a medieval site in Exeter, one possible indicator of active scurvy.....</b>	<b>104</b>
<b>Figure 5.14 Income deciles as established by the Institute for Fiscal Studies (After (Cribb et al. 2012)). Deciles are split; 1=£0-£10920, 2=£10920-14040, 3=£14040-£16120, 4=£16120-18720, 5=£18720-21320, 6=£21320-£24960, 7=£24960-£28600, 8=£28600-£33800, 9=£33800-43680, 10=£43680+.....</b>	<b>115</b>
<b>Figure 6.1 Young children playing in the streets of Newcastle in the mid-19th century, provided by (NEIMME 2016), reference number: NEMiPA-SAGP031.....</b>	<b>140</b>
<b>Figure 6.2 Example of an 1858 workhouse dietary from the Stockbridge Union Workhouse, Hampshire, showing the similarities between adult and child food.....</b>	<b>153</b>
<b>Figure 6.3 Map of the households affected by typhoid fever in 1900 (Hamer, 6) .....</b>	<b>166</b>
<b>Figure 6.4 Booth's map of poverty (London School of Economics and Political Science 2016) showing a match to the map produced by Hamer (1900) for the site of the 1900 typhoid outbreak in Southwark.....</b>	<b>167</b>
<b>Figure 6.5 Booth's map of poverty (London School of Economics and Political Science 2016) showing a match to the map produced by Hamer (1900) for the site of the 1900 typhoid outbreak in Kensal Town. ....</b>	<b>168</b>
<b>Figure 7.1 Average height per year .....</b>	<b>198</b>
<b>Figure 7.2 Female average height across the 19th century .....</b>	<b>199</b>
<b>Figure 7.3 Male average height across the 19th century .....</b>	<b>200</b>
<b>Figure 7.4 Average height from UK men born between 1810 and 1980 (Roser 2016) .....</b>	<b>203</b>
<b>Figure 7.5 Mean female height trends from the presented convict height data</b>	<b>204</b>
<b>Figure 7.6 Mean male height trends from the presented convict height data.</b>	<b>205</b>
<b>Figure 9.1 The trend in childhood poverty over time, according to households with incomes below 60% of the median.....</b>	<b>317</b>
<b>Figure 9.2 The Intervention Ladder. Levels of intervention that the government can take in order to introduce changes or limit dangers in the population health (Ali <i>et al.</i> 2007, 42) .....</b>	<b>322</b>

## Tables

<b>Table 5.1 Status of individuals buried within northern and southern cemeteries .....</b>	<b>83</b>
<b>Table 5.2 Burial costs for St Martin's Church in 1848 (Brickley <i>et al.</i> 2006)....</b>	<b>87</b>

<b>Table 5.3 Stages of preservation as defined by Behrensmeyer (1978, 151) with corresponding stages defined by Brickley et al. (2006, 94).....</b>	<b>109</b>
<b>Table 5.4 Preservation categories used by The Museum of London Centre for Bioarchaeology (Connell and Rauxloh 2003). .....</b>	<b>109</b>
<b>Table 5.5 Income deciles of survey participants in the NDNS and LIDNS data .....</b>	<b>Error! Bookmark not defined.</b>
<b>Table 5.6 Age and sex of survey participants in the modern NDNS and LIDNS data .....</b>	<b>Error! Bookmark not defined.</b>
<b>Table 5.7 Minimum height requirements for army and marine recruits (male) across the 19th century. ....</b>	<b>125</b>
<b>Table 5.8 Occupational classes of individuals included in the datasets based on those from (Woollard 1999) .....</b>	<b>127</b>
<b>Table 6.1 Results of nutrient intake from modern combined NDNS and LIDNS data and presence of metabolic pathology from 19th-century skeletal data. Unless otherwise stated, these results refer to children (defined as less than 18 years of age in modern data), since residual rickets, cribra orbitalia, and enamel hypoplasia are conditions formed during development and so represent health during childhood even in adult skeletal remains. Scurvy can be active at any stage in life, therefore the data is split into adult and child results for vitamin C/scurvy. ....</b>	<b>132</b>
<b>Table 6.2 Results of logistic regression analysis showing the risk of nutrient intake below the LRNI for adults .....</b>	<b>133</b>
<b>Table 6.3 Dietary provided to children aged between five and nine years of age within the London Foundling Hospital (Pereira 1843, 228).....</b>	<b>155</b>
<b>Table 6.4 Dietary available to children aged three years and over at the London Infant Asylum (Pereira 1843, 229).....</b>	<b>156</b>
<b>Table 7.1 Beta coefficient shows changes in height between 5 year birth cohorts of the 19th century, adjusted for sex, age, and county of trial. Statistically significant values are <math>P &lt; 0.05</math>, and are present in the female data for 1885 and 1890, and in the male data for 1885, 1890, and 1895.....</b>	<b>202</b>
<b>Table 7.2 Results of regression analysis testing for the association between the population size of place of birth/arrest and adult attained height, with the most urban category (1) as the comparator. Adjusted for sex. ....</b>	<b>206</b>
<b>Table 7.3 Top 20 causes of death for children aged below 16 years ranked by most prevalent to least prevalent for the years 1870, 1880, and 1890.....</b>	<b>215</b>
<b>Table 7.4 Physical Activity values for men, women, boys, and girls depending on activity level for use in EER estimations (Otten <i>et al.</i> 2006) .....</b>	<b>226</b>
<b>Table 7.5 EER estimates for 19<sup>th</sup>-century height and weight, differentiated by level of physical activity .....</b>	<b>227</b>
<b>Table 7.6 Estimation of the calories for each budget presented in Rowntree, as well as the demography and income of each family.....</b>	<b>232</b>

<b>Table 7.7 Estimation of the calories required for each member of each family, the total calories required per day for the whole family, and the difference between total calories required and total calories available from the budget data. ....</b>	<b>235</b>
<b>Table 7.8 Example of the diets of labourers in 1863, reported by Smith.....</b>	<b>238</b>
<b>Table 8.1 Reconstruction of the nutritional intake derived from simple and economical specimen menus for breakfast, lunch, and dinner from Beeton (1907 pp. 1720, 1724, 1753), as well as the amount of each nutrient remaining after maximum loss during cooking, and the Reference Nutrient Intake (RNI) for adult men and women. ....</b>	<b>257</b>
<b>Table 8.2 Average nutrient intakes for men, women, and children aged between 5 and 9 years and 2 and 5 years based on nutritional composition of prison and workhouse dietaries, and the modern RNI for each nutrient according to age and sex (British Nutrition Foundation 2016b). ....</b>	<b>264</b>
<b>Table 8.3 Percentage of dietaries from prisons and workhouses across the 19th century which provided sufficient energy or nutrients according to age and sex requirements. Figures for fat, carbohydrate, and sugars show the percentage of dietaries which provided intakes lower than the maximum Dietary Reference Values, all other figures show the percentage of dietaries providing intakes above the RNI ....</b>	<b>265</b>
<b>Table 8.4 Nutrient intake accounting for maximum loss during cooking .....</b>	<b>266</b>
<b>Table 8.5 Mean nutrient intake of modern English population based on data from NDNS and LIDNS surveys.....</b>	<b>268</b>
<b>Table 8.6 Comparison of Mrs Beeton suggested meal plans and Institutional (male) dietaries with modern NDNS/LIDNS nutrient intake (male), showing whether the historical sources had higher values, similar values, or lower values than modern intakes. ....</b>	<b>269</b>
<b>Table 9.1 Information from inspection reports by Poor Law Commissioners including the date of the visit, the date of the previous visit and the answers given to question number 6 of the report form relating to frequency of visits. All files are available from The National Archives..</b>	<b>282</b>

Abbreviations key:

HCP- Healthy Child Programme

LIDNS- Low Income Diet and Nutrition Survey

LRNI- Lower Reference Nutrient Intake

NCMP- National Child Measurement Programme

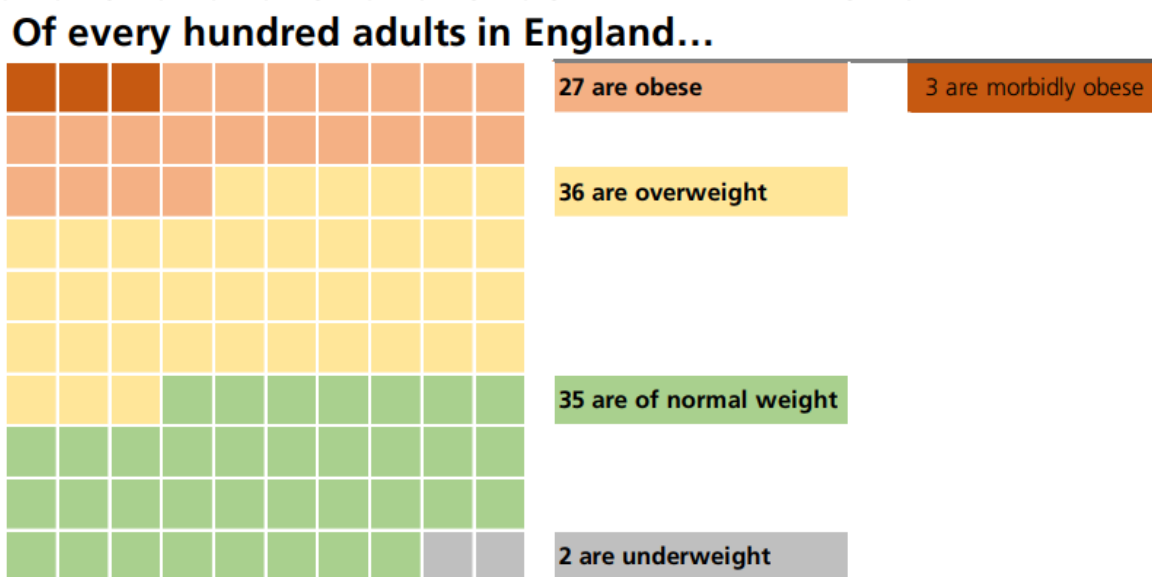
NDNS- National Diet and Nutrition Survey

NHS- National Health Service

RNI- Reference Nutrient Intake

## Chapter 1 Introduction

In 2017, 27% of the English adult population are obese and a *further* 36% are overweight, while 9% of children are obese by the age of 4-5 years (Baker 2017) (Figure 1.1). These figures may have once been shocking, but increases in overweight and obesity rates saw an estimated 10% rise between 1993 and 2014 (Baker 2017). This prevalence of obesity and overweight in the adult and child population of England is of concern because of the detrimental effects that this has on the human body and the medical conditions which occur as a direct result of an overweight or obese diet and lifestyle (discussed in Chapter 3.2).



**Figure 1.1 Visual representation of the proportions of morbidly obese, obese, overweight, normal weight, and underweight people per 100 adults in England (Baker 2017: 4)**

Overweight and obesity are visible and easily measured signs of increased risk for diseases such as diabetes type II, cardiovascular disease, and hypertension, but more insidious factors of poor dietary health are currently at play in the English population. Of particular concern, and the focus of this PhD, is inappropriate nutrient intake, which

can lead to a whole host of physical and mental health problems (discussed in Chapter 3). Besides altering the quality of life of an individual, such issues relating to diet as obesity and low nutrient intake also contribute to huge costs for the National Health Service (NHS) each year. For example, in the period 2011/12 public expenditure on malnutrition health care in England was estimated to be £19.6 billion (Elia 2015), and in 2015/16 there were 525,000 admissions to NHS hospitals for which obesity was recorded as the primary or secondary diagnosis (Statistics Team NHS Digital 2016).

Poor nutrient intake and diet-related disease in the UK today has been found to be associated with socio-economic status, with low-income groups generally having lower nutrient intakes and higher prevalence of dietary health conditions (see Chapter 2.1 for an overview). This suggests that to overcome major issues of poor health in the UK, there should be a focus on improving diet among low-income groups as well as a focus on the nutritional intake of the whole population. Because of the importance of this topic in modern society, this research focuses on the quality of nutrient intake supplied from the diet of families in England based on their socio-economic status. However, in order to understand the current concerns with dietary health, namely nutrient intake and obesity prevalence, this thesis argues that it is necessary to examine the bigger picture of nutritional health in modern history. As a result this work has undertaken a novel approach to the problem, exploring past and present health using methods, sources, and data from three disciplines; archaeology, history, and nutritional epidemiology.

## **1.1 Aims**

Rather than focusing on the facts and figures concerning nutrient intake in the 21st century English population, which are well established and reported (Chapter 2), this

PhD instead aims to place our current health crisis in the context of changing nutritional health since the 19th century. The central aim of this thesis is to use an informed understanding of the past to provide a critical analysis of modern policies aiming to improve dietary and nutritional health in the UK. To the knowledge of the author, this approach to understanding current nutritional health and its associated policies and legislation is the first of its kind, and due to the complexity of this research there are also subsidiary aims:

1. To establish the trends in nutritional health status of the English population over the 19th century using a variety of historical and archaeological sources.
2. To establish the legislation and events (e.g. famines, political changes, societal changes etc.) which led to the improvement or deterioration of the nutritional health of the 19th-century English population.
3. To establish differences in food consumption between socio-economic groups in the 19th century.

These aims require an approach which is interdisciplinary in order that a comprehensive picture can be formed about the state of nutritional health in the 19th century and the approaches which helped to change it.

## **1.2 Chapter overview**

This is a multifaceted study which investigates the diet and nutritional health trends in the 19th century, the policies in the past and in the present, and the modern health crisis of poor diet. As such it is necessary to examine evidence from a multitude of sources, using techniques from different disciplines, namely history, archaeology, and nutritional



epidemiology. The following chapters present evidence and information from this variety of approaches.

Chapter two, the literature review, provides an overview of past studies on the topics of modern and historical nutritional health and diet, particularly relating to its association with socio-economic status. The purpose of chapter two is to place this thesis within the broader context of nutritional health research, to explore previous work which may have similarities to that presented here, and to identify this research as unique in terms of its approach, aim, and conclusions. The publications covered in chapter two are not intended to be a list of all nutritional health research, but instead are select examples of the extent and types of research already available on this topic. Furthermore, the literature review does not present all of the published work which has been assessed during research for this thesis. A full bibliography of sources cited can be found at the end of this work. The literature review suggests that the research presented in this thesis stands alone in its aims, methods, and conclusions.

Chapter three provides an overview of the role of nutrients in human body function as well as the indicators of particular nutrient deficiencies in archaeological skeletal material. In addition to this, obesity and malnutrition are also discussed. This chapter concludes with a review of the current government policies relating to nutritional health which have been introduced since 2010 and are active at time of writing. Critiques of these policies are included in chapters six to nine in relation to the findings from archaeological and historical sources.

Chapter four will provide information about the methods employed in collecting and analysing each form of evidence from archaeology, history, and nutritional

epidemiology. This chapter is intended to provide information to readers who may be unfamiliar with one or more of the disciplines or forms of evidence used in this research, as well as to provide an overview of the methods on which the conclusions here are based.

Chapter five outlines the welfare which was available during the early 19th century, namely the Poor Law systems, as well as the ideologies of certain key political figures, such as Edwin Chadwick, who directly or indirectly influenced legislative changes. The chapter builds a picture of the movement from the Old Poor Law system of poverty relief towards the introduction of the New Poor Law in 1834, an Act of Parliament which had monumental effect on British culture and society. The New Poor Law introduced huge changes to the lives of the poor, including to their nutritional health, and this period also saw a new form of evidence-based government decision making and accountability, themes which are returned to later in the thesis (in chapter nine).

Chapter six presents the results of the analysis of nutrient intake data collected from two modern dietary surveys, the National Diet and Nutrition Survey (NDNS) and the Low Income Diet and Nutrition Survey (LIDNS). Data for modern households in England were isolated from the NDNS and LIDNS and merged to create one dataset containing nutritional information for 5872 individuals from high- and low-income households. The chapter also presents the results of the analysis of skeletal metabolic conditions undertaken on the skeletal remains from seven cemetery sites (ranging in date from 1712 to 1863). Four of these were from London: Chelsea Old Church (1712-1842); St Bride's Fleet Street (1770-1849); St Bride's Lower (1770-1849); and Cross Bones (1800-1853) (n=1113), all of which are curated and recorded by the Museum of London Centre of Human Bioarchaeology and are now kept in the museum archives (Museum

of London Centre for Human Bioarchaeology 2005a). A fifth cemetery site, St Martin's-in-the-Bull Ring (1720-1863), was located in Birmingham (n=501) and was excavated prior to the construction of the Bull Ring shopping centre in 2001 (Mays *et al.* 2006). This collection has now been reburied, but the detailed results from the osteological analysis were published and the original recording forms made available in the publication appendix (Brickley *et al.* 2006). The final two cemeteries are from the north of England: Coronation Street, located in South Shields (n=135); and Newcastle Infirmary (n=209), which are both curated in the collections of the University of Sheffield Department of Archaeology. The latter, kindly granted the author permission to perform osteological analysis on Coronation Street and to access the full osteological report for Newcastle Infirmary. In total, these sites provide a sample of 1958 individuals. The results of logistic regression presented in this chapter show the association between socio-economic status and the prevalence of both modern nutritional insufficiency and skeletal pathology resulting from nutritional deficiencies. Since the results are not directly comparable due to the differences in the datasets used, this chapter focuses on the wealth-health gap, which is the difference between the nutritional health of groups from high and low incomes. The results suggest that the gap between the nutritional health of high- and low-income groups has increased since the 19th century, the data for which indicated that the prevalence of metabolic disease in the past was similar between high- and low-status groups. Furthermore, prevalence of rickets was found to be higher in high-status 19th-century remains, results which were statistically significant. In contrast, the modern data revealed that individuals from low-socioeconomic households are at higher risk of insufficient nutrient intake today than individuals from high-socioeconomic households, results which were also statistically significant. This section is followed by the discussion and interpretation of the results,

in which evidence is presented to argue that cultural differences between high- and low-status groups in the 19th century led to different levels of disease prevalence. In the final section of this chapter, the modern policies relating to nutritional health and diet during early childhood are discussed in relation to the results from the skeletal analysis and historical evidence.

Chapter seven is the second results chapter, which presents the outcome of the analysis of 19th-century height data collected from criminal records. These records were accessed from the National Archives collection and height was collected for 5371 convicts, consisting of 3117 women and 2254 men born across the 19th century. Using linear splines to perform regression analysis between quinquennial (five year) periods across the century, the results suggest that height for both women and men began to increase in the final 15 years of the 19th century. This is followed by a discussion of the potential causes of changes to height at that time, including diet, disease, wealth, home environment, and work environment. Using historical evidence from written sources, it is concluded that disease prevalence, wealth, and environmental conditions in the home did not show marked improvements which would correlate with the change in average height seen in the convict data analysis. Evidence for diet is found to be inconclusive for this time, due to a scarcity of accurate records for food and nutrient intake. However, working environment for children is found to have been radically improved after 1880, when education became compulsory for all children below the age of ten years. It is argued that by removing young children from deleterious working environments of factories and mines, and placing them into the heavily regulated environment of the classroom, the health of children improved leading to increases in growth from this point onwards. The final section of this chapter discusses the current policies relating to

the nutrient health and diet of older children and the role of schools in regulating child health, in light of the historical evidence presented.

Chapter eight presents the reconstruction of recipes from prison and workhouse dietaries and from a popular 19th-century cookery book, which are interpreted in terms of their nutritional composition and are compared to the nutrient intake of modern low-income groups. This analysis found that although there have been clear improvements in nutrient intake, particularly for nutrients such as vitamins A and C, the amount of sugar added to modern products and recipes has increased up to three times the levels found in 19th-century food. This analysis is followed by a critique of a current policy concerning the government control of sugar in food sold in the UK, supported by evidence of the 19th century diet.

Chapter nine provides further critical analysis of modern policies aiming to improve current nutritional health, drawing on the historical evidence presented in the previous chapters. This chapter focuses on the use of evidence and recommendations in the formation of modern policies involving nutritional and dietary health, drawing on observations of 19th century committees, inspectors, and policies. It is concluded that, similar to the 19th century, the recommendations of committees are largely ignored by policy makers, which leads to detrimental or ineffective policies being implemented. This chapter argues that there should be more accountability and transparency in policy making, and that targets and measures should be present in each new policy or legislation.

This research has a number of conclusions which contribute to historical research concerning food in the past, and also question the effectiveness of modern public health policy, and these are outlined in Chapter ten.

## Chapter 2 Literature Review

This chapter reviews previous research by nutritional epidemiologists, historians, and archaeologists on the relationship between socio-economic status and past and present nutritional health. Although this research incorporates methods and data from three disciplines, from which there are many published studies, previous research adopting a multidisciplinary approach, integrating these disciplinary approaches, is, as will be shown, very rare. There are also few studies that have explored changes in nutritional health over time. Therefore, this chapter will first review studies that have examined the association between nutritional health and socio-economic status in either the present or the past, and will, second, review the far more limited scholarly literature which explores changes to nutritional health over time. Finally, areas which have received little attention by researchers will be highlighted.

This literature review has identified many studies which specifically investigated the role of socio-economic status in modern UK nutrient intake or dietary health. A select number of these are briefly reviewed below to form a representative picture of the available publications, since research on this topic is extensive. Following this, an overview of the relevant historical and archaeological literature concerning nutritional health in the 19th century will be provided. Despite extensive reading during research for this PhD, no studies were found which fully explore the relationship between past and present nutritional health and the association with socio-economic status, confirming the originality of this research.

## 2.1 Present Nutritional Health

There are many relevant publications which explore the relationship between modern nutritional health and socio-economic status, focusing on the association of socio-economic status with the following: general nutrient intake; the risk of being underweight, overweight, or obese; the risk of developing nutrition-related conditions such as cardiovascular disease and diabetes, and height. Two resources which have proved to be particularly useful to studies exploring nutritional health in the UK are the National Diet and Nutrition Survey (NDNS), conducted between 2008 and 2014, and the Low-Income Diet and Nutrition Survey (LIDNS), conducted between 2003 and 2005, both of which gathered data concerning dietary intake from households across the country (Nelson *et al.* 2007; Bates *et al.* 2014b). The most recent NDNS took data from a sample of 8879 households, while the LIDNS collected data from 2477 households. Publications using the LIDNS and NDNS which dealt specifically with socio-economic related nutritional intake in the UK population consistently found that poor diet disproportionately affects low-income groups, and that many such people in the UK have intakes below standard nutrition requirements (Schenker 2003; Church 2007; Damon and Drewnowski 2008; Dowler 2008; Tiffin and Salois 2012). For example, vitamin C deficiency prevalence was found to be higher than previously assumed among the low-income population, according to blood plasma measurements from participants in the 2003-5 LIDNS (Mosdøl *et al.* 2008). Analysis of data from the 1992-3 NDNS also found low iron intake in children to be associated with the low-socioeconomic variables such as household income (Thane *et al.* 2000). Also using these surveys, the nutritional health of children has been found to be impacted upon by the socio-economic status of their parents, as child malnutrition and poor quality diets



during pregnancy mainly affected individuals with low incomes (Nelson 2000; Watt *et al.* 2001). Studies have also used results from other surveys, such as that by Emmett and Jones (2014) which analysed the results of 43 previous studies based on the Avon Longitudinal Study of Parents and Children, a birth cohort study which followed the health of 14,500 Bristol families, concerning the relationship between childhood diet and socio-economic status. This research found that maternal education was strongly associated with childhood nutritional quality (Emmett and Jones 2014).

Other studies have explored the relationship between socio-economic status or income and specific health conditions, consistently finding that low-income is associated with several major health conditions relating to dietary health. Adult obesity has been found to be strongly associated with low-socioeconomic status, based on a sample of 7973 British civil servants (Martikainen and Marmot 1999), the distance between residential areas of different socio-economic status and shops selling healthy produce in Birmingham (Shaw 2012), data from 10,137 participants of a health questionnaire (Conklin *et al.* 2013), from 15,632 individuals from the UK Household Longitudinal Survey (Davillas and Benzeval 2016) and data from the Health Survey for England which involved 47,398 adults in one study (Ulijaszek 2014) and 26,898 adults in another (Booth *et al.* 2017). Furthermore, children whose mothers attained low levels of education were more likely to be either underweight or overweight according to two studies which used data from the Millennium Cohort Study (Pearce 2015; Hesketh *et al.* 2016). Using data from a sample of 33,594 children from areas in Leeds, UK, one study found obesity to be highest in both the most deprived and the most affluent wards, and was associated with low fruit and vegetable consumption, household ownership of more than one television, internet access, and low food expenditure (Edwards *et al.* 2010). Obesity was also found to be negatively associated in this study with access to

supermarkets and leisure facilities, and the purchase of school meals (Edwards *et al.* 2010). A second study used data from 13,988 children born between 1991 and 1992 to explore trends in adiposity from birth to ten years of age (Howe *et al.* 2010). This research found that socio-economic differences in overweight began around the age of four years with patterns emerging around seven years, with lower maternal education associated with increased BMI in children (Howe *et al.* 2010). Similarly, studies using data from the National Child Measurement Programme (Conrad and Capewell 2012), data from 11965 children aged five years and 9384 children aged 11 years from the Millennium Cohort Study (Goisis *et al.* 2015), and an analysis of 23 previous studies (El-Sayed *et al.* 2012) all found that childhood obesity was associated with low socio-economic status.

Women living in areas with high levels of deprivation have been found to be at greater risk of cardiovascular disease than individuals from more affluent backgrounds based on a sample of 4286 women living in areas with different scores of deprivation (Lawlor *et al.* 2005), and on data from 505 female prisoners in England (Plugge *et al.* 2009).

Diabetes has been found to be associated with low-socioeconomic status and low wealth, based on studies of 7433 (Demakakos *et al.* 2008) and 9000 adult men and women (Tanaka *et al.* 2012), and through the analysis of 35 previous papers (Everson-Hock *et al.* 2013).

Finally, much research on the relationship between socio-economic status and height has been undertaken previously. Using data from 12,366 children from the Avon Longitudinal Study of Parents and Children it was found that child birth length for British children is smaller in babies from low-income families than those from high-income families, and that this difference in height continues throughout life (Howe *et al.*

2012). Additionally, research on the height data recorded in the UK Biobank for 12,0286 individuals found that taller stature was strongly correlated with a higher household income, particularly for men (Tyrrell *et al.* 2016). However, it was found that there was a genetic component of taller height at play in this association, suggesting causation between height and income (Tyrrell *et al.* 2016). Using two British birth cohort studies with a total of 17,549 individuals, Case and Paxson (2008) found that the heights of boys are positively associated with the economic status of their fathers, and that height is associated with cognitive test scores for both boys and girls during early childhood.

The range of research described above highlights the association between socio-economic status and nutritional health in the UK, and also the extent to which this topic has been explored. Considering the prevalence of research about dietary health, our continuing poor nutrient intake is at odds with the information about good nutrition which is freely available.

## **2.2 Historical Nutritional Health**

Unlike modern nutrition research, research relating to historical diet and nutrient intake is considerably less extensive. However, some studies have been published which examine aspects of the general nutritional health and diet of the English population during the 19th century. Carpenter (2006) analysed the calorie and protein intake allowed in some 19th-century prison dietaries, although since these were designed for those convicted of committing a crime we cannot say that they were representative of the diet consumed in British households. Oddy (1970a; 1970b) attempted to reconstruct calorie and nutrient intake of 19th-century labourers using data detailing income and

food consumption collected by various surveys, including those poverty surveys by Booth and Rowntree, based on the intakes of modern men. He concluded that the calorific needs of working-class families were not provided for in the majority of cases (Oddy 1970b). However, other research has challenged this notion of insufficient dietary intake for working-class labourers.

Clayton and Rowbotham (2008a; 2008b; 2008c; 2009) argued the opposite of Oddy, that nutritional health for the working class during the 19th century was superior to that generally consumed in Britain today. The data used in this study was based on life expectancy (excluding infants), levels of physical activity, and weekly menus for a range of incomes, and they concluded that the degradation of diet to the level of the modern day was due to the introduction of processed food from the end of the 1870s (Clayton and Rowbotham 2008c; Clayton and Rowbotham 2009).

More recently, Gazeley and Horrell (2013) and Gazeley and Newell (2015) have written extensively on the subject of urban and rural working-class nutrition. Gazeley and Horrell (2013) took details of diet from working-class budgets collected across the 19th century by social commentators concerned about the Poor Law, by Government Commissioners in preparation of various reports, and by individuals conducting surveys. Gazeley and Newell (2015) focused more specifically on one source of dietary data from the Board of Trade enquiry, which collected data on the income and food expenditure of working-class families in 1904. Both studies estimated sufficient calorie and nutrient intake for the physical requirements of men based on the height estimations made previously by Floud *et al.* (2011). These studies found that for most of the working classes, both urban and rural, food consumption and nutrition was adequate for

their physical needs, and that an improvement in nutritional health occurred between 1830 and 1900 (Gazeley and Horrell 2013; Gazeley and Newell 2015).

Horrell and Oxley (1999; 2013), and Meredith and Oxley (2015) also examined household food consumption, but focussed instead on intra-household food allocation using data from household budgets and body weight and height measurements. Neither study found strong evidence for a gender bias in the preferential allocation of resources within the 19th-century home, but instead identified an earner bias, where the breadwinner and main income supporters would receive higher rations (Horrell and Oxley 1999; Meredith and Oxley 2015).

There has been extensive research into the per capita consumption of various food products based on the wage levels of the time (Clark *et al.* 1995) and a prolonged debate about the standard of living during the 19th century. This debate runs parallel to the research presented in this thesis, and was sparked by McKeown's 1976 thesis (which followed from his and Record's (1962) paper) which concluded that there was no evidence that the increase in population was due to an increase in birth rate caused by a "withdrawal of restraints on fertility", and states instead that there was unlikely to have been an increase in fertility during this period (McKeown 1976, 158). He argued that the decline in mortality was due to a reduction in deaths due to infectious disease, but that this decline in death from infectious disease could not have resulted from a change in the diseases themselves, since they were not influenced by medical intervention until 1935 (McKeown 1976). McKeown argued that there could be only one other explanation for the increase in population size – improvements to environmental conditions – and that this was a result of the improvements made to nutrition due to better food supplies (1976). This conclusion was based on two points. The first was that

there was an increase in food production and supply during the 18th and 19th centuries, and the second was that improved food supply was a “necessary condition for a substantial and prolonged decline of mortality and expansion of population” (McKeown 1976, 158). The most vocal opponent in this debate is Simon Szreter (1988), who argues instead that the rise in population was due to the public health movement of the 19th century, particularly sanitation schemes like sewage systems. Many others have suggested a pessimistic view of 19th century “progress”, particularly for infants and children, including (Hobsbawm 1957; Thompson 1980; Feinstein 1998).

Although the debate about standards of living relates in some ways to diet, it does not solve the aims of the current thesis since it questions whether better nutrition improved standards of living during the 19th century, rather than what factors affected nutritional health. The dataset McKeown (1976) and Szreter (1988) used was not incorporated into the aims of this thesis purely because population growth is not a sensitive indicator of nutritional health changes. This is firstly because, as shown in the debate which continues to this day (Szreter 2002), population growth can be interpreted as being caused by a variety of related factors such as infectious disease control, advances in public health, food supply, quality and quantity of food, hygiene, and occupational roles among others. Secondly, population growth as data cannot relate directly to individuals, since it represents an entire population. There is no personal data included in figures about population which could attest to the environmental or nutritional quality of the people in that population, hence the ensuing decades long debate over the meaning of this data. As a result of this, it is necessary to look further than population data, at data which relates directly to individuals such as metabolic disease rates from archaeological samples and adult attained height from historical records. Because these data are directly related to individuals they are far more sensitive to such factors as

environmental and nutritional health than simply how many people exist within a population. The standard of living argument not only remains unresolved, but it also does not engage with any of the potential factors which could have caused the improvement in nutritional health that McKeown (1976) claims led to the growth of population.

More specific examinations of the diets of various 19th-century groups have been conducted. Dietetic analysis of the food available to children within workhouses, for example, has been performed by Smith and Thornton (2008). This analysis used the official workhouse dietaries ordered by the Poor Law Board in 1836, which were in use in many workhouses during the 19th century, and concluded that the nutritional intake available from these dietaries would have sustained growth in children (Smith and Thornton 2008). Reynolds (2016) presents some data for workhouse infant dietaries in her research exploring the childcare practices of working-class northern families. Also concerning the diet of children, Davin (1996b) used accounts recorded in 1863 by Dr Edward Smith in his survey of the labouring classes, to argue that far from the home being the only source of food, for many families there were multiple sources of cheap meals on the streets of 19th-century London. In addition to this, the prevalence of particular diet-related health conditions has received some limited attention, such as gout which resulted from increased sugar intake between 1650 and 1900 (Rivard *et al.* 2013) and the emergence of diabetes type II in both wealthy and poor individuals between 1800 and 1950 (O'Donnell 2015). Finally, analysis has been conducted on the isotope ratios present in 19th-century, working-class skeletal remains, to establish weaning practices at that time, which revealed that babies were generally weaned before six months of age (Nitsch *et al.* 2011; Henderson *et al.* 2014). This research is based on the now well-understood principle that analysis of carbon and nitrogen isotope ratios in

bones and teeth can indicate the types of food consumed by individuals during life, and comparison of the isotope ratios of adults and children from the same burial contexts indicate feeding practices and weaning times (Katzenberg 2008). Although all of these studies concern diet or nutrient intake, none of them explicitly explore the relationship between socio-economic status and diet.

### **2.3 Osteoarchaeological data**

The previous research which explored the relationship between socio-economic status and nutritional health in the 19th century have involved osteoarchaeological data and methods, but have returned mixed results. In one study, measurements of 403 child skeletal remains from high- and low-status burial sites in London found no differences in tibial length or cortical thickness of the femora between social classes, however transverse diameter of the neural canal in the vertebrae was found to be smallest in remains from low socio-economic status contexts (Newman and Gowland 2016). A similar study of status in 19th-century skeletal remains and prevalence of dental caries also found no association with social class based on a sample size of 168 individuals (Mant and Roberts 2014). However, in a study of 279 adult skeletons recovered from two London cemeteries (one high-status and one low-status), femoral length was found to be longer in high-status females than in low-status females, but no differences were found between males (Hughes-Morey 2016). Analysis of 19th-century skeletal remains from Birmingham found that low-status individuals had lower femoral bone thickness for age, suggesting a lower quality of nutrition among these individuals during life (Mays *et al.* 2009). However this study was only performed on 44 individuals, and just five of these were from high-status burials, so these results may not be representative of the wider population. In a comparison of mortality between 474 19th-century skeletal



remains from the low-status burial ground at St Bride's Lower and 394 from high-status Chelsea Old Church cemetery, both in London, DeWitte *et al.* (2016) found reduced survival rates in low-status children in comparison to high-status children, but no difference between the adult remains. These results create an insight into the health profiles of 19th-century adults and children from differing socio-economic status, but the underlying causes behind such differences or similarities in the results has not been determined conclusively.

As well as archaeological research into body measurements, the association between socio-economic status and nutritional health has also been explored using historical sources. Height as an indicator of health and quality of life in the 19th century has been extensively discussed, mostly using historical data from army and marine recruits (Floud and Wachter 1982; Floud 1984; Floud *et al.* 1990; Floud *et al.* 1993; Komlos 1993; Floud and Harris 1996; Floud 1998; Floud *et al.* 2011; Sharpe 2012; Treme and Craig 2013; Bailey *et al.* 2016). These studies collated the body measurements of men and boys from armed forces records who were born across the 19th century, and presented the trends in average height of 19th-century men. However, since army and marine records were the only sources used in these studies, the data is not representative of the general population due to the height restrictions in place for recruits. In addition to male data, information for women's heights has been collected from convict data and trends in female average height have also been produced, but these only exist for the first half of the 19th century (Nicholas and Steckel 1991; Nicholas and Oxley 1993; Johnson and Nicholas 1995; Johnson and Nicholas 1997).

Some publications have approached the issue of nutritional health among low-income groups using a combination of historical and modern data (Carroll *et al.* 1996; Davey

Smith and Brunner 1997; Deeming 2010). Davey Smith and Brunner (1997) examined trends in mortality statistics by social class from British censuses collected between 1840 and 1980, pointing to nutritional health as the factor affecting higher mortality among low-income groups. Carroll *et al.* (1996) observed similarities between the role of socio-economic status and health in the 19th century and 1990s. However, this correlation only received a passing mention and was based on a range of historical data from different countries (including the association in one 19th-century cemetery between age at death and cost of burial according to headstone height), and did not specifically concern nutritional health. Deeming (2010) examined the use of family food budgets between the 17th century and the 21st century, but focused more on the methodology and potential uses of such budgets than on the information contained within them. A project at the University of Leeds, ‘You are what you ate’ (McCleery *et al.* 2010-2014), combined research in food science, nutrition, medical history, and archaeology with the aim of producing educational information about food intake, but did not involve comparisons of food intake according to socio-economic status. No publications have been found which look specifically at trends in nutritional health differences between socio-economic groups, since there are no studies investigating the quality of diet for the wealthier classes of 19th-century society. Furthermore, to the knowledge of the author there are no other studies which aim to critically examine modern nutritional health policies based on evidence of past changes to nutritional health.

## **2.4 Gaps in the previous research**

Although the research into nutrient intake across the 19th century was undertaken by Gazeley, Horrell, and Newell (Gazeley and Horrell 2013; Gazeley and Newell 2015),

the measure of nutritional adequacy is marred by a reliance on height measurements which are from unrepresentative samples of male military recruits. Energy requirements for a man of average stature across periods of the 19th century are reported by Gazeley and Horrell (2013, 767), however these were based on average heights established by Floud *et al.* (2011) from the measurements of army and marine recruits, and are therefore not representative of the general working-class population due to the height restrictions in place for recruits at that time.

Another obvious problem with previous accounts of nutritional health for the 19th-century population is that the requirements of women based on their physical measurements was not addressed. Gazeley and Horrell (2013, 773) suggest that women need around 75% to 100% of the nutritional requirement of men depending on health status and physical activity, but beyond this the actual status of women's nutritional health was not determined. Presumably the smaller stature of women, as well as the less physical occupations they may have had, would lower the level of nutrition required for adequacy, although pregnancy, breastfeeding, and different types of labour are likely to affect how much food women required (Gazeley and Horrell 2013). Furthermore, the diet of children, other than being assumed to be similar to that of their mothers, has not been fully examined by any researchers. Nutrient intake and environment during development, particularly during the first two years of life, is important for the survival and health of the adult (Perkins *et al.* 2016), and when families would frequently contain more children than adults, these young people would have been a noticeably large proportion of the population. However in most research about the 19th century, children are conspicuously absent from data and from discussion. Indeed, none of the studies discussed above include detailed reconstruction or discussion of children's diet, with the exception of Smith and Thornton (2008), who provided analysis on a small

number of dietaries, and Davin (1996b), who discussed food availability but did not attempt to reconstruct the nutritional quality of the diet.

To address the absence of data regarding the nutritional health of women and children, new data for the average heights of women and men born between 1800 and 1900 will be included in this thesis, collected from the National Archives convict records by the author (see Chapter 7). The inclusion of this data will benefit analysis of past nutritional health in two ways. Firstly, it provides good measures of average height for both sexes, removed from issues of height restrictions which affect armed forces records, on which estimates of sufficient nutritional requirements can be made. Secondly, trends in height across the 19th century can be ascertained, which could suggest changes to the nutritional or environmental health of cohorts of children. Particular effort was made to include height data for women, and this thesis presents a more comprehensive picture of trends in women's height across the entire 19th century than previous datasets presented by researchers, the majority of which have been based on military recruit heights. In addition to this, historical evidence for common infant feeding practices is explored in this thesis, and details relating to the diet of children, including transitional periods, for example weaning and introduction to adult diet, for children from both high and low income households is discussed.

There have been few attempts to analyse the nutritional content of the dietaries implemented in 19th-century workhouses and prisons, beyond the study performed by Smith and Thornton (2008). This is surprising considering the existence of extensive records detailing the meals provided to prison and workhouse inmates across the country, which often detail the exact amounts that were intended to be served. These records exist for institutions in each county of England and for most decades of the 19th

century, and therefore they potentially offer valuable insights into the nutritional health of inmates. This thesis will present analysis of a sample of prison and workhouse dietaries from institutions across the country which were in use during many decades of the 19th century (see Chapter 8). The analysis indicates the sufficiency of the diet for men, women, and children provided by these institutions.

As well as the potential for further historical research into 19th century nutritional health, this thesis will work with stronger evidence from archaeological sources. As discussed above, the majority of research concerning nutritional health and dietary habits as evidenced by skeletal remains focuses on collections from London, aside from one study on a small sample from Birmingham. This allows for the possibility that the results produced thus far about nutritional deficiency in the 19th-century population is not representative of England, but only of London. Further work is clearly required to expand this analysis beyond the population of London, and this thesis will provide both a larger sample and will include skeletal remains from the north of England (see Chapter 6). The advantage of archaeological analysis of this kind is that deficiency during childhood is represented. Moreover, the research presented here also aims to provide greater insight into nutrient deficiency beyond the working classes, by including skeletal remains from burial sites associated with higher socio-economic status.

This literature review has suggested that there is existing research upon which further studies can be built concerning working-class childhood nutrition, dietary reconstruction, and the nutrient sufficiency of the low-income population. This is not the case for other parts of society, as the wealthy, high-status individuals, or even the middle classes have received little attention from researchers. Evidence for people of

wealth during this time is mostly confined to articles from parliament, which rarely gives any account of their lives. Women and children would have contributed to well over 50% of the upper class population, and yet little is known about their health and wellbeing. Recent research exploring the diet of Queen Victoria sheds some light into the types of food consumed by the wealthiest and most privileged woman in society (Gray 2017). In this research, the huge quantities and variety of food available to Queen Victoria and British nobility is discussed based on historical records from the Regent's life (Gray 2017). However, factors such as the equipment and staff available in palace kitchens, the influences of international cuisines, ability to dine in restaurants and locations across Britain and the world, and the huge wealth which would have allowed access to quantities and quality of food make Queen Victoria's diet not necessarily representative of average upper-class British families.

Without evidence for the diet of society's wealthy groups, assumptions should not be made about their nutritional health. In a time when the study of nutrition was dominated by the theory that nitrogen was the vital component of human diet, before many vitamins and minerals had even been discovered, the dietary advice communicated to those who could afford to follow it may not have been beneficial. Investigations of the diet of such wealthy groups in 19th-century England have predominantly been archaeological in nature, with data from the skeletal remains of high-status individuals used as comparative material for low-status remains (Mays *et al.* 2009; Mant and Roberts 2014; DeWitte *et al.* 2016; Hughes-Morey 2016; Newman and Gowland 2016). The challenge to identifying the nutritional quality of the high-status 19th-century diet is that there are no set dietaries for these people. Accounts of the specifics of wealthy meals are rare outside of cookery books, and we cannot be sure whether the majority of families would have followed such menus or recipes in their own routines. However,

included in popular cookery book *Mrs Beeton's Book of Household Management*, originally published in 1861, are a range of breakfast, lunch, and dinner menus for the summer or winter months, “economical” choices, and ideas for both simple gatherings and for large parties (Beeton 1907, 1720-1750). The number of recipes and the variation in meals consumed by the upper classes as listed in these suggested menus illustrates that food, then as now, was not only vital for maintaining bodily health but was a key social aspect of 19th-century life. Of particular interest for research exploring nutritional health are those menus for small family meals, of which there are multiple for each meal of the day described by Mrs Beeton. Analysis of the simple and economical meals presented by Mrs Beeton will be performed (see Chapter 8), identifying the calorie and nutrient composition which would have been available per day if a family had eaten such recipes.

This chapter has reviewed the range of existing literature on the topic of nutritional health in the UK, pointing to a large body of previous work on modern nutrition. Although extensive research has and continues to be performed on modern nutritional health, there are few studies on nutrient intake and diet in history. Furthermore, there are very few examples of research which uses both historical and archaeological evidence, and almost no research on the diet of the upper classes in 19th-century Britain. Despite there being many previous studies into nutritional health during the 19th century, there is still great potential for further research into this topic. The literature concerning modern nutritional health reviewed in this chapter reveals that modern diet for low-income groups is far from ideal or even adequate in the UK, despite our extensive knowledge about healthy diet. There are important questions that historical research can pose about modern health. What were the turning points in history which improved or degraded the diet of the modern population? What can we as

a society learn from our past achievements and failures which can benefit public health today? The analysis and research into historical diet will provide an indication of the change which has occurred to nutrient intake since that time for both the wealthy and the poor. The potential causes of these changes will be discussed, and modern policy will be appraised in light of this evidence.



## **Chapter 3 Nutritional health and Modern Policy**

Any investigation into nutritional health needs first to develop a thorough understanding of the roles of the various key vitamins and minerals in the human body in order that the seriousness of deficiency can be assessed. Since this thesis is based on a combination of historical and modern evidence and uses information to establish nutritional deficiency, the following chapter presents brief overviews first of malnutrition and obesity, then of the metabolism and function of vitamins and minerals. As well as information about the nutrients themselves, the appearance in human skeletal remains of several types of conditions relating to them is also discussed. Vitamin D (with relation to calcium and phosphorous), vitamin C, and iron are deficiencies that can be observed in archaeological skeletal remains, and these will be discussed separately. Following this, an overview will be given of the remaining key vitamins and minerals. As we will see, nutrient deficiency in the modern world is still a major problem, even in developed countries such as the UK. Considering the number of government interventions into public dietary health since the 19th century, these detrimental levels of nutrient intake in varying proportions of the population suggest that the problem has not been solved, and that UK diets must be reformed to promote both a healthier future for generations of people and to also reduce costs for the National Health Service. This chapter will conclude with an overview of the current government policies concerning nutritional health in the UK.

### **3.1 Malnutrition**

Malnutrition (referred to here as synonymous with undernutrition) occurs when nutrient intake is consistently insufficient to meet the physical requirements of the body

(Skipper 2012), and this can occur due to a number of factors; an inadequate diet, altered nutritional requirements, increased energy expenditure, or reduced function of the digestive system (Saunders and Smith 2010). The consequences of malnutrition on the body are numerous, and as well as the effects of individual nutrient deficiency (outlined in previous sections) is also has an impact on every organ system (Saunders and Smith 2010). During malnutrition, due to the decrease in nutrients entering the body, reserves stored in muscles, adipose tissue, and bones are absorbed for use in vital physiological functions, and over time this can result in problems such as muscle wasting and weakened bones (Saunders and Smith 2010). The scale of micronutrient malnutrition worldwide is huge, affecting an estimated 2 billion people, or 29% of the world's population (International Food Policy Research Institute 2016). Contrary to popular understanding, this is not a problem confined to developing countries, and in the UK alone at least 2 million people are estimated to be affected by malnutrition (Malnutrition Advisory Group 2016).

Infectious disease is both a cause and a result of malnutrition, and the two are intricately linked (Bhaskaram 2002). As discussed above, certain nutrients (for example, zinc, vitamin A, vitamin B12) are known to have vital roles in maintaining a functional immune system, and a reduced intake of these can result in heightened susceptibility to infectious disease. Contrary to this, infectious disease can have a detrimental effect on nutritional health, as diarrhoea or malabsorption can decrease nutrient intake, and the nutrients which are processed must be channelled for use in the immune response (Katona and Katona-Apte 2008).

The relationship between nutritional health and immunity and disease and malnutrition is circular, both being the cause and effect of the other. But both disease and nutrition

play a key role in human growth, and during childhood both of these factors can influence the outcome of adult attained height. Nutrition is the most important factor influencing childhood growth, since deficiency in nutrients such as zinc, vitamin A and D (discussed previously), and most importantly protein can lead to stunting (Perkins *et al.* 2016). Disease, as it is so closely linked to nutrition, results in similar effects on overall attained height, and the relationship between these factors and height is summed up perfectly by Perkins *et al.* who conclude that “In sum, adult height represents the balance between nutritional intake and losses over time, including losses due to physical activity, psychological stress, and disease from conception to maturity” (Perkins *et al.* 2016, 150).

### **3.2 Obesity**

According to the World Health Organisation (WHO) overweight and obesity are defined as “abnormal or excessive fat accumulation that may impair health”, and these two conditions are frequently diagnosed using the Body Mass Index (BMI) calculation tool where  $\frac{\text{Body weight kg}}{\text{height m}^2} = BMI$  (World Health Organisation 2016). In 2013 an estimated 2.1 billion people worldwide were overweight, 671 million of which were obese (Ng *et al.* 2014). In England, 63% of the adult population (over 16 years of age) were found to be overweight or obese in the 2015 Health Survey for England (Moody 2016). The reality of simply weighing more is one of the health risks of overweight and obesity, as bones and muscles are put under excess strain during loading, and osteoarthritis can develop in the knees and ankles of overweight individuals (Bray 2004). Furthermore, altered pressure on the abdominal surface due to excess weight can obstruct the movements of the diaphragm and can result in sleep apnea (Bray 2004).

The presence of an increased number of enlarged fat cells is associated with Type 2 diabetes mellitus, non-alcoholic fatty liver disease, hypertension, heart disease, a range of cancers, infertility, and ultimately in a higher risk of premature mortality (Bray 2004).

Although it is often assumed that since obesity is commonly the result of an excessive diet the nutritional intake of overweight and obese people must meet recommended levels, this is far from the reality. Research has found a high prevalence of various nutritional deficiencies, particularly vitamins, in overweight people (Kaider-Person *et al.* 2008b; Kaider-Person *et al.* 2008a). The consumption of high energy, empty calorie foods with little nutritional value is the leading cause of the malnourished obesity crisis.

### **3.3 Vitamin D, calcium, and phosphorous**

Vitamin D is produced within the body when 7-dehydrocholesterol within the epidermal layer of the skin is synthesized by the action of UV light, most commonly from sunlight, breaking the B-ring of the compound and forming previtamin D<sub>3</sub> (Bikle 2014). Processes in the body ensure that the plasma calcium concentration level is constantly maintained with a supersaturation of bone mineral, calcium and phosphate, and if this concentration level becomes less than saturated then bone mineralization fails, leaving soft osteoid bone as the main supporting structure (DeLuca 2004; Brickley *et al.* 2018). Since osteoid in healthy bones acts to allow certain flexibility, failure to mineralise these structures during development leads to bones which bend under the weight of the body and the appearance of rickets in children (Ortner 2003; Brickley *et al.* 2018; Watts and Valme 2018). In adults, since the bones have already developed, failure to develop new mineralised bone results in osteomalacia, characterised by large areas of

unmineralised matrix (Ross *et al.* 2011; Ives and Brickley 2014; Brickley *et al.* 2018). Therefore diminished exposure to UV light, which prevents this long process of calcium retention in the bones, is the most common cause of vitamin D deficiency.

Due to the role of vitamin D and associated processes involved in calcium absorption, developmental rickets can be identified in archaeological skeletal remains with relative ease, unlike some other types of metabolic conditions, due to its unique effects on the size and shape of long bones during active deficiency and the retention of these characteristics after recovery and in adulthood. Rickets can be identified in several skeletal elements of the body, namely the long bones, and typically the femora and tibiae. Excessive osteoid deposition on the periosteal (membrane covering the outer surface of bones) and endosteal (membraneous lining of the inner surface of bones) surfaces of the long bones results in a thickened appearance, and the bones bending due to the undermineralised nature of the rachitic condition creates the two most distinctive features of childhood vitamin D deficiency (Ortner 2003; Brickley *et al.* 2018; Watts and Valme 2018). Late dental eruption and enamel disruption can also occur, although these defects usually indicate long-term metabolic stress and cannot be used as definitive signs of vitamin D deficiency in isolation (Aufderheide and Rodriguez-Martin 2011; Brickley *et al.* 2018). Osteomalacia weakens the structure of bones as the bone matrix deposited during remodelling remains as uncalcified osteoid and this results in a decrease in bone density and eventually, if the deficiency persists, in fractures in mechanically stressed areas and subsequent spicular bone (Ortner 2003; Brickley *et al.* 2007; Ives and Brickley 2014; Brickley *et al.* 2018; Watts and Valme 2018). Although these signs in the archaeological remains of adults and children are good indicators of vitamin D deficiency, it must be acknowledged that they result from only the most severe and prolonged cases. Having a blood hydroxyvitamin-D level less than 20 ng/mL

(nanograms per millilitre), the measure of insufficiency today, will not instantly result in signs of rickets or osteomalacia in an individual, so the absence of pathology in archaeological remains does not necessarily mean adequate vitamin D levels were maintained during life.

Recent research suggests that vitamin D deficiency is a worldwide pandemic which is affecting even those populations in regions of the world with consistently available high levels of UV light (Holick 2006; Holick and Chen 2008). The resulting risk of osteomalacia from vitamin D deficiency can cause many problems for adults, particularly in older life, as weakened bones increase the risk of fractures from falls, and a deficiency has been shown to contribute to hip fractures (Lips 2001). Individuals with higher melanogenic activity, depending on the size and number of melanosomes (the organelles in skin cells responsible for producing different types of melanin), are more at risk of vitamin D deficiency as melanin is deposited within the perinuclear space of the keratinocyte cells in the epidermis and is thought to act as a protective layer between DNA and incoming UV light (Brenner and Hearing 2008). The protective nature of melanin is extremely successful in limiting skin damage from UV rays, however in regions with less sunlight this same function can cause problems since it may severely limit the absorption of UV photons by 7-dehydrocholesterol (Brenner and Hearing 2008). Clothing and sun cream act in a similar way as they both function to block UV light from reaching the epidermis, and skin protection or cultural practices in which the skin is covered are also risk factors for reduced vitamin D levels. A study testing over 7000 middle aged, white individuals of both sexes found 15.5% to have blood 25-hydroxyvitamin D levels less than 25 nmol/L in the winter and spring months and 3.2% in summer and autumn (Hyppönen and Power 2007). Further research into modern deficiency in ethnic minority groups found high risk in South Asian and Afro-Caribbean

British men, with 40% and 14.1% suffering from severe deficiency respectively (Patel *et al.* 2013). Clearly vitamin D deficiency is not an issue unique to the 19th century, with a high proportion of the modern population showing insufficient levels of this vital vitamin. Not only is this detrimental to individuals' lives, health, and wellbeing, but the complications resulting from this will ultimately contribute an unnecessary strain on the resources, staff, and finance of the National Health Service. It is for these reasons that in 2016 Public Health England advised the government that daily dietary intake of vitamin D should be 10 micrograms, and suggested that individuals who have limited exposure to the sun should take a supplement throughout the year (Bolland *et al.* 2016; Public Health England 2016c).

### **3.4 Vitamin C**

Humans are among a small selection of species which are unable to synthesise vitamin C, also referred to as ascorbate, and therefore rely on dietary intakes of the nutrient. Ascorbate acts in the body to accelerate hydroxylation reactions in the biosynthesis of a number of macromolecules (Levine 1986) and also to limit oxidative damage posed by free radicals produced by biological processes within the body or introduced from external sources (Hacışevki 2009). The most recognised role of ascorbate is as a cofactor for prolyl and lysyl hydroxylase, both of which are enzymes involved in the stabilisation of collagen (Levine 1986). Collagens form the main component of many parts of the body, including skin, bone, teeth, tendons and ligaments. When collagen is synthesized, the amino acids proline and lysine are hydroxylated by prolyl and lysyl hydroxylase to form hydroxyproline and hydroxylysine, which are both required for the formation of the stable, triple helix structure of collagen (Hacışevki 2009). This triple helix structure is vital for the physiological effectiveness of healthy collagen, and it can

only be achieved if ascorbic acid is available to act as a hydroxylation cofactor. The absence of ascorbic acid within the body does not halt the formation of collagen, but the resulting fibres are abnormal and this leads to the characteristic skin lesions, tooth loss, blood vessel fragility, and delayed or absent wound healing which characterises scurvy (Hacışevki 2009). Since approximately 90% of bone is composed of type I collagen (Proff and Römer 2009), abnormal structures due to the reduced presence of ascorbic acid has been found to lead to reduced bone formation which results in thin and fragile skeletal elements (Hasegawa *et al.* 2011). Subperiosteal haemorrhage, which is characteristic of vitamin C deficiency as the blood vessels become weakened, can also lead to abnormally porous structure which can cause a separation of the periosteum from the bone cortex in infants (Ortner and Ericksen 1997; Aufderheide and Rodriguez-Martin 2011).

Low vitamin C intake is still a problem in the UK, particularly amongst individuals who are materially deprived. Research in 2008 found that 25% of 433 men and 16% of 876 women with low-incomes were deficient (Mosdøl *et al.* 2008). Vitamin C deficiency does not necessarily equate with scurvy, which has been found to be increasing in recent years with cases admitted to hospital rising from 94 in 2014 to 113 in 2015, however these physiological changes resulting from advanced and severe deficiency remain extremely rare (Winter 2015). Within Europe the majority of individuals diagnosed with scurvy have a history of alcoholism, mental health issues (including eating disorders), and often live in social isolation, and these factors may also explain the high prevalence of deficiency in low-income groups (Chaudhry *et al.* 2005). Similar to vitamin D deficiency, having low levels of ascorbic acid can result in weakened bones which are susceptible to fractures when placed under stress. Furthermore, vitamin C has also been linked with other aspects of bodily health, and research has revealed that the risk of



mortality in individuals with sufficient levels of this vitamin is halved compared to individuals with deficiency (Khaw *et al.* 2001). An analysis of eight previous studies, with a total sample of over 250,000 individuals, also found that increased fruit and vegetable intake is associated with a decreased risk of stroke (He *et al.* 2006). Vitamin C should be easily obtained from the diet, and as such it is common that individuals deficient in this nutrient will also have insufficient levels of other vitamins and minerals.

### **3.5 Iron**

As a dietary trace element, iron is absorbed in the body from enterocyte absorptive cells in the small intestine (Winter *et al.* 2014). Iron plays several significant roles in the body, particularly relating to the development and maintenance of bones. The development of the triple helix structure of collagen is reliant on iron as a second cofactor, along with vitamin C, for the hydroxylation of prolyl and lysyl (Toxqui and Vaquero 2015). Iron also plays a role in the hydroxylation of vitamin D into 25-hydroxyvitamin D and calcitriol (Toxqui and Vaquero 2015), which are vital processes for the maintenance of skeletal elements as described above. Deficiency in iron can also lead to a state of hypoxia, a reduction in oxygen supply to tissues, which can occur in anaemia as iron is an essential component of haemoglobin in red blood cells (Toxqui and Vaquero 2015). The function of osteoblasts, cells which secrete bone matrix during the continuous remodelling process, bone formation, and collagen production are all severely inhibited by a state of hypoxia (Utting *et al.* 2006). Excess iron has also been found to inhibit osteoblast function in a similar way that severely low iron does, although most people can regulate their iron levels (Zhao *et al.* 2012). Iron deficiency anemia has long been reported to be visible in human skeletal remains through the

condition cribra orbitalia, which is a lesion in the orbital bone (Stuart-McAdam 1991; Lewis 2002). Others have argued that this condition is actually a response to vitamin B12 deficiency and infectious disease causing poor absorption of nutrients (Walker *et al.* 2009), but it is generally agreed that cribra orbitalia is a result of nutrient deficiency.

Most population groups in the UK have adequate iron intake from their diet with no need for supplements, however young children aged 1 ½ to 3 ½ years, girls aged 11-18 years, and women aged 19-49 were frequently found to have intakes below 90% of the Reference Nutrient Intake (RNI) for this nutrient (73-81%, 60%, and 66-87% of the RNI respectively) (Scientific Advisory Committee on Nutrition 2010). These same groups were also found to have large proportions of people below the Lower Reference Nutrient Intake (LRNI), with children aged 1 ½ to 3 ½ meeting only 12-24%, girls aged 11-18 only 44-48%, and women aged 19-49 just 25-40% of the LRNI for iron (Scientific Advisory Committee on Nutrition 2010). The many women at risk of deficiency is a particular public health problem, as there is evidence that low levels of iron during pregnancy can increase risk of preterm delivery, low birth weight, and deficient iron status in new born infants (Allen 2000). Furthermore, research has suggested that iron deficiency in infants and children can lead to long-term developmental and behavioural cognitive deficits, although separating iron intake from potentially associated social factors, such as low-income, poverty, developmental environment, the nutritional quality of meals, and intellectual stimulation, makes it difficult to be conclusive about the role of iron and cognitive function in infants (Lozoff *et al.* 2006; Baker and Greer 2010).

### **3.6 Other Vitamins**

Vitamin A, or retinoic acid, is the name given to any compound which contains biologically active retinol and is an essential nutrient for most animals (Blomhoff and Blomhoff 2006). Vitamin A is efficiently absorbed through the healthy intestine and can therefore be easily obtained from a balanced diet (Moise *et al.* 2007). Retinoic acid has been found to enhance the host immune response to tumours (Dennert and Lotan 1978), increase T lymphocyte production, and to inhibit B lymphocyte apoptosis (cell death) (Mora *et al.* 2008). It is through these means that vitamin A is responsible for maintaining the immune system and aids in boosting lymphocyte response to cancerous tumours. Vitamin A also has an important function in the visual process, as retinal linked with opsin forms visual pigments in the eye which detect certain light wavelengths (Wald 1968). Successful reproduction at all developmental stages, from implantation of the fertilized ovum to surviving until full term, has also been found to be dependent on adequate maternal levels of vitamin A (Clagett-Dame and DeLuca 2002).

In 2013 an estimated 29% of children from low and middle-income countries were found to be vitamin A deficient, and this was highest in regions of sub-Saharan Africa (48%) and south Asia (44%) (Stevens *et al.* 2015). Research into the use of vitamin A supplements found that in 17 trials with a total sample of around 190,000 participants a 24% reduction in all causes of mortality was observed after supplementation, including reduced incidents of diarrhoea, measles, and problems with vision (Mayo-Wilson *et al.* 2011). Clearly vitamin A deficiency is a severe problem for many areas of the developing world, but it is also impacting upon the health of modern UK populations. The most recent report from the National Diet and Nutrition Survey in 2014 found that 16% of children aged 11 to 18 years had intakes below the LRNI for this vitamin (Bates

*et al.* 2016). However, carotenoids, which are pigments present in plants, are converted to vitamin A in the body and can supplement vitamin A levels (Johnson 2002)

Low levels of vitamin B12 and folate in the diet or poor absorption from the digestive system can result in megaloblastic anaemia, which causes damage to neurons and bones and can also cause problems with digestion (Yadav *et al.* 2016). Megaloblastic anaemia is characterised by a reduced number of blood cells, macrocytic erythrocytes (unusually enlarged red blood cells), and increased rates of premature death in hematopoietic stem cells (the cells which differentiate into other types of blood cells) (Koury and Ponka 2004).

In 1998 a policy was introduced in the United States by The Food and Drug Administration for the mandatory fortification of grain products with folate to reduce the risk of neural tube defects in unborn infants whose mothers had inadequate dietary intake of this vitamin (Shane 2003). However, similar mandatory fortification of flour was never introduced in the UK, with the Department of Health instead advising women to take folic acid supplements before pregnancy (Morris *et al.* 2016b). Recent research suggests that this failure to introduce folate fortification in the UK has resulted in an estimated 2000 pregnancies with foetal neural tube defects between 1998 and 2012, and which will continue to affect an estimated 150 pregnancies per year (Morris *et al.* 2016b).

Other B vitamins include thiamine, riboflavin, niacin, and vitamin B6, and all are involved in metabolising energy from food, and severe deficiency of these vitamins is very rare in the UK.

### 3.7 Other Minerals

Magnesium is involved in many enzymatic processes, including the metabolism and DNA and protein synthesis, and is therefore a fundamental nutrient in the human body (Vormann 2016). Magnesium deficiency, and particularly in severe cases of hypomagnesemia, presents in a number of symptoms, including seizures, muscle cramps, cardiac arrhythmia, vertigo, and issues with mental health (Martin *et al.* 2009). Hypomagnesemia is relatively common, affecting around 2.5%-15% of the general UK population, and is particularly common in hospitalised patients (Ayuk and Gittoes 2011).

Potassium is needed for the transmission of nerve impulses in the contraction of muscles, including the muscles of the heart, and is also involved in the regulation of water balance, blood pressure, and the metabolism of carbohydrate and protein (Burger 2004). A severe deficiency in potassium can result in hypokalemia, which causes muscle weakness, lethargy, problems with mental health, and can lead to life-threatening heart arrhythmias and cardiac arrest (Burger 2004). Hypokalemia is most usually found in hospital populations, and a study at a UK care hospital observed one case of this severe potassium deficiency occurring every week, suggesting that there may be around 300 cases in the UK a week (Reid *et al.* 2012).

Zinc is required as a component of around 200 enzymes which are involved in a number of major metabolic processes within the body, and it is clear that this mineral plays a role in the synthesis of DNA and proteins, although the exact functions of zinc are still undetermined (MacDonald 2000). Organs affected by severe deficiency are the skin, gastrointestinal system, nervous system, immune system, skeleton, and reproductive

systems, and the reliance that enzymes have on zinc makes it likely that all tissues are affected in some way during deficiency (Hambridge 2000). Zinc is intimately linked to growth and development as it is involved in the activation of insulin-like growth factor 1, which stimulates systemic body growth, and also plays a role in DNA and RNA synthesis (Salgueiro *et al.* 2002). Adequate zinc intake is of particular importance in pregnant women and in those attempting to conceive, since deficiency has been found to result in natural abortion, congenital malformations, low birth weight and stunting, and pre- and post-term delivery (Salgueiro *et al.* 2002). Since there is no specified zinc storage system in the body, unlike many nutrients which can be stored in the organs, a daily intake of zinc is necessary to maintain an adequate plasma level (Rink and Gabriel 2000), and as such it is of particular importance for pregnant women to ensure adequate intake in their diet. Even mild zinc depletion in expectant mothers has been strongly associated with foetal growth retardation (Salgueiro *et al.* 2002). Zinc also plays key roles in the immune system since it is crucial in the development and function of natural killer lymphocytes and neutrophils (the most abundant type of white blood cell), while deficiency affects the function of macrophages, and T and B cells (Prasad 2008). This role of zinc in the immune system was first considered during the 1960s when the first zinc-deficient patients were identified with severe immune dysfunctions which made them vulnerable to premature death due to infection (Prasad 2008). In the UK, 17% of boys and 22% of girls aged 11-18 years, and 6% of women between the ages of 19-64 years were found to have zinc intake below the LRNI, which has the potential to cause concern considering the risks posed to foetal development due to deficiency in young women (Bates *et al.* 2016).

Although only a trace element needed in minute quantities, selenium plays a fundamental role in the maintenance of human physical and mental health. Deficiency

has been found to result in disrupted immune system, due to the role that selenium plays in increasing the numbers of T cells and natural killer cells, and improving function in lymphocytes including their cytotoxicity (Rayman 2000). Furthermore, recent research has confirmed the role of selenium in mental health and neurological function, as an optimal range of selenium has been found to be associated with a reduced risk of depressive symptoms (Pasco *et al.* 2012; Conner *et al.* 2015). The latest NDNS survey revealed high proportions of the population of the UK have low selenium intakes, with 23% of boys and 44% of girls aged 11-18 years being below the LRNI, increasing in later life to 34% of men and 52% women aged over 65 years (Bates *et al.* 2016). The impact that deficiency can have on immunity to infections makes this particularly troublesome for individuals, but particularly those aged over 65 years who may already have weakened immune systems. Furthermore, the link between selenium deficiency and depression makes these figures all the more alarming when considering the cuts to mental health service budgets in recent times.

Iodine is a trace element which is mainly obtained in the diet from food grown in iodine rich soil or from drinking water, and is particularly prevalent in seaweed (Ahad and Ganie 2010). After digestion, iodine is transported through the blood stream to the thyroid gland, where it enters the follicular cells of the gland which are responsible for the production and secretion of thyroid hormones (Ahad and Ganie 2010). These synthesised thyroid hormones are vital for cellular metabolic activity and brain development, so iodine deficiency can result in health damaging consequences as a result of disrupted thyroid function. Iodine deficiency during pregnancy can result in natural abortion of the foetus or congenital abnormalities and perinatal death (Zimmerman *et al.* 2008). In surviving children and adults, deficiency can result in slow physical development and impaired mental function, as well as a swollen thyroid gland

forming a lump on the anterior neck called a goitre (Zimmerman *et al.* 2008). It has been generally considered that the UK eradicated iodine deficiency, however recent results have shown that deficiency does still exist in a high proportion of the population and intake may have fallen over the past three decades (Bath and Rayman 2013). This evidence suggests that iodine intake should be monitored in the UK to prevent the deterioration of public health and the detrimental effects to the cognitive function of the population.

### **3.8 Modern Nutritional Health Policies**

This section will provide an overview of the policies relating to public dietary health which are currently in action, since they are frequently referenced in the following chapters. The plans described here were introduced under both the previous Conservative and Liberal Democrat coalition government (2010-2015) and by the following Conservative government (2015-time of writing). Although created under these governments, the policies are unlikely to be solely the result of work by members of the Conservative or Liberal Democrat parties, since MPs from other parties as well as lobby groups and civil servants can introduce new agendas to Government as well as influence the direction that a proposed policy takes. The critiques presented in later chapters (Chapter 6, Chapter 7, Chapter 8, and Chapter 9), therefore, are not of particular individuals or parties, but are based purely on the policies as they are presented in the official documents.

This period started with a major overhaul of the organisation which had previously been the authority on British public health. In 2010, the British Coalition Government published a white paper, entitled ‘Healthy Lives, Healthy People’, which outlined a new



and radical proposal for a change to public health strategy (HM Government and Department of Health 2010). The paper presented plans to dismantle central control of public health and instead to pass the responsibility and funding to local government in order that local public health issues could be prioritised in each county or borough in England. As well as a removal of responsibility from central government, a new service dedicated to public health was created, named Public Health England, intended to support local government innovation in the challenge of improving population health (HM Government and Department of Health 2010). The paper introducing Public Health England argued that “it is simply not possible to promote healthier lifestyles through Whitehall diktat and nannying about the way people should live” (HM Government and Department of Health 2010: 2). A major part of the new service was dealing with challenges to health during childhood, made possible through the Healthy Child Programme (HCP) (HM Government and Department of Health 2010). The HCP was in operation before Healthy Lives, Healthy People was written, but was subsumed into the responsibilities of Public Health England in order to deliver appropriate advice and care for expectant mothers and young children. The HCP reports outlined the priorities for child health, focusing on pregnancy and the first five years of life (Shribman and Billingham 2009), and from age five to 19 years (Department of Health 2009), particularly focusing on childhood obesity. The 0-5 years report provides the following guidance on the factors which would help to prevent obesity among young children:

- Providing an assessment at 12 weeks of pregnancy, and advice on healthy weight gain during pregnancy.
- Making breastfeeding the norm for parents
- Delaying weaning until around six months of age, introducing children to healthy foods and controlling portion size
- Identifying at risk children and families

- Encouraging an active lifestyle
- Providing skilled professional support and guidance for some families
- Making sure there is easy access to professional advice
- Using Sure Start children's centres to make antenatal and postnatal services more accessible (Shribman and Billingham 2009: 28)

The key components of the HCP rely heavily on the involvement of health practitioners performing assessments at several developmental stages. These assessments are undertaken by health visitors in the Universal Health Visitor Review, and are provided at each of the following stages:

- At 28 weeks or more of pregnancy
- Within 14 days after birth
- Between six to eight weeks of age
- Between nine and 15 months of age
- Between two years and two years and six months of age (Shribman and Billingham 2009, 19)

During these reviews the nurse or other health practitioner answers any questions that the parents may have and provides guidance on healthy lifestyle behaviours for the child.

The HCP 5-19 years plan also provides assessments by nurses, particularly involving school health teams. On entering school at age four to five years, the HCP recommends that a nurse or member of the school health team assess the child, including measuring their height and weight (Shribman and Billingham 2009). These measurements are collected under the National Child Measurement Programme (NCMP), which annually gathers information on childhood BMI from schools across the country, to provide information about obesity trends among children (Department of Health 2009; Public Health England 2017a). The same measurements are taken again by school nurses for the purposes of the NCMP when children reach year six, at around ten years of age (Department of Health 2009). It is recommended, although not mandatory, that nurses

then contact the parents or carers of the child with their BMI results and, if those results suggest the child is under or overweight, the nurse can provide additional guidance and signposting for health support (Public Health England 2017a). In addition to the NCMP, interventions at school include a compulsory National Curriculum on Physical Education, with recommended access of two hours of PE plus an additional three hours of sport per week offered to each pupil aged between five and 16 years, and schools should also follow nutritional standards for the meals they provide (Department of Health 2009).

Recently, the British Government developed a plan for action on childhood obesity which both works with the HCP and targets areas of life outside of school, and this was summarised in the 2016 report entitled *Childhood Obesity: A Plan for Action* (HM Government 2016). The plan aims to reduce childhood obesity by the following actions:

- Introduction of a soft drinks industry levy
- Reducing sugar in products by 20%
- Supporting science and technology research into creating healthier products
- Updating the nutrient profile model
- Making healthy options available in public sector settings
- Providing support for the cost of healthy food among low-income families
- Funding school sports programmes
- Creating healthy rating scheme for primary schools
- Introduction of the School Food Plan
- Introduction of clearer food labelling
- Developing menus for Early Years settings
- Using technology to provide information to the public on healthy eating
- Providing guidance for health professionals to support overweight patients (HM Government 2016)

This plan was created in light of recommendations made by a group called the Health Committee. Today, much like during the 19th century, inquiries are made by several types of Committees: Select, Joint, General, and Grand Committees, which deal with different aspects of the work that the House of Commons and House of Lords do (UK

Parliament 2017a). Select Committees exist in both the House of Commons and the House of Lords. The House of Commons Select Committees perform inquiries into the work of government departments, while the Lords do not examine government work, but instead concentrate on six key areas: Europe; science; economics; communications; the UK constitution; and international relations (UK Parliament 2017a). For each government department, there is a corresponding Commons Select Committee which examines aspects of spending, policies, and administration by collecting written and oral evidence for use in their reports (UK Parliament 2017a). After the report has been presented to the Commons and published, the government has 60 days to make a reply to the Committee's recommendations, which is published either as a Command Paper or sent as a memorandum to the committee and published as a special report (UK Parliament 2017a). Select Committees are created in the face of new challenges, and range from very recent topics, such as the Exiting the European Union Committee, to more established ones like the Education Committee (UK Parliament 2017c).

The current Health Committee consists of 11 members (five Conservative MPs, five Labour, and one Scottish National Party) who were appointed in September 2017 and are chaired by Dr Sarah Woollaston, Conservative MP for Totnes (UK Parliament 2017b). Three committee members are medical doctors, one is a psychologist with experience working in mental health facilities, one has a background as a medical laboratory scientist, and three have links to the NHS by either working within or chairing health organisations (UK Parliament 2017b). The Committee, then, are not only highly qualified to make judgements about the information they receive as part of their inquiries, but are also not liable to party bias.

As well as introducing original proposals, the Childhood Obesity Plan (HM Government 2016) also incorporates aspects of the change4life campaign, which conveys easy to understand and readily accessible information and guidance on healthy lifestyle behaviours to the public. This campaign was originally targeted at adults with children, but is now aimed at people of all ages in the UK. Many of the motions set out in the childhood obesity plan (HM Government 2016) could also support weight loss in adults, for example the reduction of sugar in products, the soft drinks levy, changes to food in the public sector, and better food labelling would all help to inform adults and provide more opportunities for people to make healthy options.

Action has also been made specifically towards improving adult nutritional health, but these take the less invasive form of guidance and easy to access information since adults have autonomy over their food choices while children do not. Such guidance appears in the form of the Eatwell Guide (Public Health England 2016a), which promotes the consumption of a balanced diet as defined by government recommendations, and a host of resources available for free from the NHS website, such as the Healthy Weight Calculator, the NHS 12 week Weight Loss Plan, information about 5-A-Day promoting the greater consumption of fruit and vegetables, and NHS Choices which provides tips for healthy eating. OneYou (Public Health England 2017e) is another easily accessible, free online tool for encouraging healthy lifestyles in adults, including improving dietary choices. As well as free guidance available to adults, Public Health England has also created new guidelines for health professionals to help them to support adult patients with problems of excess weight and is encouraging such interventions through an approach called 'Making Every Contact Count' (Health Education England 2017). This approach sees health professionals briefly address concerns such as obesity and other

lifestyle choices at each contact with a patient to encourage individuals to seek support for their health.

There is a wide range of policies and actions intended by the government to improve the nation's health, and many of these include plans aimed specifically at issues surrounding obesity and diet. The approaches outlined in this chapter often do not stand alone, but are more usually one target within a broader plan to improve health, for example the HCP addresses not only childhood obesity but also mental health (Department of Health 2009; Shribman and Billingham 2009), and Make Every Contact Count (Public Health England *et al.* 2016) also aims to promote lower intake of alcohol and effective methods to quit smoking. Dietary health is clearly a priority for any government, since poor diet causes problems for individuals, families, and incurs massive costs for the NHS. The current policies in this area show good progress towards improving dietary health in the UK but, as the next chapters suggest, more can be done to aid in this aspect of population health.

### **3.9 Summary of Chapter**

The importance of good nutritional health, both for the needs of individuals and for the benefit of society, is very clear, and the rising levels of obesity in the UK as well as often insufficient nutrient intake is cause for concern. The British government has seemingly continuously made changes, adaptations, and overhauls to public health bodies and policies, suggesting that issues of diet and nutritional health in the UK are being addressed. However, as will become clear through the evidence and discussions presented in chapters six to nine of this thesis, the government's approach to tackling such issues of public health are frequently ineffective or are not evidence based.

The following chapters will examine the evidence from history, identifying patterns and trends in nutritional health, and will then provide a critique of these modern policies in light of an understanding of the past. The results from analysis of modern nutritional data and archaeological skeletal material cover infancy and early childhood, followed by the results of 19th-century height data which concerns the school age child.

Historical dietary reconstruction refers to the diet consumed by adults, and chapter nine concerns the function of legislation which could improve the nutritional health of both adults and children. Many of the policies currently in place are so recent that they are yet to return results, and in those cases little can be suggested here which could improve them. However, in some instances there is clear need for greater focus on certain areas and for a better approach with new or existing policies. The historical evidence presented lends support on these occasions, indicating that stronger action is required.

## **Chapter 4 Historical Context: Developments Towards Social Policy**

During the 19th century, as now, poverty and nutrition went hand in hand, and any discussion concerning poor nutritional health is not complete without insights into the prevalence of poverty and the function of the welfare state. An overview of the politics and opinions held during this period is also useful for establishing the cultural context within which the results of historical and archaeological analysis can be understood, and a table of key events throughout the century can be found in Appendix 2. The first part of this chapter, therefore, will briefly introduce the system of the Old Poor Law, which was the functioning system of poor relief until the third decade of the 19th century. In addition to this, the individuals who were influential in shaping government opinion of poverty relief will be examined, providing an overview of who they were, what they believed, and how their opinions and work developed society during the 19th century. Following from this the New Poor Law will be reviewed, including details on further individuals who were key in the development of the new social policies.

As we will discover in this chapter, the philosophies of both politicians and those who influenced them played a key part in the development of 19th-century legislation. The inclusion of ideologies in policy development often came at the cost of evidence made by observation in reports of commissioners, statisticians, and charitable organisations who had the advantage of experiencing the reality of living and working conditions among the poor.



## 4.1 The Old Poor Law

The poor relief legislation during the early decades of the 19th century was based on the 1601 'An Act for the Relief of the Poor', which has since become known as the Old Poor Law or the Elizabethan Poor Law. This Act set out the process for the relief of the poor, using the Churchwardens and between two and four substantial Householders from each parish to act as Overseers of the Poor (1601). The role of these overseers was to set the poor to work and to raise money by the taxation of people and property within the parish to support those who were unable to work due to some physical disability (An Act for the Relief of the Poor 1601). Furthermore, Overseers were responsible for finding apprenticeships for the children of the poor and for building and maintaining dwellings for the poor (An Act for the Relief of the Poor 1601). The Old Poor Law was the only legally established, national system of relief for the poor in existence before the 19th century (King 2011, 410), but the differences between the Poor Law as established in 1601 and the provision of poor relief available in the 1790s were great (Jones 2007). The first major amendment to the Old Poor Law occurred around 120 years after it was passed, in the 1722 'Act for Amending the Laws Relating to the Settlement, Employment, and Relief of the Poor', also known as Knatchbull's Act (King 2000). This Act aimed to reduce the number of people receiving poor relief payments from the parish by giving only a Justice of Peace the authority to approve payments to individuals who gave a reasonable cause behind their requirements (1722). Furthermore, this Act made it lawful for Churchwardens and Overseers of the Poor, with the consent of a majority of the parishioners, to open houses for the poor (1722). These buildings opened by the Overseers of the Poor are essentially the first form of workhouse, and

under the Knatchbull Act a person could be struck from the Parish poor relief books and their payments ceased if they refused to enter into the establishments.

A second major change to this legislation came in 1782 with the enactment of ‘An Act for the Better Relief and Employment of the Poor’ (King 2000), also known as ‘Gilbert’s Act’ so named after Thomas Gilbert, the MP who originally proposed the Act. This Act was less strict than Knatchbull’s in 1722; it sanctioned outdoor relief to those who did not require institutional care, it allowed multiple parishes to run joint workhouses, but it punished those refusing to work but claiming relief (1782). The Workhouse according to this act was only for those who were elderly or sick, while the poor who were able to work but could not find employment were allowed outdoor relief providing that they wore a badge marking them as claimants (1782).

Harvest failures beginning in 1794 lead to widespread food riots in Britain, and required emergency measures to relieve the poor who largely relied on bread as the key component of their diet (Walker 2004). During a meeting at a town in Berkshire called Speenhamland in May 1795, magistrates decided that the poor were entitled to assistance during the harvest crisis (Block and Somers 2003). The Speenhamland System worked to provide a minimum standard of living by giving money to supplement the earned incomes of labourers, based on a sliding scale of the price of bread and the number of family members (Blaug 1963).

#### **4.1.1 Malthus**

Thomas Robert Malthus was born in 1776 in Surrey, England, to a well-established family with connections to philosophers and authors such as David Hume and Jean-

Jacques Rousseau (MacRae 2016). Malthus lived through the majority of the technological transition which came to be known as the Industrial Revolution (c.1760-1830 (Hudson 2014)) and died in 1834, in the same year that the New Poor Law was implemented (MacRae 2016). Any reader of 19th-century politics will not fail to notice the term Malthusian and its application to certain policies and opinions of the time, and it is particularly associated with views about the relief of the poor. In ‘An Essay on the Principle of Population’, Malthus begins by proposing two truths: “First, That food is necessary to the existence of man. Secondly, That the passion between the sexes is necessary and will remain nearly in its present state” (Malthus 1798, 4). He goes on to argue that “population, when unchecked, increases in a geometrical ratio. Subsistence increases only in an arithmetical ratio. A slight acquaintance with numbers will shew the immensity of the first power in comparison of the second” (Malthus 1798, 4), and as such the “difficulty of subsistence”, in other words what happens when the population inevitably outgrows its food source, falls on a large proportion of the population who could least afford food in times of scarcity. Malthus explained how the “preventative check” on population growth was the result of man’s ability to reason that he should not marry or have children until he was financially secure enough to support a family (Malthus 1798, 20), and in this way the population would remain balanced and the poor would not suffer unduly.

The biggest threat to the rational preventative check of man and the resulting rise of distress among the poor, according to Malthus, was the Old Poor Law. He argued that by giving relief to the poor, however well intentioned, would have two effects; it would lend support to those men who would otherwise have been financially unable to marry and raise a family, thus increasing the population, and workhouses would take more

food from un-supported working men to give to the inmates, thus forcing more men to apply for relief in order to ascertain dwindling food sources (Malthus 1798, 26-7).

The influence of Malthus on the policies of the 19th century becomes clear at this point, as 36 years after the first edition of 'An Essay on the Principle of Population' the New Poor Law was introduced which aimed to abolish out-door relief and replace it instead with relief which was only available within workhouses. Although, to modern readers, Malthus' stance on poverty relief and the plight of the poor may seem extreme in its cold rationality, he was not alone in his arguments. Furthermore, it is possible to gain more of an understanding about how his thinking evolved into this position when the influence of a laissez faire doctrine on many thinkers of the time is taken into account.

#### **4.1.2 Adam Smith and *Laissez Faire***

Adam Smith was born in Fife, Scotland in 1723, and is known for his contributions to philosophy and political economics (Heilbroner 2016). His most notable work is *The Wealth of Nations* (Smith 1776b; Smith 1776a) within which he established his philosophy of self-interest and presented his argument for the system of perfect liberty, achieved through what is essentially laissez faire doctrine, a theory which had existed long before Smith but which he adapted to his purposes (Viner 1960).

The essential meaning behind laissez faire is that the function of government in society is as limited and non-intrusive as possible. Adam Smith assigned only three roles in which assistance from the government would be beneficial to society: maintenance of the justice system, defence of the country, and essential public works which a private initiative could not feasibly undertake or which, due to reasons such as the potential for

monopoly, would not be safe under private ownership (Viner 1960, 60). Smith believed that only under the laissez faire principle of diminished government involvement in the economy would it be possible to attain social freedom (Viner 1960). His reasoning for social freedom resulting from minimal government intrusion was that if each individual was left free to pursue their own interests, economically speaking, the collaboration of self-interested businesses and individuals would achieve the general good for society (Brebner 1948).

When taking account of these two extremely influential theories, Smith's argument that the most equal society can only be achieved through diminished government interference and coupling it with Malthus' principle of population, it becomes clear why Malthus, and others, believed that the government should not provide out-door relief to the poor. The reasoning that the economy naturally finds its own balance and equality without government input combined with the cold rationality that providing for the poor will only increase their number, thus increasing the poor to be provided for, leads to only one conclusion; that they should allow the natural check to population size by gradually withdrawing poor relief. It is for these reasons that the 19th century has been labelled the "age of laissez faire" (Paul 1980).

### **4.1.3 Jeremy Bentham and the Philosophical Radicals**

Jeremy Bentham (1748-1832) was an English philosopher and economist whose extensive and disorderly work covered all aspects of government, which he hoped to reorganise according to his principle of Utilitarianism (Plamenatz 2012). Utilitarianism is a doctrine which is normally summarised as 'the greatest happiness of the greatest number', although it has been pointed out that Bentham did not mean the greatest

happiness for the simple majority, rather the greatest pleasure and the least pain of all the people (Jones 2000). As founder of *The Westminster Review* in 1823, a journal dedicated to commentary on political and social themes, Bentham influenced government policy by publishing work by both himself and his followers in this influential journal (Mill 1909-14).

The combination of Smith's laissez faire principle of limited government intervention, with the Malthusian law of population, and a misreading of Bentham, the poor were placed firmly as the scapegoats of suffering to establish the greatest happiness for the rest of society (Jones 2000). Through the logic advanced by these several influential thinkers, it was possible to argue that making poor relief an experience of the upmost suffering was good for the poor, since it would force them to be self-reliant or risk the miserable conditions of the workhouse (Jones 2000). Ultimately such austere poverty relief would result in the greatest happiness for the greatest number, since it would act to limit the number of the poor and as such increase wages, employment opportunity, and improve living conditions.

It was in this political and ideological landscape that Britain entered the 19th century, and the social upheavals that followed saw a constant struggle between the reformers who championed the austere and coldly rational focus on achieving economic success, and their philanthropic contemporaries who displayed growing alarm at the state of the living and working conditions of the poorest in society.

#### 4.1.4 John Stuart Mill

Born in 1806, John Stuart Mill shared many similarities with his father James; both men were philosophers and economists, both were well acquainted with Jeremy Bentham, and both espoused Bentham's Utilitarian philosophy (Anschutz 2007). John Stuart Mill shared assumptions about the problems of population, subsistence, wages, and the failure of the Old Poor Law with Malthus and Bentham, but he was the only one of the three to witness the implementation of the New Poor Law in 1834 (Quinn 2008).

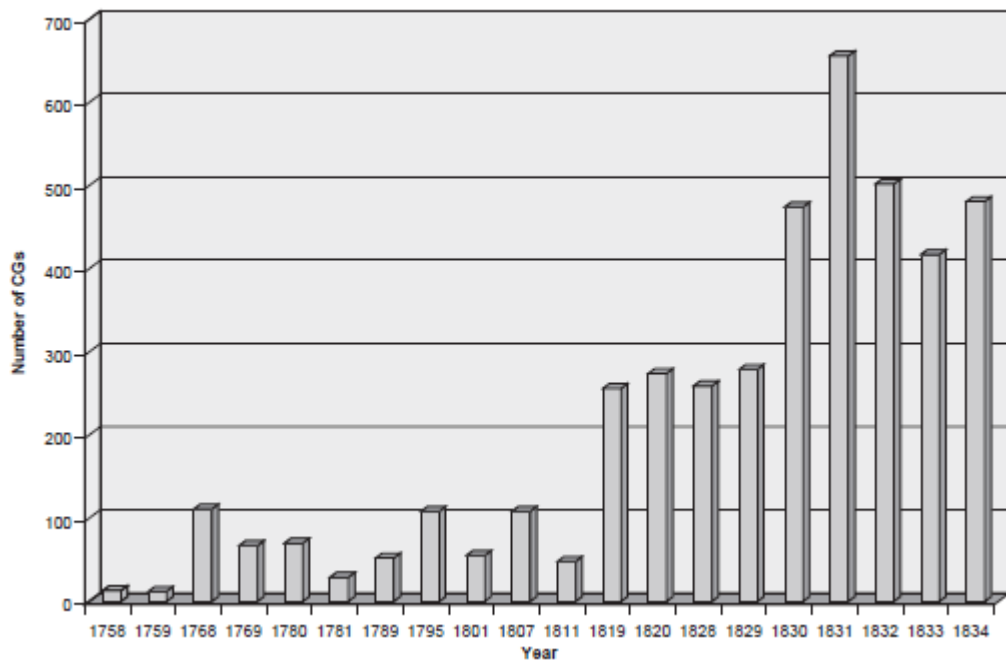
Mill was a lead member. As the acknowledged leader of the Benthamites, a member of the Philosophical Radicals, and frequent author in *The Westminster Review*, John Stuart Mill was asked by Edwin Chadwick, Sanitation Commissioner for the Government (for more information see 4.2.1), to read a draft of his Sanitary Report (Jones 2000). The criticisms he received back led Chadwick to revise his work (Jones 2000), which was published in 1842, and which later led to the Public Health Act of 1848 (Golding 2006). It is through these means that philosophers such as Mill, Bentham, and Malthus not only influenced the attitudes behind parliamentary decisions, but were directly active in the formulation of policies. These men conversed with each other in person and via their writing, and periodicals such as *The Westminster Review* allowed their ideas to reach key players in parliament. Many of these characters knew one another, John Stuart Mill and Edwin Chadwick had become friends after meeting through Jeremy Bentham (Cunningham Wood 1988, 252), and the result of such relationships, between those who thought about society and those who could change it, were policies driven by ideology.

#### 4.1.5 Revolutionaries

Although the 19<sup>th</sup> century is remembered as a time of austere philosophers and politicians casting the poorest of society into the formidable conditions of the workhouse, it was also during this time that the labouring class voice began to be heard, and in some cases heeded. The far reaching influence of Malthus met opposition in the late 18th and early 19th century from figures such as Thomas Paine, Karl Marx, and Thomas Spence (Sherwood 1985; Marangos 2008). The early 19th century saw the rise of public involvement in politics, which began through methods of riots and public protest, becoming more organised and frequent as the century progressed. Charles Tilly (2010) produced figures for the numbers of what he termed contentious gatherings between 1758 and 1834, using information from seven national periodicals. He identified 4271 such contentious gatherings, defined as “occasions on which ten or more people gathered in publicly accessible places and made collective claims”, in the counties of Kent, Middlesex, Surrey, and Sussex between 1758 and 1820, and a further 3817 examples from the rest of the country between 1828 and 1834 (Tilly 2010, 293).

Tilly’s data showed a huge rise in contentious gatherings, from less than 50 in 1758 and 1759 to well over 600 in 1831 alone (**Error! Reference source not found.**), and he identified four factors which led to the rise of the public meeting in this period (Tilly 2010, 297).





**Figure 4.1 Contentious gatherings in the London region, 1758-1834 (After Tilly 2010)**

The rise of capitalism connected urban centres with rural regions and as such national issues became important at the local level while there also became a clear divide between workers and capitalists. These changes meant that there were better opportunities for political organisations to promote public meetings in these local areas to call attention to issues of national importance (Tilly 2010, 297). During this time Parliament gained leverage through increasing tax power and became far more important in national political life, while the power of the Crown diminished (Tilly 2010, 297). Parliamentary elections provided opportunity for the 97% of the adult male population who had no legal right to vote (Aidt and Franck 2013, 230) to meet and march in support of candidates running for contested seats who championed popular causes, such as manhood suffrage (Tilly 2010).

The first two changes; the rise in national issues and use of public meetings for political purposes, led to political spokesmen such as Hunt and Cartwright gaining opportunities to address crowds of working people and coordinate political activity in regions across the country (Tilly 2010, 298). These public meetings in support of particular candidates paved the way for further gatherings concerning other matters and could be used to good effect, particularly by facilitating very large numbers of signatures for various petitions. One of Henry Hunt's petitions for manhood suffrage received half a million signatures through his use of public meetings (Belchem 1978, 749), and Cartwright used these events to spread knowledge of effective petitioning and activism to the working classes (Miller 1968, 720).

The final factor that Tilly identified as leading to the rise in contentious gatherings during this period were the meetings themselves. As activists met and struggled against the punishments handed out to those who gathered in protest, Tilly argues (2010, 298) that they began to establish the rights of assembly and resisted the attempts of authorities to prevent the development of their political rights. He concludes that "Public meetings served thrice: to mobilise local people into national causes, to publicise those causes, and to coordinate direct appeals to Parliament" (Tilly 2010, 298).

It is well established that there was a large working-class presence at such meetings, and these contentious gatherings changed in character, size, and motivation through the century. Until the 1820s food riots were the most frequent form of collective action, often resulting in violence, and were caused by the rise in food prices after harvest failures (Bohstedt 2010, 2). The food riot of late 18<sup>th</sup>- and early 19<sup>th</sup>-century England consisted of organised and disciplined crowds from local areas with clear objectives and

beliefs in their rights (Thompson 1971). Between 1795 and 1800 rural rioting swept across the country due to consecutive years of poor harvests, the majority of such riots centred on the industrial areas of the North-West of England (Booth 1977). Far from being disorderly mobs attacking targets which appeared by chance, the actions of these groups point to organised and reasoned activity by community members who felt that their rights were being violated. For example, in 1795 at Delph near Manchester, a group apprehended a baker's caravan and sold the contents to the gathered crowd, before returning the proceeds to the driver (Booth 1977, 93). This is known as a price-fixing riot, where members of the local communities seized and sold goods at prices which they considered fair.

The rise in protests over the price of food during the first decades of the 19th century suggests that the Old Poor Law was not providing sufficient relief in periods of scarcity. This context of poor relief and the attitudes towards it set the scene for the revolution of social welfare which occurred with the introduction of the New Poor Law in 1834.

## **4.2 The New Poor Law and Social Policy**

In 1834 Britain introduced a revolutionary set of policies which would eventually spark the introduction of the welfare state. The enacting of the New Poor Law saw the removal of over 200 years of out-door aid provided to paupers under the Old Poor Law, and instead introduced the widespread and compulsory use of workhouses for poverty relief (House of Commons 1834a). The development of this law was the culmination of a growing population size, increased stress on the poor rates, and commentary by such philosophers as Malthus, Ricardo, and Bentham. The social unrest which had resulted in

the food riots of the early 1800s was a further driving factor behind the decision to change the law and method of poor relief (Jones 2000).

The Royal Commission into the Operation of the Poor Laws was appointed in 1832 to inquire into the workings of poverty relief, with the subsequent report published in 1834 (Mandler 1990). There were nine royal commissioners: Bishop Blomfield of London, Bishop Sumner of Chester, William Sturges Bourne, M.P., the Rev Henry Bishop, Henry Gawler, James Trail, Walter Coulson, Nassau William Senior, and Edwin Chadwick. The last three, Coulson, Senior, and Chadwick were all members of the Political Economy Club, a London-based organisation formed in 1821 to “support the principles of Free Trade”, where influential economists, politicians, government officials, and businessmen gathered to debate policy issues (Henderson 1983). Other members of the Club included James Mill and Robert Malthus, who were among 30 members to meet on the first Monday of each month to discuss a proposed topic (Henderson 1983). The discussions and connections which occurred in this Club were instrumental in the development of New Poor Law policy, but to understand this it is first necessary to introduce the key players of the Royal Commission.

#### **4.2.1 Sir Edwin Chadwick and the New Poor Law**

Edwin Chadwick is undoubtedly the most famous name associated with the New Poor Law of 1834, as he was instrumental in the development of the Royal Commission and later worked in the administration of the law, responsible for its implementation in reality. Chadwick was born in Manchester in 1800 (Golding 2006) and later moved to London where he spent the rest of his life, becoming close friends with Jeremy Bentham, whom he worked under as a literary secretary (Hamlin 1998). Through this

relationship, Chadwick developed a Benthamite approach to policy, believing that the government should act to create the greatest good for the greatest number (Martin 2008). After the passing of the Poor Law, Chadwick was commissioned to investigate the environmental conditions of cities, which resulted in his Report on the Sanitary Conditions of the Labouring Population (Chadwick 1842). At a time when many believed in limited state interference in public concerns, instead advocating *laissez faire*, Chadwick's sanitary policies formed the foundations of modern public health. Despite the clear improvements to the lives of individuals which could occur as a result of progress in public health, this was not Chadwick's main concern and we should not mistake his attempts to sanitise inner cities as a show of concern for the poor. Rather, the resulting disease and death caused by insanitary living and working conditions meant that individuals could not work to support themselves and their families, and instead had to rely on the government's poor relief (Martin 2008), and Chadwick was open about his desire to keep the expense from the poor rates to a minimum (Finer 1952).

#### **4.2.2 Nassau William Senior**

Nassau Senior, born in Berkshire in 1790, was a leading and influential economist who was appointed to first chair of political economy at Oxford University in 1825 (Hunt and Lautzenheiser 2011). Before the turbulent events of the 1830s and 1840s, where labour exploitation caused widespread unrest among the working classes, Senior's opinions showed a level of benevolent concern for the poverty of labourers (Hunt and Lautzenheiser 2011). However, after the riots, strikes, and industrial sabotage of the following decade, Senior's attitude changed and he became convinced that the poor laws had instilled a notion of the right to relief among the working classes, and

decreased the incentive to work (Hunt and Lautzenheiser 2011). Senior was the first economist to argue against the widely accepted Malthusian theory of population, rejecting the notion that population grows faster than subsistence (Vine 2013). As a friend and fellow Political Economy Club member, Senior agreed to some extent with Malthus' views (Martin 2008: 48), but while Malthus argued that all forms of poverty relief should be withdrawn, Senior and many others regarded the abolition of the Poor Law as impossible and instead favoured reform (Vine 2013).

Ultimately, despite its multiple authors, it was Chadwick and Senior who organised the main work of the Royal Commission, with Senior providing an analysis of the existing Poor Law system and Chadwick making recommendations, both of which were likely to be influenced by their Benthamite thinking (Jones 2000). It is in this way that, although Malthusian thought formed a basic understanding of the perils of poverty relief at that time, a Benthamite perspective of reforming the system was more influential in the formation of the New Poor Law.

### **4.2.3 Gathorne Hardy**

Born in 1814, Gathorne Hardy was a British Conservative MP from 1856-1866, before serving as the president of the poor law board from 1866-1868 (Parry 2008). He is most notable for his introduction of Poor Law legislation in 1867, which acted to spread the cost of poor rates across London parishes and to remove physically and mentally ill paupers from workhouses and into hospitals (Parry 2008). In 1878 Gathorne Hardy took a seat in the House of Lords, becoming Earl Cranbrook in 1892 (Parry 2008). Although the 1867 act was hugely influential in the way that the poor law functioned and in its introduction of free medical care to the poor, Gathorne Hardy was not a social reformer

like others mentioned in this chapter, but instead had responded to pressure placed on the poor law board by lobbying from charitable groups and organisations.

#### **4.2.4 The New Poor Law: Theory and Reality**

After the investigation and recommendations of the Royal Commission, the new law was enacted in 1834 entitled ‘An Act for the Amendment and better Administration of the Laws relating to the Poor in England and Wales’, commonly referred to as the New Poor Law (House of Commons 1834a). The major feature of this new law was the creation of a board known as The Poor Law Commissioners for England and Wales, who took central control over the rules and regulations relating to the management of poor relief (House of Commons 1834a). Although the new law dictated a move from local authority to central control, the Guardians, Overseers, and Clerks of Union workhouses answered directly to the Commissioners, and could get permission from them to alter the regulations according to local needs (House of Commons 1834a). A second major change to the system of poor law relief was the requirement that “able-bodied” paupers must enter the workhouse with their families in order to make a claim for support, exempt only by permission of the Commissioners in emergency circumstances, while a Justice of the Peace could give permission for anyone old or infirm to receive out-door relief (House of Commons 1834a). The intention of this new legislation was to prevent the abuse of the poor relief system by introducing the deterrent of the workhouse in the process (Durbach 2013).

Despite his extensive work and knowledge of the system, Chadwick’s lower social status barred him from the position that he expected on the Poor Law Board. Instead roles on the Board went to Thomas Frankland Lewis, a Tory member of Parliament,

George Nichols, manager of the Birmingham branch of the Bank of England, and Sir John Shaw-Lefevre, a Whig MP and barrister, while Chadwick was allowed to stay on as secretary to the Commission (Jones 2000). The result of the appointments to these positions was a far harsher and more inhumane approach to the New Poor Law than was probably intended by the followers of Bentham, with minimal diets, workhouse uniforms acting as to mark out those who could not support themselves, and even a ban on the tolling of church bells for pauper funerals, all enforced by the new Commissioners (Jones 2000). The intention of the workhouse to be an uninviting prospect for the able-bodied who were simply idle, was enforced to the extreme, and workhouses became places where the forced separation of husbands from their wives and children from their parents was just some of the cruel treatment that poor working-class families were exposed to under the new regime (Jones 2000).

Soon after implementation, the New Poor Law began to receive fierce criticism from Parliament, and in 1837 a Select Committee of the House of Commons reported the cruelty inflicted on the poor within the workhouse (Fazakerley 1837a). However, it was not until there was public awareness of scandals like the famous case of Andover Workhouse, where in 1846 inmates forced to crush bones were driven from hunger to eat the marrow inside them (House of Commons Debate 1846), that the three Commissioners were removed from their posts. They were replaced by a Poor Law Board whose President was a member of government, and thus the workhouses came directly under the influence of Parliament (Jones 2000). However, even after this change from Commission to Board, most of the assistant commissioners remained in place as Poor Law inspectors (Rees 2001).

### **4.3 Chapter Summary**



This chapter has outlined the history of the development of the Poor Laws and detailed some of the most influential figures behind policy change in the past. The individuals, themes, and government bodies mentioned within this chapter facilitate an understanding of the socio-political landscape of the 19<sup>th</sup> century, which is relevant to the historical events discussed in chapters six through nine. Working from this historical background, the following four chapters will provide the results of analysis and discussion of the state of nutritional health in the past and the political decisions which affected it, before using this historical perspective to critique modern public health policies.

## Chapter 5 Methods and Data

This chapter will outline the methods used in each of the three disciplinary approaches adopted in this research – osteoarchaeology, nutritional epidemiology, and history – as well as the sources of data from each discipline. Beginning with osteoarchaeology, an overview will be provided of the main techniques used in the analysis of human skeletal remains as well as details of the skeletal sample used in the analysis of metabolic pathology. The potential limitations of archaeological research will also be discussed, particularly relating to the accuracy of interpreting demographical information and health conditions from human remains. Following this the methods employed in nutritional epidemiology will be reviewed, particularly focusing on the NDNS and LIDNS from which modern nutritional data used in this research is derived. The historical sources for 19th-century working-class height and the reconstruction of 19<sup>th</sup>-century diet will be outlined in the final section of this chapter, including an overview of the methods used in the collection and analysis of these data, and the challenges of interpreting historical information.

### 5.1 Archaeological Data

This section will provide an overview of the sites from which the skeletal assemblage originated, including brief details about the history of each cemetery and the contextual evidence for socio-economic status. Information about the skeletal remains will also be outlined, including the demography of each sample. **Error! Reference source not found.** illustrates the location of each cemetery site included in this research within England, and **Error! Reference source not found.** displays the sample of high- and low-status remains from these sites.



**Figure 5.1 Sites of the seven cemeteries across England. 1-4 are Cross Bones, St Brides Fleet Street, St Brides Lower, and Chelsea Old Church, 5 is St Martin's-in-the-Bull Ring, 6 is Newcastle Infirmary, and 7 is Coronation Street.**

The data from 19th-century skeletal remains contains observations of metabolic pathology in 1958 deceased men, women, and children from seven cemetery sites from around the north and south of England **Error! Reference source not found.** Due to the nature of 19th-century society, an individual's burial within a cemetery adhered to similar patterns as would their activities during life, with certain cemeteries or areas within a cemetery provided for the rich, and other areas designated to the poor. As such, the skeletal pathologies can be compared between high- and low-status groups. The remains were grouped into high- or low socio-economic status using the information

established from contextual information, and status is tested in Chapter 6 for association with the metabolic conditions rickets, scurvy, cribra orbitalia, and enamel hypoplasia using multivariate logistic regression.

Cemetery site	Region	Number high status	Number low status	Total
Chelsea Old Church	South	198	0	198
Coronation Street	North	0	135	135
Newcastle Infirmary	North	0	209	209
St Brides Fleet Street	South	226	0	226
St Brides Lower	South	0	541	541
Crossbones	South	0	148	148
St Martins-in-the-Bull Ring	North	95	406	501
Total		519	1439	1958

**Table 5.1 Status of individuals buried within northern and southern cemeteries**

### 5.1.1 Chelsea Old Church, London

The skeletal collection from Chelsea Old Church was originally exhumed and reburied during building works on the site in the 1960s, after the church suffered damage from bombing during World War II (Kausmally 2008a). These skeletons were later re-excavated by the Museum of London in advance of further development and, out of the 290 exhumed, 198 individuals were analysed (Kausmally 2008a). A total of 168 adults (74 females, 78 males, and 16 undetermined) and 33 juveniles were included in the analysis, recovered mainly from earth cut graves with wooden coffins, some with lead lining, two burial vaults and two brick-lined graves (Kausmally 2008a). The individuals buried within the cemetery of Chelsea Old Church represent a population who lived on the outskirts of London, in more rural areas during the 18th to 19th centuries, and the population is considered to be of high status from this affluent area (Kausmally 2008a).

The contextual evidence for status is supported by biographical data provided from information found on the coffin plates which survived in 25 burials (Kausmally 2008a).



**Figure 5.2 Coffin plate from Chelsea Old Church (Cowie et al. 2008, 34)**

### **5.1.2 St Brides Fleet Street, London**

Remains from St Bride's Fleet Street were analysed by the Museum of London Centre for Human Bioarchaeology, but the remains are now stored within the crypts where they were discovered (Museum of London Centre for Human Bioarchaeology 2005b). A total of 227 individuals (213 adults, and 14 juveniles) were excavated during the 1950s after bomb damage to the church during World War II, and biographical data, as well as

the type of burial within crypts under the church, suggest that they were part of an affluent population from the surrounding area (Museum of London Centre for Human Bioarchaeology 2005b). Although this cemetery is located within the same parish as another of the four London based sites included in this analysis (St Bride's Lower), it represents a very different social class from that burial ground.

### **5.1.3 St Brides Lower, London**

Burials at St Bride's Lower began as a result of overcrowding of the churchyard at St Bride's church, Fleet Street, and was located at a separate site around 185m (605 feet) north of the church building (Kausmally 2008b). Out of the 606 individuals originally recovered, 544 were available for analysis, 47 of which had been buried within a vault and 497 densely packed within an open yard (Kausmally 2008b). These remains comprise 369 adults and 175 juveniles. The contextual evidence suggests the majority of the burials were of low-socioeconomic status, since they were buried in wooden coffins and were stacked into the ground in up to eight layers (Mant and Roberts 2015). There was no fee hierarchy depending on the location of burial within the cemetery, making it unlikely that the wealthy would choose to be interred here (Mant and Roberts 2015). Instead poorer individuals from the parish, including inmates of Bridewell workhouse and Fleet prison, were received for burial (Mant and Roberts 2015). This site represents the low-status individuals within the parish of St Bride's, whilst St Bride's Fleet Street represents high-status individuals from the same area.

### **5.1.4 Cross Bones, London**

The Museum of London excavated part of Cross Bones cemetery and recovered 148 inhumations, 44 adults (12 males and 27 females, 5 undetermined) and 104 juveniles,

thought to date to the last 50 years of cemetery use, from approximately 1800 to 1853 (Mikulski 2007). The burial ground was originally established in Southwark for the burials of sex workers and paupers, and it remained a paupers' cemetery until its closure in 1853 (Mikulski 2007). Based on the contextual and documentary evidence for this site, it is clear that it represents a very poor socio-economic population who lived in the surrounding area.

### **5.1.5 St Martins-in-the-Bull Ring, Birmingham**

The cemetery at St Martin's-in-the-Bull Ring was excavated by Birmingham Archaeology (the commercial unit from the University of Birmingham which closed down in 2011) in 2001, and of the 857 burials recovered 500 were analysed (Mays *et al.* 2006). The skeletal remains date to the late 18th and the 19th century, with 99 individuals found in family vaults, chambered vaults, and brick-lined graves, and a further 401 individuals from earth-cut graves (Mays *et al.* 2006). These remains consist of 349 adults and 151 juveniles. Records of costs for burial within a type of vault or within earth-cut graves reveals that burial within structures was significantly more costly than a simple coffin burial in the churchyard (5.2Table ) (Mays *et al.* 2006). This suggests that vault burials were reserved for use by people from high-socioeconomic status, whilst earth-cut graves were mainly for those from lower socio-economic status.

	Rector			Clerk			Sexton			Total		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Grave not exceeding 6 feet	0	1	4	0	1	0	0	4	0	0	6	4
Ditto, per every additional foot extra	''	''	''	''	''	''	0	1	0	0	1	0
Vault in Church	5	5	0	0	5	0	''	''	''	5	10	0
Fresh interment in ditto	2	2	0	0	2	6	''	''	''	2	4	6
Vault in yard	4	4	0	0	5	0	0	12	0	5	1	0
Fresh interment in ditto	1	1	0	0	2	6	0	12	0	1	15	6
Tomb with railings, without vault	4	0	0	0	5	0	''	''	''	4	5	0
Fresh interment in ditto	1	1	0	0	2	6	0	12	0	1	15	6
Tomb over vault, extra to vault	1	0	0	0	2	6	''	''	''	1	2	6
Ditto, higher than 3 feet	2	0	0	0	5	0	''	''	''	2	5	0
Brick Grave	1	1	0	0	2	6	0	12	0	1	15	6
Fresh interment in ditto	1	1	0	0	2	6	0	12	0	1	15	6
Flat Stone	1	1	0	0	1	0	''	''	''	1	2	0
Head or foot stone	0	5	0	0	0	6	''	''	''	0	5	6
Tablet outside Church	3	3	0	''	''	''	''	''	''	3	3	0
Tablet inside Church	5	5	0	''	''	''	''	''	''	5	5	0

**Table 5.2 Burial costs for St Martin's Church in 1848 (Brickley *et al.* 2006)**

### 5.1.6 Newcastle Infirmary, Newcastle

Newcastle Infirmary, Newcastle-upon-Tyne, opened in 1753 and the burial ground associated with it was in use from 1753-1845 (ARCUS 1998). The site was excavated in 1996 by Newcastle City Archaeology Unit, but osteological analysis was performed by specialists at Archaeological Research and Consultancy at the University of Sheffield (ARCUS 1998). Individuals at this site were recovered from wooden coffins within unfurnished graves as well as from charnel deposits containing disarticulated material (ARCUS 1998). A total of 209 articulated burials were subject to osteological analysis, consisting of 22 juveniles and 187 adults. The lack of juveniles is likely due to the admissions policy of the infirmary to only admit individuals above the age of seven years (ARCUS 1998). This site was the first post-medieval cemetery site to be excavated in the north of England, and was also the first to represent the poor. The individuals who were admitted, treated, and ultimately buried in the grounds of Newcastle Infirmary were those from lower socio-economic backgrounds and were thus unable to afford home treatment by a doctor when they became sick.



### **5.1.7 Coronation Street, South Shields**

Coronation Street, South Shields, was excavated in 2006 by Oxford Archaeology North prior to the development of the site for the construction of a supermarket (Raynor *et al.* 2011). The location of St Hilda's church and its associated cemetery in an area of heavy industrial development during the 19th century suggests that the site contained working-class individuals employed in the local collieries, gas works, and ship yards (Raynor *et al.* 2011). In support of this, the burials within the investigation area of the 2006 excavation contained mass-produced, wooden coffins, and it is likely that these individuals were working class, although not necessarily paupers since these individuals could afford burial in a churchyard (Raynor *et al.* 2011). The 135 individuals included in this analysis consist of 7 juveniles and 128 adults, all of whom were buried within this site from around 1816 to 1860 (Raynor *et al.* 2011).

### **5.1.8 Socio-economic Status**

The sites outlined here were selected for analysis due to the socio-economic differences between them. Skeletal remains from Chelsea Old Church, St Bride's Fleet Street, and the vault burials from St Martin's-in-the-Bull Ring were ascertained to be from a high-socioeconomic status based on the contextual and documentary evidence. Individuals recovered from Cross Bones, St Bride's Lower, Newcastle Infirmary, Coronation Street, and the earth-cut graves from St Martin's-in-the-Bull Ring are all likely to have been of low socio-economic status.

Status in this analysis refers to the socio-economic status assumed by the contemporary evidence, burial location, and type of burial recorded in the contextual reports from the sites. Due to the nature of archaeological collections, it is not possible to be certain that

all of the skeletal remains within one cemetery were from high-status backgrounds and that all from another contained only low-status skeletal remains. For example, perhaps an individual buried within a low-status cemetery, or part of a cemetery, had lost their social standing or wealth through some means. Thus, their remains may reflect high-status health despite being excavated from a cemetery containing mostly low-status individuals. Another complication may be that St Bride's Lower started as a new burial ground after established locations became overcrowded. Before it became known for being used predominantly by the local workhouse and prison, high-status individuals may have been buried at this location. As such, high and low status is used to describe the results, but the given status must be interpreted with caution due to the potential unreliability of the archaeological record. However, generally the documentary and contextual evidence would support the deduction that most of the skeletal remains from these cemeteries will be of identifiable status.

A further complication in assigning status to archaeological human remains is that it is not possible to provide a quantitative definition of the terms high and low socio-economic status within the context of human remains. Whereas in modern studies the distinction can be made by the income decile that a household falls into, the nature of establishing socio-economic status in archaeological contexts is far less precise. It can only be concluded that the sample used in this research represents individuals from labouring or pauper backgrounds and those who are from wealthier positions in society, both of which are deductions based on burial form and location.

## **5.2 Osteoarchaeology: The study of human remains**

Archaeological research is unique in its reliance on information which, rather than being distributed between individuals via spoken or written words, depends on the physical remains of human life. The archaeological data and methods presented in this research are based on the evidence excavated from human skeletal remains. The term osteoarchaeology is used here to describe the study of archaeological human skeletal remains exclusively, since there is currently no generally accepted term to differentiate between human remains and other forms of organic remains such as plants and animals (Nikita 2017), and terms also vary between countries.

Methods employed in osteoarchaeology are based on the scientific understanding of bone modelling and reactions, including bone growth and development, as well as bone response to external forces (Ortner 2003). Decades of health research have provided osteoarchaeologists with a variety of methods for establishing demographic information from skeletal remains, such as age, sex, stature, and ancestry (Bass 1995), as well as means of diagnosing pathological conditions and identifying trauma (Roberts and Manchester 1995; Ortner 2003; Aufderheide and Rodriguez-Martin 2011). The value of osteological research is that it provides direct evidence of physical conditions in past populations. By combining this information with material culture, contextual evidence, and funerary archaeology, inferences can be made about life in the past which are not reliant on written records, thus suffer less from the bias of author agendas which can be problematic in historical research.

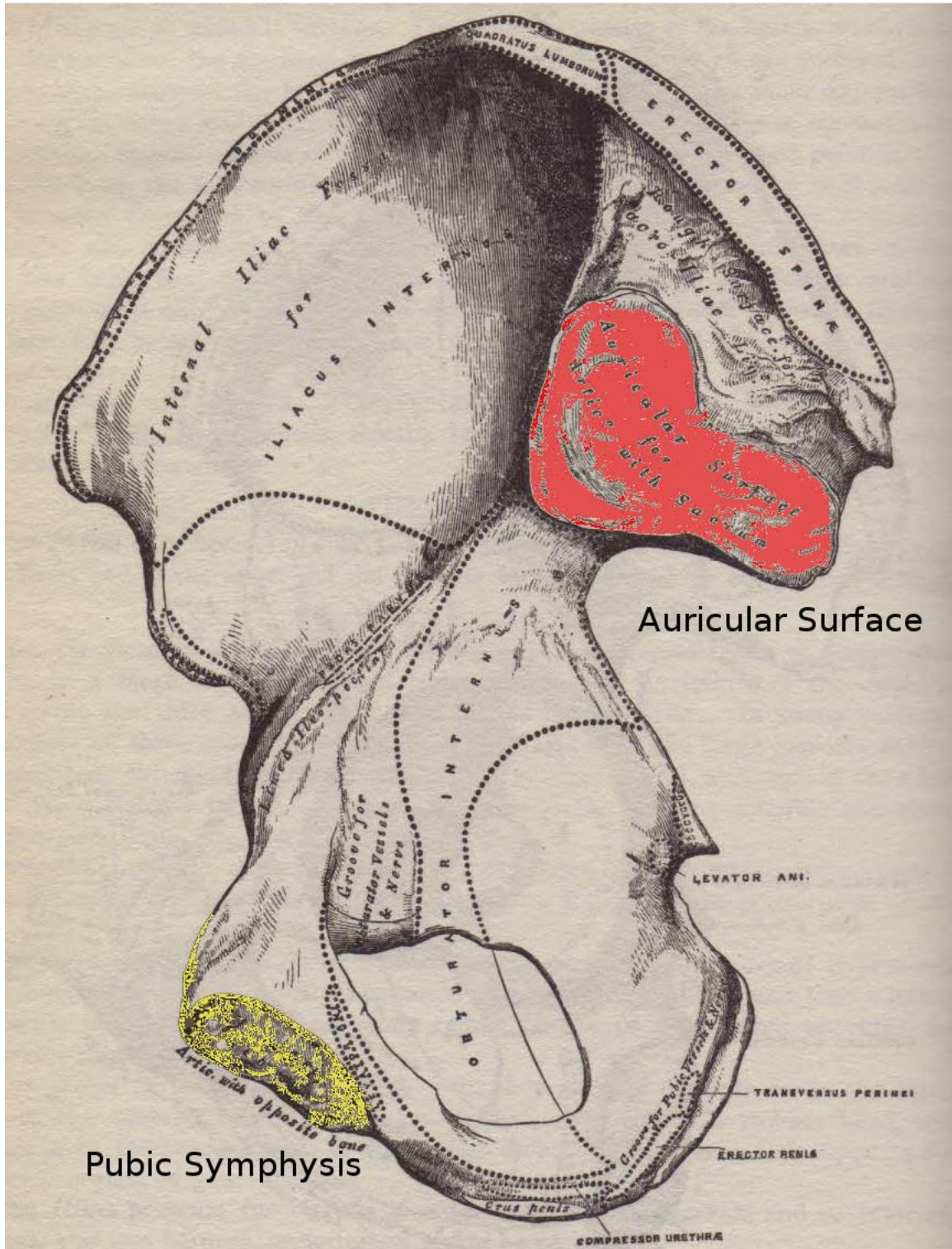
The state of the poor during the 19th century was a topic of much debate and disagreement and the written historical records are potentially influenced by the politics

and ideologies of their authors. Philanthropists writing on the topic, such as Rowntree in his 'Poverty, a study of town life' (1908), described the state of desperation and poverty that labourers' families experienced, whilst many other contemporary writers, notably Townsend (1786), downplayed the extreme conditions and argued that poverty was the result of the idleness which was being encouraged as a direct result of the provision of poor relief. To account for the potential observer bias, the direct evidence available from osteoarchaeology is essential within the current project to provide a source of evidence which is not reliant on such written accounts. Although we cannot establish the experiences of poverty from skeletal remains, we can reconstruct an idea of bodily health, in particular the adequacy of diet through the identification of metabolic disease.

### **5.3 Methods in osteological analysis**

There have been many techniques developed over the past century to determine age and sex in human skeletal remains using elements which differ between the sexes or change over an individual's lifetime (Bass 1995). Adult age is by far the more difficult to estimate accurately, as it can be observed in only a few elements which are often of varying preservation quality in archaeological specimens, and because there are many more possibilities for age than there are for sex. Individuals age at different rates, depending on a number of factors including genetics, environment, health, and lifestyle, so the development of age determination techniques has been a long and extensively tested process (White and Folkens 2005). Determining the sex of an adult individual is less complicated, as it is rare to have more than two biological options, and sexual dimorphism is less affected by external factors.

For adults, the most accurate age and sex determination techniques are all based on features in the pelvis. The ossa pubis, or the pubic bones, are the anterior parts of the pelvis which meet medially (Figure 4.1). This medial, cartilaginous connection between the two bones is called the pubic symphysis, and it is this feature which undergoes characteristic changes associated with the aging process (White and Folkens 2005).



**Figure 5.3 Anatomical illustration showing the right pelvis with the auricular surface (red) and pubic symphysis (yellow) (after Gray and Carter (1858))**

The first methodical system of age determination from changes to the pubic symphysis was conducted by Todd (1920) who derived his classification from 306 white males from the Ohio anatomical laboratory. Each of these individuals had a recorded age at death, although as Todd notes “it is not everyone who knows his own age, and some of those who do make erroneous statements regarding their age for various reasons” (1920, 5). He also described the four types of changes which occur in ageing; billowing, ridging, ossific nodules, and texture (Todd 1920). Although no tests for accuracy were conducted on the Todd method, it was accepted as an accurate estimator of age for dry remains until Brooks (1955), McKern and Stewart (1957), and later Gilbert and McKern (1973) noticed the tendency for the method to overage individuals and attempts were made to refine the technique (Bass 1995). These attempts were eventually found to be just as inaccurate as the original method, as they under-aged the individuals, and Suchey *et al.* (1986) and Katz and Suchey (1986) examined a sample of 739 male ossa pubis with more accurate information of age at death than Todd’s samples (Bass 1995). Katz and Suchey (1986) recommended a modified Todd technique, and during this refinement the effects of ancestry on the pubic symphysis changes also began to be assessed (Bass 1995). Finally, Brooks and Suchey (1990) studied 273 pubic bones of women, with associated accurate age at death records, and developed the technique to include classifications for female pubic symphyseal changes.

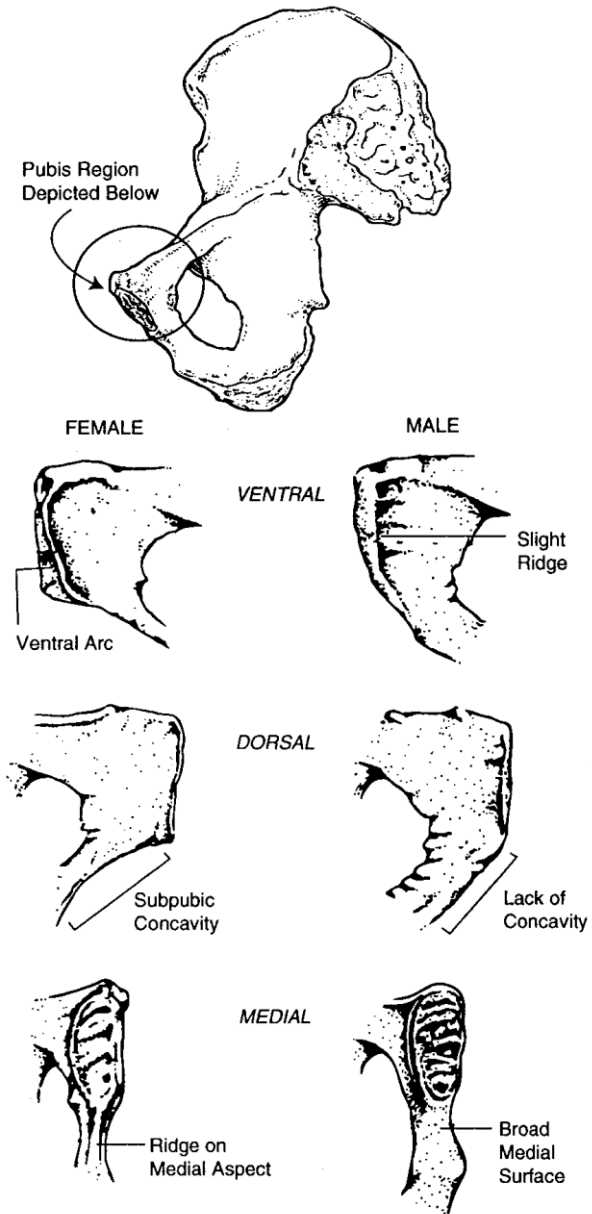
A second age determination technique involves the auricular surface of the ilium, located posteromedially, which forms the sacroiliac joint between the pelvis and the sacrum on both sides (Figure 4.1). This method was originally developed by Lovejoy *et al.* (1985) as the pubic symphysis is frequently found poorly preserved in archaeological specimens and becomes less accurate for determination after the age of 50. Changes in the auricular surface were tested for association with age on just over 750 skeletons with

known age at death from the Todd collection, Libben collection, and several forensic cases, and the technique was developed (Lovejoy *et al.* 1985). This method was then revised by Buckberry and Chamberlain (2002) who clarified the descriptions of the age related changes and introduced a new scoring system for each one before testing was undertaken on the Christ Church Spitalfields collection from London. Overall, this technique was found to show a good correlation between age and auricular surface morphology (Buckberry and Chamberlain 2002). The final characteristics for determining age were; transverse organisation, surface texture, microporosity, macroporosity, and apical changes (Buckberry and Chamberlain 2002). Both the pubic symphysis and the auricular surface ageing techniques are fairly similar in terms of their accuracy and the width of their age brackets, however, only the auricular surface has been recently tested for accuracy on a 19th-century British population (Buckberry and Chamberlain 2002).

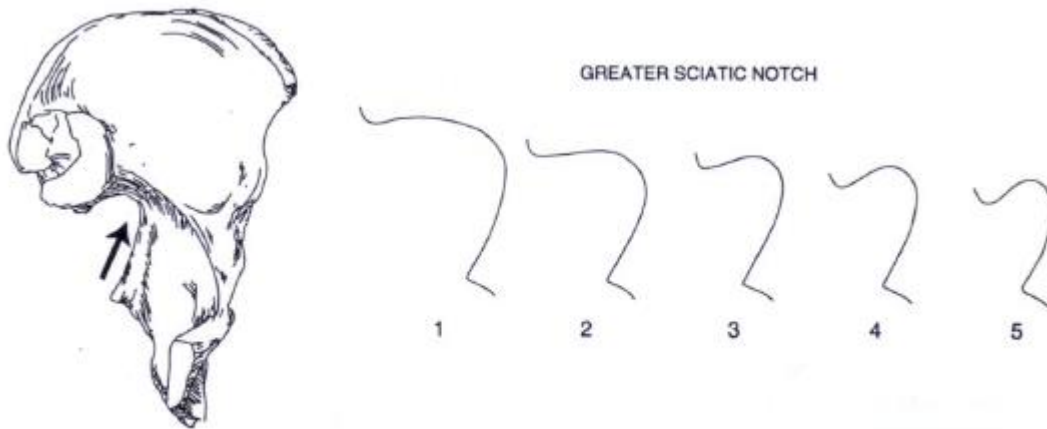
Similar to age, the sex of an individual is most accurately determined when pelvic features of the pubic bone, the greater sciatic notch, and the preauricular sulcus, are used. The pubic bone comprises of three separate indicators of sex, occurring as a result of sexual dimorphism in the skeleton (Buikstra and Ubelaker 1994). Figure 5.4 depicts the location of the bone in relation to the os coxa, and the three sex distinguishing features: the ventral arc, the subpubic cavity, and the medial aspect.

Figure 5.5 shows the location and classification of the greater sciatic notch in sex determination. Although this feature has a higher survival rate in archaeological contexts, it is less reliable for accurately determining sex than the features on the pubic bone due to physiological factors affecting the appearance of the bone. For example, the notch is narrowed in females with osteomalacia (Buikstra and Ubelaker 1994).





**Figure 5.4 Sexual dimorphism in the adult pubic bone of the os coxa (Buikstra and Ubelaker 1994)**

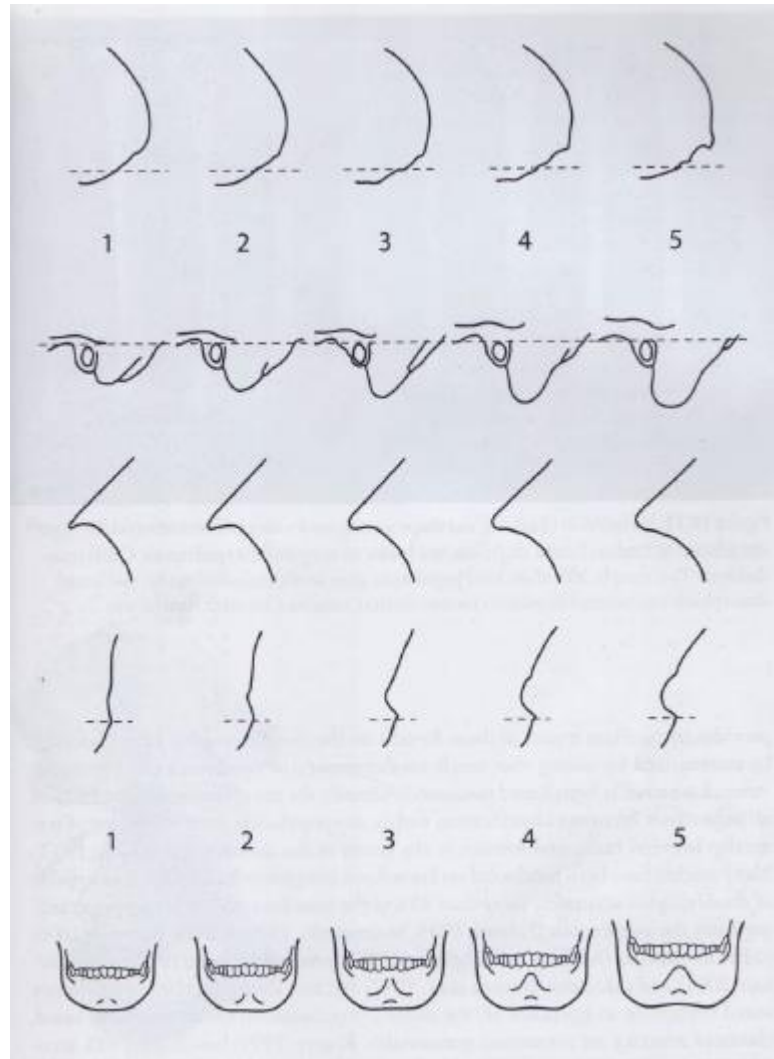


**Figure 5.5 The greater sciatic notch and the classification of sex for its width, where 1 is female, 2 is probably female, 3 is indeterminate, 4 is probably male, and 5 is male (Buikstra and Ubelaker 1994)**

Finally, the preauricular sulcus sits below the auricular surface and is only present in females. Although the presence of a preauricular sulcus indicates that an individual is almost certainly female, the absence of this feature does not necessarily mean that they are male as this feature is not present in all females (Buikstra and Ubelaker 1994).

Therefore, this is the least accurate measure of sex in the pelvis.

Cranial morphology is also an indicator of sex, although it is far less accurate than the pelvis as cranial features differ more between populations and groups (Buikstra and Ubelaker 1994). The cranial features used in sex determination are; the nuchal crest, the mastoid process, the supra-orbital margin, and the mental eminence, see Figure 5.6. For sex determination from the cranium it is often the case that females exhibit finer, sharper, and more gracile features whilst males are more robust, with larger, and thicker bones.

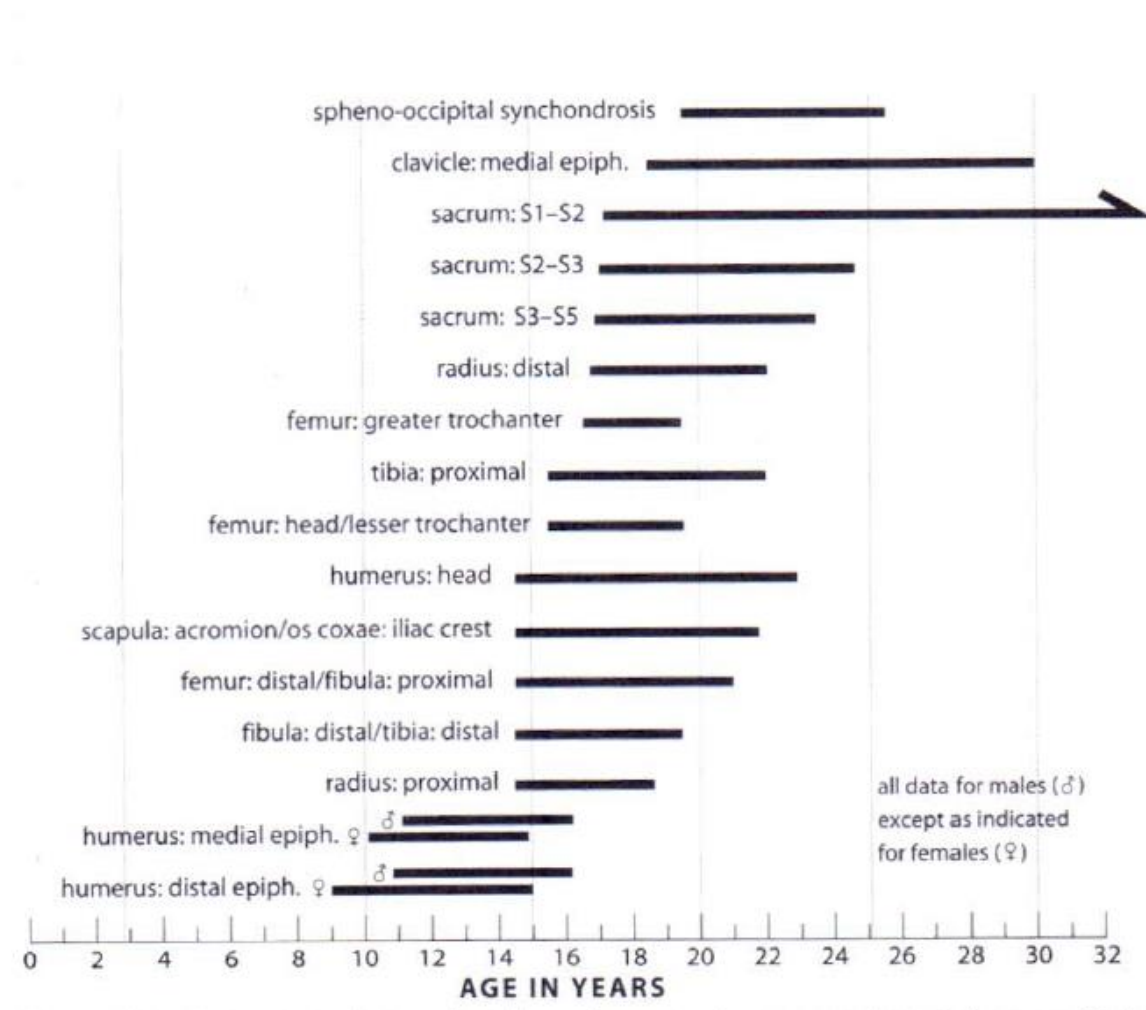


**Figure 5.6 Cranial morphology showing sex determination features. 1 is female, 2 is probably female, 3 is indeterminate, 4 is probably male, and 5 is male (Buikstra and Ubelaker 1994)**

Juveniles are individuals who had not attained full physical maturity in the skeleton, which occurs around 20 years of age (Bass 1995). Although there are currently no reliable osteological methods to determine the sex of juvenile skeletons, as skeletal sexual dimorphism does not become apparent in humans until puberty, it is both easier and more accurate to determine their age than it is for adults. This is due to the standard

rate of epiphyseal fusion and dental change which occurs during the developmental years of healthy individuals.

The most accurate age estimation technique for juveniles is dental development, as it is subject to less variability than other developmental features (Gustafson and Koch 1974). Less accurate, but still a very good indicator of age in juvenile skeletons, is epiphyseal fusion times as demonstrated in Figure 4.5.



**Figure 5.7 Age at which the fusion of the epiphyses occur (Buikstra and Ubelaker 1994)**

Analysis of the remains included in this thesis follow the standard and accepted techniques outlined above. The Centre for Human Bioarchaeology determines age at

death for juveniles using epiphyseal fusion as described by Scheuer, Black, and Cunningham (Scheuer *et al.* 2000), dental eruption from Gustafson and Koch (1974), and dental development stages from Moorrees and Fanning (1969) and Smith (1991) (Connell and Rauxloh 2003). Age at death for adults is determined by the Centre using a combination of pubic symphysis variation from Brooks and Suchey (1990), auricular surface variation from Lovejoy *et al.* (1985) and Buckberry and Chamberlain (2002), and costo-chondral method from Iscan *et al.* (1984; 1985) (Connell and Rauxloh 2003). Sex is determined using a combination of the pubic characteristics of the pelvis from Phenice (1969), and other characteristics of sex, such as the greater sciatic notch and preauricular surface, from Brothwell (1981), Ferembach *et al.* (1980), and Bass (1995) (Connell and Rauxloh 2003).

The osteological methods used at St Martin's-in-the-Bull Ring to determine age at death were a combination of pubic synthesis, auricular surface, and sternal rib end variation from Buikstra and Uberlaker (1994) and Bass (1995) (Mays *et al.* 2006). Sex was determined using morphology in the pelvis and crania following methods from Buikstra and Uberlaker (1994), Bass (1995), and Brothwell (1981) (Mays *et al.* 2006).

The sample from Newcastle Infirmary was analysed by archaeologists at the University of Sheffield Department of Archaeology (ARCUS 1998), who determined sex and age information from morphological characteristics of the cranium and pelvis (Lovejoy *et al.* 1985; Brooks and Suchey 1990; Buikstra and Ubelaker 1994).

The present author established age at death for individuals from South Shields using a combination of dental development, epiphyseal closure, auricular surface, and pubic symphysis methods (White and Folkens 2005). Sex was established using morphology

in both the pelvis and crania (Brothwell 1981; Buikstra and Ubelaker 1994; White and Folkens 2005).

In the determination of age and sex some methods are more accurate than others, but in dealing with archaeological remains it is often not possible to use a technique due to the preservation of the bone. This is one reason that researchers often use a range of age and sex determination methods on each individual, but it is also necessary as an extra measure of accuracy. By only performing one method the researcher would bias the results; therefore, the entire skeleton should be examined to facilitate accurate analysis.

### **5.3.1 Metabolic conditions**

Malnutrition in archaeological human skeletal remains cannot be isolated to a specific nutrient deficiency, but can be more broadly identified as a result of metabolic stress during development. Severe or prolonged metabolic stress, particularly during childhood, leaves distinctive impressions on the skeleton, and nutritional deficiencies can be identified by their specific distribution and effect on the bones. The physical conditions resulting from these nutrient deficiencies are rickets, resulting from vitamin D deficiency, cribra orbitalia and enamel hypoplasia, both signs of general malnutrition, and scurvy, an indicator of vitamin C deficiency.

#### **5.3.1.1 Rickets**

Rickets is characterised in the juvenile skeleton by inadequate mineralisation of bone formed during development, which leads to the deformation of the postcranial elements including; rib flaring, long bone deformity and thickening, bone porosity, flattening of the femoral head, and flaring of the long bone metaphyses (Ortner 2003; Pinhasi *et al.* 2006; Brickley *et al.* 2018; Mays and Brickley 2018). In the adult skeleton, weakened

bone due to poor mineralisation can result in pseudofractures in the ribs and long bones, surrounded by spicular bone calluses which indicate poorly mineralised newly deposited bone (Ives and Brickley 2014; Brickley *et al.* 2018). Only those skeletal remains demonstrating multiple diagnostic indicators for this disease were included as having rickets. Bone deformity such as that illustrated in Figure 5.8 indicates the presence of residual rickets, which occurred due to severe vitamin D deficiency during childhood.



**Figure 5.8 Adult tibia and femur demonstrating the appearance of bone deformity present in residual rickets. Gratitude to The Museum of London Centre for Bioarchaeology for the use of this image.**



**Figure 5.9 Localised region of porosity in the left orbital roof indicative of cribra orbitalia**



**Figure 5.10 Image of enamel hypoplasia in an individual excavated from Exeter**





**Figure 5.11** Image portraying retraction of alveolar bone in the maxilla of an individual excavated from a medieval site in Exeter, one possible indicator of active scurvy.

### 5.3.1.2 Cribra orbitalia

Within human skeletal remains iron deficiency is often identified through a condition known as cribra orbitalia, which was widely accepted to be a result of chronic anemia resulting from iron deficiency (Stuart-McAdam 1991; Lewis 2002; Zuckerman *et al.* 2014). However, Walker *et al.* (2009) argue that this condition results instead from vitamin B12 deficiency and nutrient loss due to infectious disease. This theory has been disputed, and there is ongoing debate about the aetiology of cribra orbitalia, however it remains an indicator of poor nutritional health (Oxenham and Cavill 2010). This condition is the result of marrow hypertrophy in the diploe of the cranium, and can be observed as pitting and porosity on the roof of the orbital bone (Figure 5.9), which is

now thought to be associated with erythropoiesis (the blood formation process) (Oxenham and Cavill 2010).

### **5.3.1.3 Enamel hypoplasia**

Enamel hypoplasia is another indicator of childhood metabolic stress, since disruptions to growth due to environmental factors such as malnutrition and disease can cause disturbances to the early formation of adult dental enamel, pictured in Figure 5.10 (Ortner 2003; Ogden *et al.* 2007; Hillson 2008). Defects in the enamel can be visually observed as furrows or pits on or along the tooth, occurring once or multiple times (Ogden *et al.* 2007; Hillson 2008). Enamel hypoplasia disrupts the growth of adult dentition during development so, since enamel cannot remodel, enamel hypoplasia is an indicator of childhood stress which can be assessed in adult remains. Enamel hypoplasia was recorded as present or absent, based on the presence of furrows or pits in the dentition.

### **5.3.1.4 Scurvy**

A sign of acute vitamin C deficiency, Scurvy is identified in the skeleton by abnormal porosity of the cortical bone and new bone formation caused by an inflammatory response to haemorrhage (Ortner 2003; Zuckerman *et al.* 2014). The presence of scurvy can be distinguished in archaeological human skeletal remains if an individual was vitamin C deficient at death. After treatment with vitamin C, the symptoms of scurvy quickly disappear in the living person, so skeletal indicators of this disease will not be present in an individual who recovered before death. Scurvy in archaeological remains, unlike rickets, cannot therefore be used as an indicator of childhood nutritional health unless it is present in a child's remains. Weakened cartilage and ligaments from this

deficiency results in retraction of the alveolar bone leading to ante-mortem tooth loss (Figure 5.11) (Ortner and Ericksen 1997; Brickley and Ives 2008; Armelagos *et al.* 2014; Klaus 2014; Stark 2014). Additionally, subperiosteal haemorrhage from weakened and abnormal blood vessels can cause the periosteum to be shifted away from the bone, resulting in new bone formation (Roberts and Manchester 1995; Ortner and Ericksen 1997). This new bone formation can be observed as an unintegrated area of porous bone sitting on the surface of affected elements (Ortner 2003). Intracranial haemorrhage due to weakened meninges can also cause inflammation and porous new bone formation within the cranial vault, particularly on the parietal bones, as well as deepened meningeal grooves, and porotic hyperostosis is often identified on the outer cranial surface (Ortner and Ericksen 1997; Ortner 2003; Zuckerman *et al.* 2014). The scapulae is commonly affected by such porosity caused by haemorrhage, as well as the ribs, where the costochondral joint becomes enlarged which creates flaring, often referred to as the scorbutic rosary (Ortner and Ericksen 1997; Ortner 2003). Although all the indicators of scurvy are macroscopic, when taken individually they can signify many different pathologies, including rickets, anemia, tooth-loss through dental caries or periodontal disease, and degenerative joint disease (Crandall and Klaus 2014). As a result of this, it is important to identify multiple indicators of scurvy in skeletal remains in order to make a conclusive differential diagnosis.

The impact of vitamin D deficiency and general malnutrition during childhood are retained by the skeleton and will still be apparent in adulthood, however the signs of vitamin C deficiency are only temporary and heal after recovery (Lewis 2017). This difference in retention affects which age groups in the sample will present with pathological signs, and also means that adult individuals with rickets, cribra orbitalia,

and/or enamel hypoplasia are actually displaying signs of their nutritional health during childhood.

### **5.3.2 Potential limitations in osteological analysis**

Multiple methods were used to determine age and sex by both the Museum of London, the team responsible for the analysis of St Martin's, osteology specialists at ARCUS, and the present author. Although there were differences in some of the methods implemented, all relied on well-established features which have the most reliable morphological changes determined by age and sex, namely the pubic symphysis and auricular surface of the pelvis. In light of this, it is unlikely that there are any problematic differences in the accuracy of age or sex determination between the records, which are not the result of normal subjective observer error. In addition to this the age and sex of the remains are not the main focus of this study, more important is the status of the remains based on the contextual evidence of the sites and the diagnosis of metabolic conditions in the skeletons.

The identification of pathological indicators in the skeleton presents more of a challenge to the researcher, since problems with preservation and interactions between multiple conditions can confuse diagnoses. Scurvy in particular is more difficult to identify in dry remains as it often presents with subtle areas of new bone formation and some of the indicators for its presence, such as porotic hyperostosis, can also be the result of other conditions. However, since all of the remains analysed from the seven sites have the potential to have suffered from multiple conditions during life, and will have preservation issues to some extent, there will be similar challenges to the interpretation for individuals from both high and low status sites. Each of the sites were recorded as

having good to excellent preservation for the majority of the human remains recovered (Brickley *et al.* 2006; Mikulski 2007; Cowie *et al.* 2008; Kausmally 2008b), and the observations of the author found the skeletal remains from South Shields to be in good condition based on the preservation of the bone surface and good retention of whole skeletal elements. At Birmingham, around 60% of individuals were found to be in excellent or good condition, 24% fair, and 12% poor, with 6% in varied condition (Brickley *et al.* 2006). To assess the preservation of skeletal remains from Birmingham, researchers used the stages developed by Behrensmeyer (1978)

Behrensmeyer (1978) stages	Brickley <i>et al.</i> (2006) stage
Stage 0 – Bone surface shows no sign of cracking or flaking due to weathering. Usually bone is still greasy, marrow cavities contain tissue, skin and muscle/ligament may cover part or all of the bone surface	Excellent  Good
Stage 1 – Bone shows cracking, normally parallel to the fiber structure. Articular surfaces may show mosaic cracking of covering tissue as well as in the bone itself. Fat, skin and other tissue may or may not be present.	Good
Stage 2 – Outermost concentric thin layers of bone show flaking, usually associated with cracks, in that the bone edges along the cracks tend to separate and flake first. Long thin flakes, with one or more sides still attached to the bone, are common in the initial part of Stage 2. Deeper and more extensive flaking follows, until most of the outermost bone is gone. Crack edges are usually angular in cross-section. Remnants of ligaments, cartilage, and skin may be present.	Fair
Stage 3 – Bone surface is characterized [sic] by patches of rough, homogeneously weathered compact bone, resulting in a fibrous texture. In these patches, all the external, concentrically layered bone has been removed. Gradually the patches extend to cover the entire bone surface. Weathering does not penetrate deeper than 1.0-1.5mm at this stage, and bone fibres are still firmly attached to each other. Crack edges usually are rounded in cross-section. Tissue rarely present at this stage.	Fair  Poor
Stage 4 – The bone surface is coarsely fibrous and rough in texture; large and small splinters occur and may be	Poor

loose enough to fall away from the bone when it is moved. Weathering penetrates into inner cavities. Cracks are open and have splintered or rounded edges.	
Stage 5 – Bone is falling apart in situ, with large splinters lying around what remains of the whole, which is fragile and easily broken by moving. Original bone shape may be difficult to determine. Cancellous bone usually exposed, when present, and may outlast all traces of the former more compact, outer parts of the bones.	Poor

**Table 5.3 Stages of preservation as defined by Behrensmeyer (1978, 151) with corresponding stages defined by Brickley et al. (2006, 94).**

The Centre for Human Bioarchaeology also used a standardised approach to determining the preservation of skeletal remains from London sites (Table 5.4). Skeletal remains from Chelsea Old Church had “good” preservation in 89% of cases (Kausmally 2008a), those from St Bride’s lower had good preservation in 95% of cases (Kausmally 2008b), and at Cross Bones skeletal remains had good preservation in 85% of cases (Mikulski 2007). This approach was also used by the author to establish preservation in the remains from South Shields.

1 = Bone surface is in good condition with no erosion, fine surface detail such as coarse woven bone deposition would be clearly visible (if present) to the naked eye.
2 = Bone surface is in moderate condition with some post-mortem erosion on long bone shafts but the margins of articular surfaces are eroded and some prominences are eroded.
3 = Bone surface is in poor condition with extensive post-mortem erosion resulting in pitted and eroded cortical surfaces and long bones with articular surfaces missing or severely eroded.

**Table 5.4 Preservation categories used by The Museum of London Centre for Bioarchaeology (Connell and Rauxloh 2003).**

The ARCUS (1998) report detailing the osteological analysis of the Newcastle Infirmary site does not specify the method used to determine skeletal preservation. However, the articulated remains were described as being “preserved in a very good

condition with excellent cortical integrity, which provides an exceptional basis for osteological and palaeopathological examination” (ARCUS 1998, 5). This description is similar to the good to excellent preservation stages described by the Behrensmeier (1978) method and the categories outlined by the Museum of London Centre for Bioarchaeology (Connell and Rauxloh 2003), and suggests that all the sites discussed had a similar level of preservation.

The only site with no recorded observations on preservation is St Bride’s Church, London, but since these burials were contained within a closed crypt beneath the church building it is likely that the preservation of those individuals was also at least good. The good to excellent preservation of the individuals reduces the challenges to interpretation and indicates that there would be fairly consistent identification between sites of the more subtle metabolic conditions. This is important, since the analysis performed on these samples tests for differences in prevalence of metabolic conditions between the two socio-economic groups. The similarity of preservation between the sites of both high and low socio-economic status limits the influence of interpretation error on the results from this analysis.

#### **5.4 Nutritional Epidemiology: The study of population health**

Nutritional epidemiology examines the role of diet in disease within human populations (Willett 2013). Although the discipline itself is relatively young, the importance of nutrition in disease prevention has long been acknowledged. It was particularly during the 18th and 19th centuries that the link between diet and health started to be understood. In 1747 James Lind, medically trained at Edinburgh University and later a

surgeons' mate in the British Navy, conducted an experiment to identify a dietary cure for scurvy (Milne 2012). Lind's account of the experiment is as follows:

On the 20<sup>th</sup> May 1747, I selected twelve patients in the scurvy, on board the Salisbury at sea. Their cases were as similar as I could have them. They all in general had putrid gums, the spots and lassitude, with weakness of their knees. They lay together in one place, being a proper apartment for the sick in the fore-hold; and had one diet common to all...

Two of these were ordered a quart of cyder a-day. Two others took twenty-five drops of elixir vitriol three times a-day... Two others took two spoonfuls of vinegar three times a-day... Two of the worst patients, with the tendons in the ham quite rigid (a symptom none of the rest had) were put under a course of sea-water... Two others had each two oranges and one lemon given them every day... The two remaining patients, too the bigness of a nutmeg three times a day...

The consequence was, that the most sudden and visible good effects were perceived from the use of oranges and lemons; one of those who had taken them, being at the end of six days fit for duty. The spots were not indeed at that time quite off his body, nor his gums found; but without any other medicine, than a gargle for his mouth, he became quite healthy before we came into Plymouth, which was on the 16<sup>th</sup> June. The other was best recovered of any in his condition; and being now pretty well was appointed to attend the rest of the sick. (Lind 1753, 149-150)

This study was not only the first observation that fruit such as oranges and lemons could cure scurvy, but the treatise also contained an early example of a literature survey and a scientific test consisting of experimental and control groups.

Later in the 19th century, concerns were expressed about the nutritional health of soldiers serving in the Boer War of 1899-1902 (Cross and MacDonald 2009), and Joseph Rowntree published his 'Poverty: a study of town life' examining the living conditions of the labouring classes in York (Rowntree 1908). Rowntree, in particular, discussed the heightened vulnerability to disease which he believed could result from a deficiency in protein to argue for the improved conditions and wages of the poor.



Today, nutritional epidemiology conducts research using large-scale surveys to collect data on the diet of populations (Kelemen 2007). Such surveys commonly involve food frequency questionnaires or 24-hour dietary recalls, which depend on a sample of participants to record accurately their dietary intake over a period of time (Illner *et al.* 2012). These surveys are individually designed to identify particular diet-related health problems, such as maternal nutrient intake and risk of disease in infants, which can either be undertaken in a single survey, or can be repeated with the same participants over a number of years to establish trends in slow-developing conditions such as cancer and their potential relation to dietary habits (Kelemen 2007). In this way, nutritional epidemiology contributes to medical research and uses statistical methods to draw conclusions about the impact that diet has on disease. The results of such surveys can identify particular issues in the nutrient intake of a group, or the dangers of certain dietary habits, and such research can help to both improve the health of the population and reduce costs of medical care for preventable diseases.

#### **5.4.1 Methods behind diet and nutrition surveys**

Two modern nutritional surveys are used in this research: the National Diet and Nutrition Survey (NDNS) and the Low Income Diet and Nutrition Survey (LIDNS). The NDNS is a rolling programme and the data used within this analysis were collected over four years, between 2008 and 2011, using a random sample of 21,573 addresses from 799 postcode sectors (Bates *et al.* 2014a). For each household one adult and one child, or just one child were selected as participants and asked to complete a diary recording food and drink over four consecutive days (Bates *et al.* 2014a). Contextual information about dietary habits, demographic status, lifestyle, and physical activity was collected via a face to face interview with the participants (Bates *et al.* 2014a). Blood

and urine samples and physical measurements were taken from willing participants by a nurse who conducted a follow up visit after participants had completed the survey diary (Bates *et al.* 2014a).

The LIDNS focussed on the bottom 15% of the population in terms of deprivation, and a sample of 25,818 addresses was selected from deprived areas across England between 2003 and 2005 (Nelson *et al.* 2007). At each address a doorstep screening questionnaire was conducted to identify markers of deprivation, ensuring eligibility for the survey, and either two adults or an adult and a child were subsequently selected as participants from each address (Nelson *et al.* 2007). Trained interviewers conducted face-to-face interviews with the participants, who were then asked to fill out a self-completion questionnaire covering dietary intake on four random days, including at least one weekend day, within a ten day period (Nelson *et al.* 2007). A nurse visit then collected blood samples and physical measurements from willing participants (Nelson *et al.* 2007). The dietary data was processed in both surveys to calculate the nutrient intake for each individual.

The two nutritional surveys have very similar methodologies; therefore, it has been possible to merge them into one data set for statistical analysis. The need for using data from both the NDNS and the LIDNS results from the different aims of the surveys. The LIDNS specifically focussed on examining the effects of low income on diet, whilst the aim of NDNS was to

assess the diet, nutrient intake and nutritional status of the general population aged 1.5 years and over (Bates *et al.* 2014a).

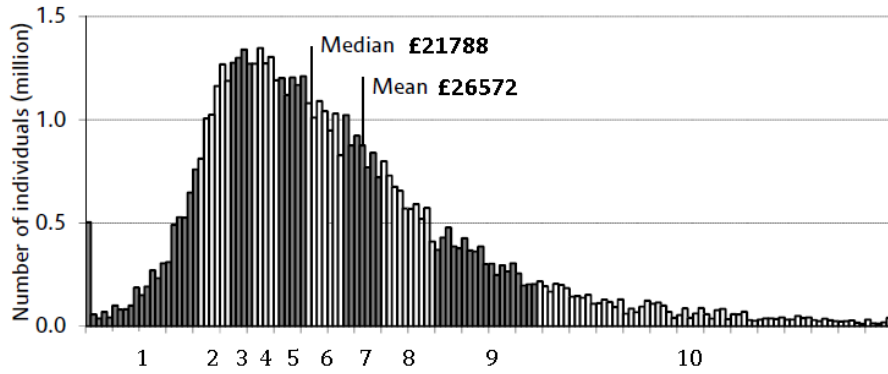
Although NDNS contains information on income, it does not aim to answer the question of whether there were health differences between those with high and low socio-economic status. LIDNS does, in contrast, focus on nutritional health in populations with low socio-economic status claiming to be a

sample of the most materially deprived households [which] provides nationally representative baseline data on the dietary habits and nutritional status of the part of the UK population that has a low income. (Nelson et al. 2007)

However, LIDNS only focuses on this low income nutritional health, without comparison with health found in those with high incomes. Therefore, the combination of both datasets provides information for both high and low income households across the UK for comparison of dietary intake and nutritional health.

#### **5.4.2 Implementation of diet and nutrition surveys**

Data for England was isolated from the NDNS and LIDNS and a merged dataset was created. Since the data derives from households at all levels of socio-economic standing, with household income also recorded, the data was split into groups of income according to decile groups established by the Institute for Fiscal Studies (Cribb *et al.* 2012).



**Figure 5.12** Income deciles as established by the Institute for Fiscal Studies (After (Cribb et al. 2012)). Deciles are split; 1=£0-£10920, 2=£10920-14040, 3=£14040-£16120, 4=£16120-18720, 5=£18720-21320, 6=£21320-£24960, 7=£24960-£28600, 8=£28600-£33800, 9=£33800-43680, 10=£43680+.

Deciles	Income ranges	Number households in decile	Percentage
1	£0-£10,920	2429	46
2	£10,920-£14,040	510	10
3	£14,040-£16,120	191	4
4	£16,120-£18,720	275	5
5	£18,720-£21,320	210	4
6	£21,320-£24,960	213	4
7	£24960-£28,600	213	4
8	£28,600-£33,800	348	6
9	£33,800-£43,680	313	6
10	£43,680+	609	11
Total		5311	100

**Table 5.5** Income deciles of survey participants in the NDNS and LIDNS data

The deciles displayed in Figure 5.12 split the population into low income and high income groups, with deciles 6 and 7 containing the average income bands.

Age group	Age ranges (years)	N age	%	LIDNS female	LIDNS male	NDNS female	NDNS male
1	0-3	423	7	49	51	147	176
2	4-6	398	7	59	42	148	150
3	7-10	512	9	74	75	176	187
4	11-14	494	8	75	64	172	183
5	15-18	485	9	56	57	191	181
6	19-50	1892	32	652	281	552	406
7	51+	1668	28	569	328	420	351
Total		5872	100	1534	898	1806	1634

**Table 5.6 Age and sex of survey participants in the modern NDNS and LIDNS data**

To facilitate statistical analysis, only deciles 1 and 2 (very low income) and 9 and 10 (very high income) were included in the analysis in Chapter 6. This makes it possible to undertake a comparison of high and low incomes and their association with meeting nutritional values. The resulting modern nutritional dataset contains observations on the nutrient intake of 5872 men, women, and children in England (5.6)

Dietary reference values (DRVs) are estimates of the nutritional requirements for populations and consist of a number of different recommendations (British Nutrition Foundation 2015). The Reference Nutrient Intake (RNI) is the amount of a nutrient which ensures that the needs of 97.5% of the population are being met, although many people within the group will need less of this nutrient (British Nutrition Foundation 2015). The Lower Reference Nutrient Intake (LRNI) is the amount of a nutrient which

meets the needs of just 2.5% of the population, whilst the majority will need a higher intake (Great Britain committee on medical aspects of food policy panel on dietary reference values 1991). Reference nutrient intake variables were created with observations of either ‘met recommended intake’ or ‘did not meet recommended intake’ which were accurate to the requirements of age categories and biological sex.

Multivariate logistic regression, adjusted for age and sex, was performed using the statistical software programme Stata (StataCorp 2013) to identify any association between socio-economic status and whether the RNI and LRNI were met for vitamin D, vitamin C, folate, vitamin B12, iron, vitamin A, zinc, selenium, iodine, magnesium, potassium, and calcium.

## **5.5 Potential Limitations**

Although working with modern populations is more straightforward than attempting to reconstruct the life experiences of people in the past, nutritional epidemiology does have limitations which may affect the reliability of results. Particularly important in this research is the problem of measurement issues, potentially present in any epidemiological study which uses food questionnaires (Cainzos-Achirica *et al.* 2018).

An unavoidable aspect of food questionnaires in surveys such as the LIDNS and NDNS is that they require individuals to accurately and truthfully report their own food intake, and this can lead to underreported nutrient and calorific outcomes (Cainzos-Achirica *et al.* 2018). There is little that can be done to alleviate this issue, but the large sample size used here should reduce the variability of the results. However underreporting is a factor which should be raised when discussing the results of such surveys. Another limiting aspect of nutritional epidemiology is the huge variety of food now available to

consumers and the comparatively small food composition tables on which nutritional analysis is based. This means that standard food tables may not be accurate for the many variations of food types available – for example different brands of the same product may differ in their ingredients and food tables will not pick these differences up.

## **5.6 Historical documentary research**

Historical research relies heavily on contemporary accounts of the past which can be conscious observations or opinions of an author, or administrative records which can provide information about historical events as well as more personal accounts of the lives of individuals, such as from diaries or autobiographies. The value of historical research is that a modern reader can directly access the words and opinions of those in the past, however this is also its main weakness. The challenge to any researcher using historical resources is the high potential for written agendas to obscure or mislead.

The historical resources examined in this research comprise texts written by contemporary authors in newspaper articles or books on the subject of poor relief laws and the nature of human poverty, and official documents such as registers and parliamentary bills or Acts and reports by Commissioners who worked for the government by presenting information relating to all kinds of subjects, from sanitary health to conditions within mines. Together, these texts and documents work to build a picture of past experiences as well as the attitudes towards poor relief and the attempts made by the government to amend the laws surrounding it and other conditions which affected the population. The Parliamentary Archives hold proposed Bills and Acts of the

House of Commons, which described in detail law amendments and proposals for amendments regarding food and poor relief.

### **5.6.1 Reconstruction of Diet**

Historical documents are good sources of information about the food which was eaten during the 19th century, particularly for working-class inmates of prisons and workhouses (for example, House of Commons 1836; House of Commons 1865), but cookery books also hint at the types and varieties of meals on the upper-class table (for example, Rundell 1806; Beeton 1861; 1865; 1907; Edinburgh School of Cookery and Domestic Economy 1908). Previous research has used similar documents to establish the dietary intake provided by institutions (Carpenter 2006; Smith and Thornton 2008; Reynolds 2016), while others have performed dietary reconstruction using autobiographies and budgetary sources (Davin 1996b; Horrell and Oxley 1999; Clayton and Rowbotham 2008a; Clayton and Rowbotham 2008b; Clayton and Rowbotham 2008c; Clayton and Rowbotham 2009; Horrell and Oxley 2012; Gazeley and Horrell 2013; Horrell and Oxley 2013; Meredith and Oxley 2015). There is good precedent for the use of these types of sources, however, they only reveal the dietary intake of the working-class population, so the inclusion of cookery books as a source of dietary data in this thesis aims to provide additional information about the diet of more affluent individuals in society.

After the passing of the 1834 Poor Law Act the Government kept detailed records of the food served to workhouse inmates, including how the food was cooked and the weight to be provided to each inmate based on their sex and age. Similar government documents also provide the same information for the dietaries of prisons. The ProQuest



database of UK Parliamentary Archives was invaluable for this research, and documents contained within the archive included reports on these institutional dietaries. A key word search was performed, excluding documents relating to Ireland, for the period 1800-1900, to identify documents which contained descriptive accounts of prison or workhouse dietaries. A total of six documents were included which contained detailed accounts of workhouse dietaries appropriate for dietary reconstruction (House of Commons 1836; Fazakerley 1837c; Fazakerley 1837b; House of Commons 1844; House of Commons 1853; House of Commons 1868), and a further six containing the established prison dietaries (House of Commons 1819; House of Commons 1825; House of Commons 1834b; House of Commons Papers 1843; House of Commons 1856; House of Commons 1865). Due to the number of prison dietaries available from these records, a system was created to ensure the random selection of dietaries, by picking the second county listed for each letter of the alphabet, and then selecting the first gaol listed.<sup>1</sup> The resulting collection of prisons were then followed through time in the records, and the dietaries in use were identified for every decade. Workhouse dietaries were less numerous, so each one discovered was included in the analysis.

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<sup>1</sup> Today, differences in the use of terms jail (historically written “gaol”) and prison relates to length of stay. Modern jails are commonly controlled by local law enforcement and are used for short imprisonments, while time spent in prison tends to be longer. Historically there does not appear to have been such a distinction, evidenced by the inclusion of dietaries at some gaols for inmates imprisoned for longer than six months. One example of this is the dietary at Chester Common Gaol in 1844 (House of Commons 1844, 31)

Using these government records, the nutritional component of prisons and workhouse dietaries were reconstructed based on each ingredient included in the diet. Nutritional values were ascertained for each food stuff using the United States Department of Agriculture (USDA) Food Composition Database (National Agricultural Library 2017), which is a free online resource providing the nutritive information for thousands of non-brand, unprocessed and unfortified foods, providing information on the nutritional components of the food by weight and cooking process. Although this database contains information for modern, US foods, the nutritional component of each recipe was estimated using the weight of each individual ingredient. Only food which was unfortified and unprocessed was selected from the database for use in this analysis.

For the dietary reconstruction of the upper classes, a selection of suggested menus was taken from the 1901 edition of *Mrs Beeton's Book of Household Management* which provided middle- and upper-class households with a huge range of recipes and suggestions for breakfasts, lunches, dinners, and suppers. As well as more sumptuous menu plans, such as twelve course meals for dinner parties, Beeton also includes "simple" or "economical" suggestions for family meals, often using the cold leftovers from the previous day. These suggested meals were selected for analysis in this thesis due to their simplicity and cheapness, to increase the likelihood that such or similar meals were regularly consumed by the average upper-class family. The aim was to provide the most accurate dietary reconstruction of a normal day in such a household, rather than a day in which excess may skew the results. The selected meals all had corresponding recipes within the same edition, and the nutritional component of each meal was reconstructed using the same technique as the workhouse and prison dietaries, using data from the USDA Food Composition Database. The results for reconstruction of both prison, workhouse, and recipe book meals can be found in Chapter 8.

There are obvious challenges to the interpretation of such dietary reconstructions. The first is that we cannot be sure that individuals ate the items listed, in the portions given, and cooked according to the recipes provided. In the case of institutional dietaries, it is impossible to know whether cooks used the correct proportion of ingredients, or prepared dishes using the set methods, and we cannot be sure that the food provided to each inmate was of the size or quality stated in such dietaries. Additionally, it is unknown whether the food served within institutions was of a similar quality or quantity available to working-class families providing for themselves. Similarly, it is impossible to ascertain whether the recipes and meals suggested by Mrs Beeton were followed and eaten in upper-class households, or what size portion individuals would have chosen, or whether other snacks throughout the day would add to the overall nutritional consumption of a person. Nonetheless, dietary reconstruction provides additional insight into the types of food that were available and the potential nutritional quality of the diet in the 19th century. It is not an infallible method, and conclusions should never be drawn entirely from its results, but alongside the other forms of evidence presented in this thesis it provides some additional detail to the picture of 19th-century diet.

### **5.6.2 Average height**

Height is an anthropometric indicator of developmental nutritional health, used by the World Health Organisation to establish malnutrition in children and socio-economic conditions within developing countries (WHO 2016). Factors such as genetics, nutrient intake, environmental conditions, and health all impact on growth during childhood, with poor experiences of any one of these leading to stunted adult height (Perkins *et al.* 2016). Height data from history can be used to aid our interpretation of the adequacy of past nutritional health or environmental conditions, by examining fluctuations in

average height across a period of time, in this case the 19th century. The average height data presented here represents the working classes from across the 19th century, and it was compiled from administrative and descriptive records relating to criminal convicts who receive the punishment of transportation for their crimes. Previously, average height estimates for much of the 19th century have been ascertained from records of British army and marine recruits, and much work has been conducted on this particular data (Macleod 1895; Floud *et al.* 1990; Steckel 2001). However, there are challenges to using data such as this, particularly since it only contains the heights of male recruits who would presumably have been of acceptable physical health for the role. This removes both women and men who did not reach adequate recruit height from our understanding of past nutritional health.

Secondly, the complicated enforcement of minimum height requirements for recruits meant that many young men who did not meet the set height would have been refused entry into the services and as a result the average in the data will be taller than the actual average of the general population. Table 5.7 shows some evidence for the changes in height restrictions across the century as well as the differences between services as recorded in various bills of parliament and reports and papers presented to the House of Commons. The list in Table 5.7 is by no means exhaustive of the records detailing recruit height restriction changes over the century, but it illustrates the frequency of the change in the different services. In it, the infantry alone underwent four changes to the specified minimum height over 100 years, and the final difference between men recruited to the Artillery in 1901 and those recruited to the Cavalry in 1899 is 5 inches. Clearly these changes and differences present difficult challenges to the use of Army or Marine records when compiling average height records, particularly for the investigation of nutritional health changes over time, as fluctuations in the data may be

the result of a change in height restriction rather than a change in childhood nutritional quality.

There were many wars during the 19th century which involved British troops, most notably the Napoleonic Wars which took place between 1792 and 1815 (Forrest, Hagemann, and Rendall 2009). Conflicts such as these had untold effects on the lives of millions of people, both civilians and military personnel, and the impact that war had on the nutritional health of the British population would have been dependent on many different circumstances. For example, the location of the war would affect what food sources were available to soldiers, as well as potential disruption to trade routes which could impact on food prices or availability at home, while the length and expense of wars would impact on the economy and potentially drive up food prices in England. Many such factors could affect the nutritional status of men, women, and children in England during wartime, however, research using anthropometric data from children born and living through the First World War found there to be no indication of any changes to nutritional health at that time (Harris 1993). This is an extensive and important area of research, but it is beyond the scope of this thesis.

Material accessed from the National Archives consists of criminal registers from male and female prisons (HO 26, MEPO6, Manchester Prison registers, PCOM 3, PCOM 4) which contain the files of convicted individuals, including information for name, age, occupation, and physical descriptions including height. The value of these records is that they are far more representative of the general population (at least of the population who were convicted of a crime), as they include both male and female individuals with no limitation on height or age. In total, height information was gathered for 5371

convicts, consisting of 3117 women and 2254 men who were born throughout the years of the 19th century.

<b>Date</b>	<b>Regiment</b>	<b>Minimum Requirement</b>	<b>Reference: (House of Commons Parliamentary Papers)</b>
1801	Militia	5 feet 4 inches	(1801-2)
1806	Army	5 feet 2 inches	(1806)
1807	Army Home service	5 feet 2 inches	(1807)
1814	Regular Army	5 feet 4 inches	(1814-15)
	Militia	5 feet 2 inches	
1847	Heavy Cavalry	5 feet 7 inches	(1847-8)
	Light Cavalry	5 feet 7 inches	
	Infantry	5 feet 6.5 inches	
1850	Cavalry	5 feet 7	(1850)
1859	Militia	5 feet 4	(1859)
1861	Horse guards:		(1861)
	1 <sup>st</sup> Dragoons	5 feet 8	
	6 <sup>th</sup> Dragoons	5 feet 6	
	Light Dragoons	5 feet 4.5	
	Infantry	5 feet 4	
1862	Artillery	5 feet 8	(1862)
1867	Militia	5 feet 4	(1867-8)
1871	Army Home Service	5 feet 5.5	(1871)
	Artillery and Infantry	5 feet 6.25	
1874	Infantry	5 feet 5	(1874)
1875	Infantry	5 feet 5	(1875)
1881	Cavalry:		(1881)
	Heavy Dragoons	5 feet 8	
	Medium Dragoons	5 feet 7	
	Light Dragoons	5 feet 6	
	Infantry	5 feet 5	
1882	Infantry	5 feet 4	(1882)
1892	Infantry	5 feet 4	(1892)
1893	Army Home Services	5 feet 4	(1893-4)
1899	Cavalry	5 feet 7	(1899)
	Infantry	5 feet 4	
1901	Artillery	5 feet 2	(1901)
	Infantry	5 feet 3	

**Table 5.7 Minimum height requirements for army and marine recruits (male) across the 19th century.**

The relevant records were identified by discerning the government departments which would contain law enforcement and prison documents. Each of these departments was sorted through to establish records of potential use based on the name and description of each one. Once identified, file samples from each record were viewed, either online or in the archival reading room of the National Archives, and it was established whether or not height had been recorded. Data was methodically collected from these documents, working through the documents to reach a similar sample size for each decade of the century. Since these documents were compiled from information recorded in prisons around the country, aspects of the data such as age, crime committed, and location of arrest or birth were already randomly organised. The only relationship between the individual records implemented in this data collection was the date of arrest. Since a large sample was required for this analysis, any documents which could be accessed and which contained the relevant information were utilised for data.

Two separate datasets were created, for women and for men, and the final data consisted of record reference number, type of record, date of record, name of individual, age of individual, height inches, height cm, crime committed, place of arrest/birth, coded place of arrest/birth, occupation, coded occupation, coded occupational class, year of birth, decade of birth, and sex of individual. Before analysis, occupations contained within this dataset were organised according to the classification guidelines from the 1881 census of England and Wales (Woollard 1999). These classifications include classes 1-6, which in order are professional, domestic, commercial, agricultural, industrial, and unoccupied (Woollard 1999, 42-52). In the datasets presented here, the class “unoccupied” as suggested by Woollard (1999) was split into two further categories. In this research, class six consists of individuals whose occupations were recorded as “prostitute” (referred to by the author as sex workers), “traveller”, or “vagrant”.

Individuals assigned to class 7 in this thesis had occupations listed as “wife” or “housekeeper”, and although these individuals were not active in the workforce, and therefore technically “unoccupied”, they were also not synonymous with travellers or sex workers and are likely to have had a different social standing.

Individuals contained within these records were predominantly occupied in domestic service or roles in industry. This suggests that a majority working-class population is represented by the data. Previous research implementing data from penal records supports this deduction, and it has been argued that far from there being a ‘criminal class’ which is separate from the working classes, even those individuals labelled habitual criminals by the police forces at the time did in fact have occupations and belonged to the labouring Victorian population (Johnson and Nicholas 1995, 472-3). From the occupational roles shown in Table 5.8, it is clear that only a minority of these people are contained within class 6, which is comprised of only 0.8% of the male sample (all of whom were termed “vagrants” or “travellers”, no men were described as “prostitutes”), while female vagrants and sex workers represent only 3.8% of the data. Similarly, only 5.5% of men and 1.6% of women had occupations of a professional class level, suggesting that the middle and upper-classes are not represented in this data.

<b>Occupational class</b>	<b>Description</b>	<b>% Women (n=3402)</b>	<b>% Men (n=3217)</b>
1	Professional class	1.6	5.5
2	Domestic class	29.6	1.5
3	Commercial class	0.4	8
4	Agricultural class	0.7	3.4
5	Industrial class	32.2	75.1
6	Travellers and sex workers	3.8	0.8
7	None	31.7	5.7

**Table 5.8 Occupational classes of individuals included in the datasets based on those from (Woollard 1999)**



Places of birth/arrest were also organised into counties and large urban areas both to establish that the data represented each region of England and also to test for the possible effects of regional differences in height. Since individuals included in this data came from both urban and rural areas, and came from a number of counties around the country, this dataset is representative of working-class men and women across England. Urban areas did represent a large proportion of the data, particularly London, however a large number of individuals also came from the counties of Lancashire and Yorkshire, and smaller numbers from many different rural areas around the country.

Once the data were collected, cleaned, and plotted it became clear that it was not linear in nature and as such simple linear regression would limit the interpretation of trends across the century. Instead, the data was separated into decades using linear splines, which also allowed for the individual years of birth to be represented rather than placing them into decade categories. These splines allowed the data to be analysed using logistic regression analysis as a piecewise function, testing for association between average adult attained height and year of birth. In this way the change in height between decades (i.e. between 1800 and 1810, between 1810 and 1820 etc.) was assessed to establish whether it was not significant and the null hypothesis – that there is no association between height and birth year – was true, or if it was a significant result and our alternative hypothesis of a relationship between year of birth and adult attained height could be accepted. In order to explore the potential causes of significant height changes between decades, the data was organised by year of birth, for example, the height of a 27-year-old man which was recorded in 1834 would represent the year 1807.

## **5.7 Chapter summary**

This chapter reviewed and discussed the methods behind the research performed here, including those employed by other researchers, and also provided information about the data itself. It highlights the interdisciplinary nature of this research and, as well as Chapter 2, the originality of the work presented here. The use of well-established methods and data from archaeology, nutritional epidemiology, and history allows for the question of nutritional health changes to be approached from different perspectives. This interdisciplinary approach broadens understanding and allows for better insight into past events and present challenges. The following chapter will introduce contextual historical information about 19th-century politics before chapters six, seven, eight, and nine discuss modern policies in light of historical and archaeological evidence.

## **Chapter 6 Results: Nutritional data Analysis**

This chapter will present the results for the nutritional health of the English population produced from analysis of 19th-century archaeological sources and 21st-century survey data from the LIDNS and NDNS. These results will then be discussed within the context of historical evidence for the diet of children in the past. This evidence for infant and child feeding practices will be presented and followed by an extensive discussion exploring the topic, which has previously received only limited attention in the literature (See Davin 1996b). From the archaeological and historical evidence and discussions, three aspects of nutritional health emerge which remain relevant to modern Britain, and these are reviewed: vitamin D deficiency; breastfeeding rates; and food availability in Early Years settings.

### **6.1 Results of Nutrient Intake and Metabolic Pathology**

Results from logistic regression analysis on the modern nutritional surveys and the skeletal pathology datasets show evidence for risk of nutrient insufficiency in individuals from across the two centuries (Table 6.1). The tests were adjusted for the potential confounders of sex and age, and cluster analysis was performed on the skeletal sample in order to take account of the geographical distribution of the cemeteries. The modern results display the risk of individuals from very high or very low income households having nutrient intakes below the LRNI level, while the 19th-century results indicate the risk of high- or low-status skeletal remains presenting with pathologies resulting from nutrient deficiency. The results displayed in Table 6.1 refer to children unless otherwise specified, since only scurvy is a condition which can be active in later life. In addition to these results, Table 6.2 presents analysis of the modern LDNS and

NDNS data for adults (over the age of 18 years), and illustrates that there is further inequality in nutrient intake between different socio-economic groups during adulthood.

An odds ratio (OR) of 1 indicates that there is no difference between socio-economic groups. An OR greater than 1 indicates greater nutrient insufficiency in the high-socioeconomic group, while an OR less than 1 indicates greater nutrient insufficiency in the low-socioeconomic group. Although the OR indicates differences in the rates of nutrient intake between the two socio-economic groups for each sample, this result is only taken to be statistically significant if the P-value is less than or equal to 0.05. These statistical tests have been performed at a 95% confidence interval (CI), which indicates the range within which results for the same analysis on the whole population would fall 95% of the time.

The results outlined below are not directly comparable. However, the aim of presenting these results is to examine the difference in health between the two socio-economic groups in each dataset. Since it is the change in the risk of deficiency that is being explored, the problem of having different types of data for these centuries is reduced. Instead we can see how nutrient deficiency affected members of the English population according to social status in the 19th century in comparison with the present.

Modern dataset (intakes below LRNI)							Skeletal dataset (prevalence of metabolic pathologies)						
Nutrient	n=	% high income	% low income	OR	95% CI	P=	Condition	n=	% high status	% low status	OR	CI	P=
Vit. D (blood)	224	8	31	0.20	0.91, 0.45	<0.01	Resid. rickets	1139	9	7	2.4	1.79, 3.22	<0.01
Calcium	1368	4	8	0.54	0.31, 0.93	<0.05							
Vit. C (adult)	3861	0	2	0.13	0.03, 0.55	<0.01	Scurvy (adult)	1150	1	3	0.93	0.05, 18.4	0.96
Vit. C (child)	949	0	0	1			Scurvy (child)	480	9	10	0.89	0.31, 2.59	0.84
Folate	1368	1	2	0.61	0.24, 1.52	0.29	Cribra Orbit.	963	13	18	0.99	0.44, 2.27	0.99
Vit. B12	1368	0	0	0.19	0.22, 6.58	0.84	Enamel hyp.	905	74	77	0.92	0.39, 2.15	0.85
Vit. B6	1368	8	8	0.93	0.59, 1.44	0.74							
Iron	1368	11	14	0.84	0.57, 1.25	0.39							
Vit. A	1368	6	13	0.48	0.31, 0.72	<0.01							
Zinc	1368	8	16	0.48	0.33, 0.53	<0.01							
Selenium	1368	11	45	0.10	0.07, 0.15	<0.01							
Potassium	1368	9	11	0.82	0.52, 1.29	0.39							
Magnesium	1368	13	19	0.54	0.36, 0.79	<0.01							
Iodine	1368	6	9	0.66	0.41, 1.06	0.09							

**Table 6.1 Results of nutrient intake from modern combined NDNS and LIDNS data and presence of metabolic pathology from 19th-century skeletal data. Unless otherwise stated, these results refer to children (defined as less than 18 years of age in modern data), since residual rickets, cribra orbitalia, and enamel hypoplasia are conditions formed during development and so represent health during childhood even in adult skeletal remains. Scurvy can be active at any stage in life, therefore the data is split into adult and child results for vitamin C/scurvy.**

Results of the modern nutrient intake values presented in Table 6.1 indicate that children from low-income households were more likely to have nutrient intakes below the LRNI for calcium, vitamin A, zinc, magnesium, and selenium than children from high-income households (see chapter 5.4.2 for LRNI description). Furthermore, children from low-income households are also more likely to have a vitamin D blood level below the established adequacy level of 25nmol/L (Bates *et al.* 2016), than children from high-income families. These results are all found to be statistically significant.

<b>Modern dataset (adult intakes below LRNI)</b>						
Nutrient	n=	% high income	% low income	OR	95% CI	P=
Vitamin D (blood)	622	12	30	0.30	0.19, 0.45	<0.01
Calcium	3861	4	8	0.49	0.34, 0.71	<0.01
Folate	3861	1	5	0.24	0.12, 0.47	<0.01
Vitamin B12	3861	0	1	0.19	0.05, 0.81	<0.05
Vitamin B6	3861	8	15	0.63	0.49, 0.82	<0.01
Iron	3861	9	19	0.50	0.39, 0.65	<0.01
Vitamin A	3861	5	11	0.40	0.29, 0.55	<0.01
Zinc	3861	6	12	0.39	0.29, 0.53	<0.01
Selenium	3861	22	76	0.06	0.05, 0.08	<0.01
Potassium	3861	9	23	0.42	0.32, 0.53	<0.01
Magnesium	3861	10	23	0.40	0.32, 5.1	<0.01
Iodine	3861	4	9	0.51	0.36, 0.73	<0.01

**Table 6.2 Results of logistic regression analysis showing the risk of nutrient intake below the LRNI for adults**

From the skeletal data, it is found that children from both high- and low-socioeconomic status groups were at equal risk of vitamin C deficiency (scurvy) and indicators of metabolic stress potentially arising from malnutrition (cribra orbitalia and enamel hypoplasia). No difference was found in the risk of scurvy between adults from different socio-economic groups. However, prevalence of vitamin D deficiency (residual rickets) was found to be around 2.5 times more common among high-status children, which was

a statistically significant result. This result could be due to the osteological paradox (Wood *et al.* 1992), however if the results for rickets prevalence were due to the differential survival rates of children we would expect to see similarly significant results for cribra orbitalia and enamel hypoplasia, since both of these conditions were also formed during childhood. This suggests that there may be an alternative reason for a higher prevalence of rickets in children from high socioeconomic backgrounds.

Further analysis of the modern adult data from the combined LIDNS and NDNS dataset found that adults from the low-income group were at higher risk of having nutrient intakes below the LRNI for all 12 nutrients tested, and were also at higher risk of blood vitamin D level below the established adequacy level (Table 6.2). All of these results were found to be statistically significant.

### **6.1.1 Interpretation**

These results suggest that the risk of poor nutritional health posed to groups with different socio-economic status has changed considerably over the preceding centuries. The prevalence of insufficient nutrition appears to be higher among both low-income adults and children in the modern population, as shown by higher proportions of those from low incomes with nutrient intakes below LRNI levels. In particular, levels of selenium, vitamin D, iron, zinc, and vitamin A are of concern, since between 11-76% of the low-income population have reduced intake in these nutrients. In contrast, the 19th-century results suggest a far higher level of nutritional equality between high- and low-status individuals, with no significant difference found between status and the risk of presenting with pathological signs of vitamin C, iron or vitamin B12 deficiency, and metabolic stress. Furthermore, the risk of vitamin D insufficiency in association with socio-economic status appears to have been reversed since the 19th century, since high-

status individuals were significantly more at risk of presenting with rickets, whereas the modern results show low-income individuals to be significantly more likely to have low vitamin D blood concentration levels than those with high incomes.

When taken alone, this evidence suggests that, since the 19th century, there has been an increase in nutritional inequality between socio-economic groups to the detriment of low-income groups. It would appear that inadequate nutritional health has changed from being a problem which affected people regardless of their socio-economic status, and was potentially made worse by high-status lifestyles, to one which has become an issue commonly found in low-income groups today. Since high-status, 19th-century remains are significantly more at risk of showing signs of rickets, it follows that calcium deficiency may also have been a problem for these people, particularly since the fortification of flour did not occur in Britain until the 1950s (Scientific Advisory Committee on Nutrition 2012).

Similarly, the tests for signs of iron, vitamin B12, or folate deficiency (cribra orbitalia), as well as vitamin C deficiency (scurvy), and general metabolic stress (enamel hypoplasia) would suggest that it was malnutrition in general that transcended social class boundaries, since it is unlikely that individuals were deficient in just one nutrient at a time. These results for disease prevalence support previous work which has found similarly high rates of metabolic disease in high-status skeletal remains (Giuffra *et al.* 2013; Newman and Gowland 2016). The relationships between vitamins and minerals in foods and in the body make it unlikely that an individual could be deficient in just one nutrient, and the distribution of nutrients within food means a restrictive diet is likely to result in several types of deficiency.



Recent historical evidence examining the high mortality rate among the wealthy in 19th-century England further support the apparent level of health equality shown in the data presented here. (Razzell and Spence 2006). Razzell and Spence (2006, 399) point to the hazards of wealthy living as the cause of greater mortality levels among the wealthy during this period “The economic capacity to consume tobacco – along with an excessive consumption of food and alcohol – undoubtedly damaged the health of the wealthy. These patterns of consumption along with a lack of physical activity may have been largely responsible for the high adult mortality of the rich”. Their argument is supported by the research of Bivins and Marland (2016) who discuss the increasing number of books detailing how to manage weight loss which appeared during the mid-19th century, and Kennaway and Andrews (2017) who examine the glorification of digestive complaints and their connection with wealth and luxury during the 18th and early 19th century. However, it has been previously noted that the diet was poorly balanced, and that the exclusion of fruits and vegetables would have led to vitamin deficiencies and possibly mild forms of scurvy (Drummond and Wilbraham 1957). This theory is supported by the evidence here. Whereas restrictive budgets among low-income families may have prevented their consumption of a nutritionally balanced diet, evidence points towards aspects of the wealthy 19th-century lifestyle which were potentially even more detrimental to bodily health.

## **6.2 Historical Evidence for Nutrient Intake**

Having discussed the results for the association between metabolic stress and socio-economic status, the following sections will turn to the historical evidence for nutrition in the 19th century. The historical evidence lends support to the skeletal findings of equality in the prevalence of metabolic pathology between high- and low-status remains, and also to the finding that severe vitamin D deficiency was more prevalent

among children from high socio-economic backgrounds. This section will address the historical evidence for rickets (vitamin D deficiency), infant feeding practices, the process of weaning, and the introduction of “adult” food during later childhood.

### **6.2.1 Vitamin D Deficiency**

As previously discussed in Chapter 3, vitamin D is not primarily absorbed from the diet, rather it is synthesised in the skin through a process activated by UVB light. Not only is this not a dietary deficiency, but the 19th-century results show rates of residual rickets, not the active form osteomalacia, thus they represent the lifestyle during childhood.

This prevalence of rickets in the skeletal remains suggests that children who were raised in high-status families more often had infrequent exposure to sunlight, preventing vitamin D synthesis, while the same is true among low-income modern children.

Because this is not a dietary nutrient, the cause of historical and modern deficiency will be discussed separately here since there are different factors affecting intake.

According to a 2016 report from the Scientific Advisory Committee on Nutrition, around 30-40% of the population had a blood plasma vitamin D concentration below 25nmol/L during the winter months (Scientific Advisory Committee on Nutrition 2016).

On the basis of this report, Public Health England issued new advice to the general public, which recommends that from October to March a daily vitamin D supplement should be taken by everyone in the population, but particularly by pregnant and breastfeeding women, infants and young children, people who spend very little time exposed to the sun, people aged over 65 years, and ethnic minority groups (Public Health England 2016b). The incidence of vitamin D insufficiency has been found to be associated with later childhood, low levels of outdoor exercise, and receipt of income support, and has a far higher prevalence among non-white children (Absoud *et al.*

2011). Modern cultural behaviour involving more time being spent indoors away from sunlight, particularly in Britain where light is limited, is seemingly behind the large prevalence of vitamin D insufficiency present in the modern population.

Determining the cause behind vitamin D deficiency in the 19th-century population requires far more discussion, since surveys of time spent outdoors and prevalence rates according to a variety of factors are not available. One theory about the cause of rickets in children historically is that prolonged swaddling practices resulted in inadequate sunlight exposure (Veselka *et al.* 2015). However, clinical studies on modern infants and children have found no association between swaddling practices and rachitic development (Urnaa *et al.* 2006; van Sleuwen *et al.* 2007). Wearing occlusive clothing is another potential cause behind the reduced exposure of children's skin to sunlight. However, although this has been suggested in previous publications (Giuffra *et al.* 2013; Veselka *et al.* 2015), no investigation has been undertaken into the types of clothing that children from wealthy families wore, nor how occlusive the clothes really were that were worn by infants aged up to 2 years (the most common age for developing rachitic symptoms). A further possibility is that the polluted atmosphere in and around the cities from which these skeletal remains originated acted to block out much of the sunlight, so much so that these children were receiving reduced UVB because of the quantities of pollutants in the air. This theory does appear to be supported by evidence from research into population movement and pollution, as the huge rise in urban living led to increases in smoke from industrial and domestic coal burning which blocked out the sun over densely inhabited areas (Hardy 2003). This phenomenon has been more recently studied in India, where it was determined that children in areas with high pollution were at higher risk of developing severe vitamin D deficiency than children from less polluted areas of the same city (Agarwal *et al.* 2002).

However, in 19th-century England the rich and the poor lived essentially side by side, although perhaps in different streets or neighbourhoods, certainly under the same sky. Indeed, at least one of the sites from which the high-status human skeletal remains included in this analysis were sourced, Chelsea Old Church, was still a suburb of London in the early 19th century, having not been subsumed into the urban mass at that point in time, and would therefore have potentially had less severe levels of pollution (Cowie *et al.* 2008). As such, if air pollutants were the direct cause of rickets in the 19th century, then we would expect to see no difference in the risk of pathology between high- and low-status remains, since it would have also caused rachitic lesions in low-status children. As it stands, the higher risk of deficiency in high-status children may be revealing an alternative story.

It is well established that working-class adults and children alike spent much of their time outdoors, on the streets of urban areas for both work and play (Davin 1996a; Heywood 2013). A series of photographs focusing on working-class crowds around the streets of Newcastle between 1850 and 1860 reveal the various activities which would occur outside in urban areas (NEIMME 2016). These photographs picture vendors selling their products, crowds of people drawn to street entertainment, and often feature young children either with their parents or playing in groups, such as in Figure 6.1 below.

In contrast, written accounts of childhood in mid 19th-century middle and upper class households describe the long periods of time that children spent confined in day-and-night nurseries situated at the top of the domestic home, separated from the outside world (Hamlett 2013). Those with means could afford to surround themselves with a physical barrier against the constant reality of poverty, disease, and death in the urban streets outside by closing their front doors and arranging their home environments to

reflect the refined behaviours and ideals of the middle and upper classes (Davidoff and Hall 2002). It is possible that the combination of factors, such as occlusive pollution over urban areas and young children being contained within certain indoor spaces, may have acted as catalysts for the development of rickets in high-status, 19th-century children.



**Figure 6.1 Young children playing in the streets of Newcastle in the mid-19th century, provided by (NEIMME 2016), reference number: NEMiPA-SAGP031.**

As well as nutritional diseases, rickets in children has also been linked with increased risk of mortality from respiratory diseases since the early 20th century (Hardy 1992; Walker and Modlin 2009). In particular, cases of whooping cough were well-established to be linked to rachitic conditions in children from 1913, when it was noted that rickets was often present in children who died from this respiratory infection (Hardy 1992). Hardy (1992) puts forward evidence that a reduction in the frequency and severity of

ricketts was likely to have been a key factor in the decline of whooping cough mortality during the initial years of the 20th century, pointing to improved child-care practices rather than improvements to nutritional quality. Hardy (1992) argues that, had it been nutritional improvements which led to a decrease in whooping cough, then there would have been a similar decrease in the rate of mortality from other childhood diseases such as measles. As it is, the steady rate of measles mortality during the period before 1915 suggests that it was environmental and cultural changes which affected whooping cough and ricketts, rather than nutritional improvements. There are many more infectious diseases which are intrinsically linked to nutritional health, such as cholera which was particularly prevalent during the 19th century with four major outbreaks occurring between 1831 and 1866 (Snow 2002; Condrau and Worboys 2007). It is well established that individuals who are already malnourished are more vulnerable to infectious disease, and in cases such as cholera the disease itself can result in poor nutritional health due to the acute diarrhoea which prevents intake and absorption of nutrients during infection (Molla *et al.* 1982). However the impact of infectious diseases on the nutritional health of the 19th century population is beyond the scope of this thesis.

In 1940, the Ministry of Food conducted the first National Food Survey which was to become the longest running survey of household food consumption in the world (Ministry of Food 1951). The purpose of the survey of working-class consumption was to provide an “independent check on the food consumption and expenditure of the population during the war and thus to assess the effectiveness of the Government’s war-time food policy” (Ministry of Food 1951: iii). In this survey, the role of such policies as the introduction of canteens in government factories, Local Authority based “British

Restaurants” for the provision of cheap meals, and the expansion of the school meals service after the start of the war was discussed (Ministry of Food 1951: 9).

Nutrition began to improve after the advent of war in the early 20th century. This led directly to such nutritional policies as the National Milk Scheme, which provided free or subsidised milk to young children and pregnant women, and the Vitamin Welfare Scheme which aimed to supplement the diet of young children after war time rationing of fresh fruit, butter, and eggs created shortages in the diet (Ministry of Food 1951). This scheme provided free supplements, such as cod liver oil and blackcurrant syrup, to children under two years of age from 1941, which was then extended to children up to five years and pregnant women with the replacement of blackcurrant syrup with orange juice in 1942, and from 1943 pregnant women were also provided vitamin A and D tablets (Ministry of Food 1951). The 1951 report of the war years of The National Food Survey summarised that “these measures went beyond the replacement of losses in the diet occasioned by the war. They amounted to a positive policy for increasing the provision of those nutrients in which the pre-war diet of the majority who benefited from them had been deficient” (Ministry of Food 1951: 9). This policy marked the first time that the nutrient intake of children had been specifically targeted in Britain. Studies at the time indicated that such nutrient supplementation was working to improve the health of children by observing the increase in the average height of 18,000 children of the same age between 1938 and 1944 (Magee 1946).

### **6.2.2 19th-Century Infant Feeding**

During the 19th century, the choices of healthy infant feeding were limited, particularly for low-income families. The wealthy had access to more choices than the poor, and if a wealthy woman could not or would not breastfeed they could employ a wet nurse to

provide this service. For poor women, nursing was a good source of income and wet nurses frequently advertised their services in newspapers. Wet nurses shared the common situation of having recently been through pregnancy and birth, but advertisements placed in the *The Times* from 1801 to 1900 indicate that these women found themselves in very different circumstances (The Times Digital Archive Online). Many such adverts were placed by married women, the children of whom had reached a certain age, an example being the case of a “healthy young married Woman, whose own infant is nearly four months old, and whom she would wean” (The Times 1816, 4). Other women were less fortunate; “a respectable healthy young married Woman, with a good breast of milk; has laid in 10 weeks, but lost her child” (The Times 1814, 4). Although reference to a child passing in these adverts was rare, many noted the health of their child to increase their worth; “has not the least doubt but her own child will be a strong recommendation” (The Times 1813, 4), hinting at the possibility that many more breastfed children passed away within the first weeks or months of life but were not mentioned in the advertisements for fear of the mother appearing unhealthy or unfit for the job.

There is also evidence to suggest that women who took positions as wet-nurses for wealthy patrons, but who had surviving children, sent their own offspring out to be nursed in turn. In newspaper coverage of a court case, a young woman discovered that her husband was already married, and after giving birth to their child left his home to work as a wet nurse; “having obtained a situation for herself as a wet-nurse in a gentleman’s family, she placed her child out at nurse, and quitted the defendant entirely” (The Times 1816, 3). These secondary nurses must have charged less than the earnings of wet nurses, otherwise there would be no financial incentive for the wet nurse to work. It is likely that these children were sent to a dry nurse, a woman who fed



the child pap or animal milk, which would have been a cheaper alternative to wet nursing (Fildes 1995, 109).

Aside from those women employed within the home as wet nurses or otherwise engaged in roles which took them away from their children, recent studies concerning infant diet in the 19th century provide evidence for the high prevalence of breast feeding in low-income populations in London at that time. Results from stable isotope analysis of 72 infant remains from Spitalfields suggests that weaning took place before the age of one (Nitsch *et al.* 2011), whilst analysis of 42 individuals from St Saviour's Almshouse burial ground in Southwark revealed that infants received non-breast milk foods at the average age of 6 months (Henderson *et al.* 2014).

This direct evidence suggests two things; first that children of the poor were frequently fed using breastmilk (although perhaps not exclusively), and second that they were being weaned at around 6 months of age. There are further sources from historical child-rearing advice texts which explicitly state the common feeding behaviours that high- and low-income women engaged in with their children. Dr Hugh Smith (1801, 67) noted that the upper classes were commonly refusing to breastfeed their infants at that time, and that "the peasant, whom necessity compels to follow nature, is, in this respect, happier than his lord", and Dr Michael Underwood (1806, 390), physician to the Princess of Wales and member of the Royal College of Surgeons in London, acknowledged that "Fashion, has prevailed over the good sense and natural feelings of many, whose maternal affection can be, in no other instance, suspected". Dr William Moss (1808, 25), surgeon to the Liverpool lying-in charity, similarly commented that "some mothers are not disposed to suckle their own children", while Dr Frederick Corbyn (1828, 9), member of the London Royal College of Surgeons, stated that "In the higher stations of life in Britain, ladies have deemed the office of nursing derogatory; as

in their opinion, it assumes the appearance of the poorer orders of persons". Although some of these texts were published in the United States and one in India, all of the authors were British doctors or were associated with a British medical organisation, and it is clear from these texts that the authors were drawing from their experiences in the UK. There are striking similarities in the arguments, suggestions, and warnings given by the various authors, that mothers should breastfeed their own children. Corbyn (1828, 10) provided some explanations for the disinclination of the wealthy to nurse their own children, citing the belief that breastfeeding ruins the figure, prevents ladies from attending social engagements, and leads to ill health. However, each author insisted that there could be no substitute for breastmilk and urged their readers to provide for their own children, or at least to hire a respectable wet nurse for the charge.

There is evidence that the working classes were concerned with the diet of their infants, and that breastfeeding was preferred over artificial foods due to the safety concerns of parents (Pooley 2010). Reynolds (2016) in her examination of the childcare practices of working-class northern mothers during the 19th century describes how, although some infants were fed pap by nurses while their mothers were at work, many women factory workers did find ways of breastfeeding their infants while they worked. Working mothers in factories would have their baby minder bring the child to them during breaks so that they could breastfeed during the day, and some mothers managed to take their infants to work with them or go home regularly during the day to feed (Reynolds 2016).

The testimonies of these medical professionals suggest that large numbers of the upper classes were not breastfeeding their own infants, and hint at a much higher prevalence of the practice amongst the poor. This is supported by previous studies on the topic during the early 20th century, using evidence from Annual Reports of the Medical Officers of Health, which found that the majority of poor mothers at least partially

breastfed their infants, whilst infants born to wealthy families were more likely to receive artificial substitutes (Fildes 1992). Furthermore, the number of wet nurses advertising in *The Times* from the early 19th century suggests that there may have been a reasonable demand for the services of these women, and that the wealthy were seeking alternative ways to breastfeed their infants.

The evidence presented here begins to build a picture of the diet that was available to infants of the poor in Britain during the 19th century. The London populations tested using stable isotope analysis appear to have been breastfed until at least the age of 6 months, and it is likely that these children also received some of the solid food which was being eaten by adults in the home (Nitsch *et al.* 2011; Henderson *et al.* 2014). If the infant could not be breastfed, either because the mother was not present or was unable to, and no other woman could be found, the alternative was animal milk, or more commonly, substances known as panada or pap, described in an 1808 childcare text as being “composed of bread and water boiled and sweetened with brown sugar; to which is, sometimes, added a small quantity of milk: or, oatmeal and water, in the form of a thin water gruel, with the same additions” (Moss 1808, 27). These mixtures were either spoon fed to the infant, administered using a cow’s horn with a thick parchment to form a teat (Armstrong 1808, 191-2), or by using the pap boat which usually took the form of a small jug with a spout (Stevens *et al.* 2009).

There were three major issues with feeding a baby using such breastmilk substitutes. First, these mixtures were of limited nutritional quality, particularly when formed from just bread and water, and would be unlikely to meet the needs of a growing infant. Second, adulteration in food was a considerable problem, particularly during the first half of the 19th century, and waterborne diseases were common killers (Rowlinson 1982; Davey Smith 2002). Breastfeeding would have acted to protect young infants

from dangerous food additives and bacteria, which could and did kill babies who were exposed to them in their diet (Fildes 1992). Thirdly, limited knowledge of hygiene and poor facilities meant that keeping utensils clean and food fresh was challenging, and the subsequent build-up of bacteria in food and within pap boats or horns was extremely dangerous to the health of the child (Stevens *et al.* 2009). Although most working-class mothers preferred to breastfeed their infants for these very reasons, families who were unfortunate enough to enter into the workhouse were sometimes prevented from making his feeding choice (Reynolds 2016). Reynolds (2016) describes how the workhouse prescribed practice of feeding infants on cow's milk, which is nutritionally inadequate for babies and was also frequently contaminated, led to diarrhoeal diseases, while the addition of large amounts of sugar in the milk (which was added because of the belief that cows milk contained less sugar than breastmilk) led to wasting conditions. This, she argues, resulted in the extremely high infant mortality rate seen in workhouses throughout the 19th century (Reynolds 2016). Ultimately, the good intentions and practices of working-class mothers were easily overturned when these women and infants found themselves reliant on the Poor Law system.

These artificial feeding methods and the accompanying issues were not confined to the working classes, and evidence for the diet and feeding techniques for infants born to upper class parents in the 19th century is plentiful. The numerous child care manuals published between 1800 and 1900 addressed in great detail the proper feeding methods and the food that infants should receive, as well as guidelines about selecting wet nurses, the correct weaning age, and the introduction of solid food into a child's diet (Smith 1801; Underwood 1806; Armstrong 1808; Moss 1808; Buchan 1809; Corbyn 1828; Hartmann 1881; Burdett 1885).

Although the authors of these childcare manuals unanimously declared that children

should, if possible, always be breastfed by the mother, they conceded that certain circumstances might make this impossible. If a suitable wet nurse could not be found as a replacement, the authors each considered the best alternative for feeding the infant, namely pap, panada, or animal milk. The inclusion of these substitutes in texts which were clearly written for the attention of the upper classes, who were commonly addressed or referred to by the authors, who could have afforded to buy such publications, and who were literate, suggests that such mixtures were fed to the infants of the wealthy. This evidence suggests that infants from all social classes received a similar diet, and that perhaps those born to the poor would have more frequently received the safer, more nutritious, and immune boosting breastmilk from their mothers.

### **6.2.3 Weaning**

Previously, Fildes (1982) established that the median age of weaning for British children decreased from around 18 months of age in the 16th century to around 7 months of age in the late 18th century, and this fits well with the isotope analysis discussed previously in section 6.2.2 (Nitsch *et al.* 2011; Henderson *et al.* 2014). Suggestions from child care publications recommend that weaning should commence after the age of six months (Armstrong 1808, 198; Corbyn 1828, 13-14), although some suggest twelve months to be more suitable (Smith 1801, 121; Burdett 1885, 29). George Armstrong, Scottish Physician and founder of the Dispensary for the Infant Poor (Dunn 2002), wrote that “It is hardly to be believed, but the fact is very certain, that many mothers here, amongst the lower sort of people, give flesh meat to their children while they are suckled, and fish, when they can come at it; nay, some give them porter, and stronger liquors, under the notion of heartening them” (Armstrong 1808, 231). This practice of feeding the infant with ordinary food is again noted around 70 years later,

when Dr Jacob Hartmann, member of the Royal College of Physicians in London and the Royal College of Surgeons in Edinburgh, reported that premature weaning was a major cause of illness and death in infants “Those who have been in the service of foundling hospitals are aware of the fact. It cannot be easily imagined to what extent the carelessness of mothers go in that regard. Every woman ought to know that an infant, during the first few months of its existence, should be fed upon nothing else but milk.” (Hartmann 1881, 62). These accounts suggest that low-income women were likely to practice a method of breastfeeding with additional supplements of solid food.

There is much agreement between the authors of child care advice manuals concerning the food first introduced to infants during the weaning process. Smith (1801, 97) suggests broth with bread and jellies; Underwood (1806, 439) beef tea or broth mixed with bread; Armstrong (1808, 198) chicken, veal, or mutton broth, beef tea, and crust of bread; Moss (1808, 72) milk, bread, boiled potatoes, and broth; Buchan (1809, 67) bread and milk, bread pudding, bread sliced in broth, gravy from roast meat after dilution with water; Hartmann (1881, 61) soup, broth, and pap made out of soup or beef tea mixed with milk; and Burdett (1885, 28) egg yolk and German rusk in a cup of beef tea, bread and milk or oatmeal, rusk and beef tea. From these sources, it appears that broth or soup with bread was a common suggestion for food during the weaning stages of infancy, creating a diet which would consist of meat juices, bread, a little oatmeal, and milk, perhaps with some vegetables present in the soup or broth. This type of food would have been cheap to procure, easy for the child to eat with the early development of dentition, and crusts of bread were commonly advised in order for the child to “cut” their teeth during teething (Underwood 1806, 128; Armstrong 1808, 200).

## 6.2.4 Early Childhood

Identifying the food fed to young children during the 19th century is challenging, since no childhood diet surveys exist from that time. However, for the children of the wealthy it is possible to return to the child care manuals, which suggest that there was some variation concerning the food recommendations deemed appropriate for children between one and two years of age. Smith (1801, 122-3) recommended that a continuation of the types of foods used around the weaning process should be given from the age of one year, but warns against feeding children biscuits, sweet-meats, and sugar plums. Buchan (1809, 67) similarly warned against allowing children sweeteners to their food, spices, pastry, butter, unripe fruit, and fermented liquors. These two authors appear to have made statements very similar to health advice today, warning against the detrimental effect of sweets to the health of young children, however Moss (1808, 73) instead gave the advice to use vegetables sparingly during the earlier periods of childhood, but similarly recommends continuing weaning foods until the second year of life. Armstrong (1808, 199) suggested that the child could begin to receive meat in the form of minced boiled chicken at seven months of age, as well as bread and bread pudding. The age of seven months is likely to have been given for the introduction of meat due to the first appearance of teeth, which can occur at any time between six and twelve months. Underwood (1806, 429) similarly suggested that meat could be given after the teeth have come through, accompanied by vegetables, puddings, blancmange, white-pot, and custard. He also recommended light puddings made from bread, semolina, tapioca, rice, and salep in boiled milk. Finally, Burdett (1885, 30) suggested that as the child approached two years of age bread and butter, eggs, minced meat, gravy, and light puddings were appropriate.

Although there is a slight contradiction here, namely Moss stating to avoid vegetables, there do appear to be common themes running through these recommendations. The consistency of much of the advised food is very similar, light puddings made from soft, soaked ingredients, softened meat after the teeth appear, and the continuation of broths and soups which were first introduced during the weaning process. Bread also appears in many of the texts, which is unsurprising considering how common a component it was in the diet of the time.

The text written for British residents of India suggested that at ten months of age plain curry, rice, barley meal, dhal, biscuit and bread should be introduced to the child (Corbyn 1828). Although clearly very different from food found in Britain, it seems likely that Corbyn was suggesting locally available dishes which could be given as an alternative to the meals found at home in England. When viewing Corbyn's suggestions in this way, similarities can be seen, particularly between the broth and soup of infants in England compared to the curry and dhal (a lentil based soup dish) of infants in India.

The age of two years appears, from the childcare sources, to be the time at which children were introduced to the wider diet of their parents. It is noted by three authors that dining with parents should be permitted after the age of two or three years (Smith 1801, 137; Moss 1808, 74; Burdett 1885, 30), with Smith and Moss specifically stating that this is common practice. Many of the foods remain as before, but with the addition of fish, shell-fish, more meat, and fruit pies (Smith 1801; Underwood 1806; Buchan 1809; Burdett 1885). These pies were said to contribute to a large part of children's diet after this age (Moss 1808, 77).

These historical sources suggest that high-status children in the 19th century were fed on a restricted diet for a longer period of time than modern children, keeping them from



eating the same food as their parents until they reached the age of 24 months, while the majority of modern children begin to consume the same meals from the age of 12 months.. Although these texts are clearly the ideal for infant feeding and child diet, and it could be argued that they do not represent the reality, the consistency with which the authors suggested the same food at similar ages indicates that the advice conveyed in these publications may well have been common practice in the homes of the upper classes. More crucially, statements concerning behaviours that parents engaged in, which the authors considered detrimental to the child, also appear similar in many of the texts, suggesting that many children may have been dry-nursed, fed solid food from an early age, and had access to adult food, likely including sweets, once they were capable of mastication.

It is not possible to tell what quantity of food young children born into wealthy families received, since there were no particular guidelines and in all likelihood this depended on the preferences of the child and the behaviour of the parents or nurses. For the poor, however, it is possible to gain a more direct insight into the types and quantities of food that these children ate, and the ages at which transitions between foods occurred, by referring to institutional dietaries.

The food fed to inmates within prisons and workhouses was of great interest to the British Government throughout the 1800s. The drive behind this attention was simple, the government needed to find a balance between providing enough food for inmates that they didn't starve, but not so much that these institutions began to look like comfortable options to the labouring classes (Durbach 2013; Miller 2013). As such, many documents exist which detail the quantity of food provided for inmates, specified by age, health, and sex. One such document is the return of dietaries in use in the Workhouse Unions of England, which provides a list of 18 dietaries for men, women,

and children which were in use in 1863 (Gilpin 1863). In this return, children are placed into three categories; two to five years, five to nine years, and nine to sixteen years of age with the type of food and the quantity varying accordingly (Figure 6.2).

STOCKBRIDGE UNION.

DIET TABLE—Approved by the Poor Law Board, September 1858.

	BREAKFAST.		DINNER.					SUPPER.			
	Bread.	Gruel.	Suet Pudding.	Cooked Bacon.	Cooked Mutton.	Potatoes or other Vegetables.	Bread.	Cheese.	Bread.	Gruel.	Cheese.
	oz.	pints.	oz.	oz.	oz.	lbs.	oz.	oz.	oz.	pints.	oz.
<b>Sunday :</b>											
Men - - - - -	5	2	-	-	-	-	7	1½	7	1½ or 1½	
Women - - - - -	5	1½	-	-	-	-	6	1½	6	1 " 1½	
Children from 2 to 5 - - -	4	1	-	-	-	-	4	1	4	-	1
„ from 5 to 9 - - -	5	1	-	-	-	-	5	1	5	-	1
<b>Monday :</b>											
Men - - - - -	5	2	-	5	-	1	-	-	7	1½ or 1½	
Women - - - - -	5	1½	-	4	-	1	-	-	6	1 " 1½	
Children from 2 to 5 - - -	4	1	-	-	4	½	-	-	4	-	1
„ from 5 to 9 - - -	5	1	-	-	5	½	-	-	5	-	1
<b>Tuesday :</b>											
Men - - - - -	5	2	-	-	-	-	7	1½	7	1½ or 1½	
Women - - - - -	5	1½	-	-	-	-	6	1½	6	1 " 1½	
Children from 2 to 5 - - -	4	1	6	-	-	6 oz.	-	-	4	-	1
„ from 5 to 9 - - -	5	1	8	-	-	8 oz.	-	-	5	-	1
<b>Wednesday :</b>											
Men - - - - -	5	2	-	5	-	1 lb.	-	-	7	1½ or 1½	
Women - - - - -	5	1½	-	4	-	1	-	-	6	1 " 1½	
Children from 2 to 5 - - -	4	1	-	2	-	½	-	-	4	-	1
„ from 5 to 9 - - -	5	1	-	3	-	½	-	-	5	-	1

Figure 6.2 Example of an 1858 workhouse dietary from the Stockbridge Union Workhouse, Hampshire, showing the similarities between adult and child food.

Each union provided three meals a day which consisted of a variation on bread, oatmeal gruel or porridge and milk for breakfast, cooked meat or bacon, potatoes or other vegetables, soup, bread, meat or suet pudding, and rice for dinner, and bread, cheese or butter and milk for supper (Gilpin 1863). Children from each age group received these meals, and there does not appear to have been any differences between the types of food consumed at different ages, only the quantity. For example, in the Hemsworth Union workhouse in West Yorkshire, children aged between two and five years received four ounces (oz.) bread and half a pint of milk porridge for breakfast, whilst those aged

between five and nine years received five oz. bread and a full pint of milk porridge (Gilpin 1863, 14). Providing porridge and bread for children of these ages appears to also fit with the experiences of those born to wealthy families. However, for dinner these unions provided meat and potatoes or vegetables to children from two years of age, and as such appear to have had less concern over feeding young children solid foods than the upper classes (Gilpin 1863, 14). The meals for children from the age of two years and for adults in these unions were identical, the only difference between them being the quantity, but it is noted alongside most of these dietaries that infants aged less than two years should be fed according to the directions of the medical officer for that union.

Although these dietaries provide good evidence for the types of food available to individuals within the workhouses of Britain in the mid-century, a question remains as to whether children of these ages really had transitioned to adult food, or whether the food supplied to adults within these institutions was selected due to its simplicity and suitability for young children. Children contributed a large proportion of workhouse populations (Goose 1999), and dietaries may have been designed to be suitable for all ages. To establish the foods which were deemed appropriate at the time for young children, we turn to the dietaries of institutions which only accepted such age groups.

In 1843 Dr Jonathan Pereira, member of the Royal College of Physicians London, published a treatise on food and diet, which included a list of dietaries from British establishments providing care for children (Pereira 1843, 228). The Foundling Hospital was established in Holborn, London, in 1741 as an institution for abandoned or orphaned children (Clark 1994). Extensive research of records from Berkshire indicate that infants admitted to the hospital often spent the first years of their life with a wet nurse in rural areas of the home counties, returning back to the institution around the

age of five years (Clark 1994, 13). The use of country nurses until the age of five years suggests that the following dietary originally presented by (Pereira 1843, 228) was deemed suitable for children between five and nine years of age:

<b>Day</b>	<b>Breakfast</b>	<b>Dinner</b>	<b>Supper</b>
<b>Monday, Wednesday, and Friday</b>	4 oz. bread ½ pint of milk	4 oz uncooked mutton- roasted 6 oz. potatoes 2 oz. bread	4 oz. bread 0.25 pint of milk
<b>Tuesday and Thursday</b>		4 oz. uncooked beef to be boiled into soup 1.5 oz. rice 4 oz. bread	
<b>Saturday</b>		Rice pudding (0.5 pint milk, 3 oz. rice, 0.5 oz. treacle) or Suet pudding (7.5 oz. flour, 1.5 oz. suet, 0.75 pint milk)	
<b>Sunday</b>		4 oz. uncooked beef for roasting 6 oz. potatoes 2 oz. bread	

**Table 6.3 Dietary provided to children aged between five and nine years of age within the London Foundling Hospital (Pereira 1843, 228)**

This dietary is very similar to that provided to workhouse inmates ten or twenty years later, and suggests that foods such as meat, potatoes, and bread, as well as light puddings and milk were commonly consumed by children.

A comparable dietary was also provided to young children aged three years and over at the Infant Orphan Asylum in Dalston, London:

Day	Breakfast	Dinner	Supper
Monday	Bread and milk	Meat, or boiled beef-steak pudding	Bread and butter with milk
Tuesday		Mutton, potatoes, and boiled rice	
Wednesday		Cold mutton and family pudding	
Thursday		Roast beef, potatoes, suet pudding	
Friday		Cold mutton and family pudding	
Saturday		Roast beef, potatoes, and suet pudding	
Sunday		Roast beef and mashed potatoes	

**Table 6.4 Dietary available to children aged three years and over at the London Infant Asylum (Pereira 1843, 229)**

A note with this dietary reads “children under three years of age to have Beef Tea, or Mutton Broth, besides cold Meat, on Sundays ... Green Vegetables are occasionally introduced, as circumstances require ... As much as they like to eat, within moderation” (Pereira 1843, 229). Other dietaries presented by Pereira are from the Royal Military Asylum, Chelsea, which states it is for ages five to fourteen years, but that the proportion of very small children were receiving 6 oz. of meat. Furthermore, the Naval Asylum, Greenwich, and Mr. Aubin’s Establishment at Norwood, Surrey, both note that those under seven years of age were allowed Sago, Arrow-root, milk, or any other substance that their “tender age may require” alongside the standard dietary (Pereira 1843, 228-229).

A report on gaols from 1843 provides returns of dietaries for adult inmates from all county prisons from this period, which invariably consisted of a combination of bread, gruel, potatoes, meat, and vegetable soup (House of Commons Papers 1843). The similarities between the food served within gaols and within institutions for young children suggests that there was little difference in meals besides quantity. Evidence from these sources indicate that children by the age of two years, and possibly younger, ate the same food as the adults around them, but that very young children were likely to receive supplementary food in the form of milk and puddings in addition to the usual diet.

The diet of young children in the 19th century appears to have commonly consisted of porridge, milk, bread, meat, potatoes, and milk-based starchy puddings made of rice or tapioca. This diet consistently appears in reference to children from the upper classes and those from poor backgrounds, suggesting that many children, regardless of their parent's social standing, were consuming similar items in their main meals. However, it was observed that children from wealthier families received additional items in the form of sweets and puddings, which were likely to have been beyond the budgets of poorer households, whilst children from working families are likely to have begun transitioning to the full adult diet at a younger age. It would appear that modern children begin to receive adult food at an earlier age than did those in the 19th century. In addition to this, it seems likely that 19th-century children from both high- and low-status backgrounds ate "child suitable" soft foods until at least the age of two years, and possibly until the age of three years. The similarity in the food consumed at this stage of life is a second potential cause of the equality of metabolic disease prevalence found between the high- and low-status 19th-century skeletal remains, whereas for modern children this transition to adult food marks a second stage of nutrient inequality (the first being breastfeeding rates) between socio-economic groups due to parental diet differences according to income.

### **6.2.5 Later Childhood**

Where modern British children now attend school from the age of four years, and as a result receive school meals or packed lunches alongside the meals that they eat at home, for the majority of children during much of the 19th century school was not an option. Children from low-income households would have been introduced to employment during this period of life, with some children beginning work as young as five years of

age (Humphries 2013). In contrast, children from high-income households would have either remained at home to be educated by a tutor, or attended school depending on the gender of the child and the wealth resources of the parents. As discussed in the previous section, 19th-century children from all backgrounds began to receive meals similar to those consumed by their parents from the age of two years. However, between the age of five years and adulthood the diets of the rich and the poor began to diverge, and the difference in fares available to adults from the various socio-economic groups developed.

In 1864, the report of commissioners appointed to investigate the revenue and management of several colleges and schools in England was published containing detailed interviews with members of staff from those institutions, including the topic of school diet (Frederick *et al.* 1864). The commissioners found that most of these schools – Eton, Winchester, Westminster, St. Paul’s, Charterhouse, Merchant Taylors, Harrow, and Rugby – provided very similar meals for their students, who were invariably the children of wealthy families (Frederick *et al.* 1864, 49). At Rugby, Eton, Charterhouse, Harrow, and Shrewsbury breakfast consisted of bread with butter and tea, coffee, or cocoa, dinner of meat and vegetables, followed by pudding or tart a few days a week, and bread with cheese or butter and beer or tea for supper, with the addition of cold meat at Harrow (Frederick *et al.* 1864). Besides the recorded meals, the report gives accounts of the opinions of the staff about the quality of food, as well as an indirect insight into the thoughts of the students. A member of staff from Eton explained that if the boys had complaints it would be about the lack of variety in their diet, and suggested that meals should be introduced like those in other schools, such as Marlborough College, whilst another commented that the boys did not like mutton five times a week (Frederick *et al.* 1864, 48, 145, 161).

The observed lack of sufficient variation of food in these institutions suggests that meals in upper class households at this time may have been very different to those served in school. During the 19th century, cookery and household management publications enjoyed huge popularity, with none so admired as those written by Mrs Isabella Beeton. *Mrs. Beeton's Book of Household Management* was originally published in 1861 and contained guidance for Victorian Ladies in the proper management of their homes as well as recipes for hundreds of dishes. For this research, the useful elements in this publication are not so much the recipes themselves, since it is unknown which would have been popular and commonly eaten, but the pages with the Bills of Fare, which are suggested meal plans for various occasions (Beeton 1861, 909-960). Alongside suggested menus to feed between six and eighteen people are recommendations of "plain family dinners" for each day of the week and recipes are provided for every month of the year. The notable point about these so called "plain" dinner plans is the wide variety of food both within and between meals. For example, a sample menu for dinner on a Wednesday in March consists of Fried whittings, melted butter, potatoes, followed by boiled beef, suet dumplings, carrots, potatoes, marrow-bones, and an arrowroot blancmange desert with stewed rhubarb, while on the Thursday a family could have a starter of pea-soup, and a main of stewed rump steak, cold beef and mashed potatoes, finishing it all off with rolled jam pudding (Beeton 1861, 921).

Although a three course meal each day of the week may appear to be fairly extravagant, the food itself is likely to have been regarded as plain fare at the time, since boiled beef, suet, arrowroot, and pea soup all feature in dietaries from prisons and workhouses, and as such were likely to be cheaply procured. Furthermore, these suggestions frequently refer to the inclusion of leftovers from the previous day. For example, it is suggested that the boiled beef stock from Wednesday should be reused to make the pea soup on Thursday, the remains of codfish from Sunday dinner in January is incorporated into an



oyster sauce starter on Monday, and a stew of meat and vegetables on Saturday in April consists of the remains of a shoulder of veal served on the Friday (Beeton 1861, 921, 913, 925). There is less detail concerning breakfast, luncheon and supper, but what suggestions are given for those meals indicate that meat played a large part in each one (Beeton 1861, 959). Later editions of this publication give more detailed accounts of other meals, and the 1907 version included suggestions for so-called economical family breakfasts, luncheons, and suppers (Beeton 1907, 1720, 1724, 1754 ). Economical breakfasts included boiled and scrambled eggs, bacon and cold meats, and fish, with toast, marmalade, butter, coffee, tea, and milk, suggestions for economical luncheon were stew, pie, soup, and various forms of meat dishes, such as shepherd's pie, with potatoes, and puddings like apple charlotte, rice pudding, bread pudding etc. (Beeton 1907, 1720, 1724). "Very economical suppers" consisted of cold meat, and lower quality meats such as sheep's heart, and cod, with potatoes of various forms and puddings like treacle tart, baked apples, and stewed fruits (Beeton 1907, 1754). Again, these cuts of meat and choices of cheaply made desserts point to these meals being plain or economical, and therefore available to the average upper-class family. Despite this, there was still a wide variety of meals at the table. The inclusion of meat at the table three times a day even in menus specified as economical may go some way to explain the complaints at private schools about the monotony of their meals, and indicates that there was perhaps high meat consumption and a good variation of meals within upper class households during this time.

The introduction of adult food during the early years of life suggests the possibility that after the age of three years children were likely to be introduced to a variety of foods for each meal, however it is not clear how long children from wealthy families remained within the nursery or whether food served in the nursery was different. Within the

section entitled “children, and what to do with them” from her 1865 publication *Housewife’s Treasury*, Mrs Beeton suggested that children from the age of 18 months should be introduced to the dinner table, in order to learn the proper behaviour there, but that at the “nursery-table” they should be taught not to waste food (Beeton 1865, 439-440). These remarks do suggest that children may have eaten their meals separately from the parents for the early years of their lives, even after weaning, and Beeton further warned of the dangers concerned by the practice of regularly allowing young children to take their meals with the household servants, since “the lessons they learn here are not always to be desired” (Beeton 1865, 439). However, it may have been common practice for parents to be visited by their young children after dinner time, and Beeton suggested that these visits should be conducted outside of dessert hours, stating that the practice by many parents of allowing their children dessert from their own table is a “cruel kindness” (Beeton 1865, 441). Throughout this description of the nursery and guidelines on introducing children to the realm of their parents, the specific age of these children remains obscure. It is not clear at what age children left the nursery, or began eating with their parents for every meal, other than that the “regular occupants of the nursery are the children who are too young to be admitted into the schoolroom even for ABC purposes” and that “the occasional occupants of it are the school boys and school girls, who spend the chief of their time with the governess, only patronising the ‘little ones’ room’ now and then” (Beeton 1865, 433).

At what age did children begin to receive lessons at school or by a governess? Beeton suggests that six years of age is the earliest that a child should begin to learn their alphabet, and that six hours a day of lessons is enough for children under the age of ten years (Beeton 1865, 509). All nine schools examined by the Commissioners in 1864 admitted boys from the age of eight years, with the average age of students being

around 15 years (Frederick *et al.* 1864, 24). Details on the age of admittance for 22 boys schools and 24 girls schools in the 1880s reveal that around 40% (n=9) of the schools took boys from the age of seven or eight years, while 54% (n=13) of schools took girls aged at or below eight years (Dumaresq de Carteret-Bisson 1884a; Dumaresq de Carteret-Bisson 1884b). A number of advertisements within the 1884 published list of educational institutions give details of kindergartens attached to schools for children younger than seven years of age, but the numbers of children admitted to these appear to be far lower than attended the older classes (Dumaresq de Carteret-Bisson 1884a; Dumaresq de Carteret-Bisson 1884b). If a family hired a governess children could be educated by her from the age of five years (Hughes 1993, 62).

The earliest age of admission into most educational institutions appears from this evidence to have been around eight or nine years. The complaints of monotony from boys at private schools which served mutton five days a week disappear when beef is present in the diet, as it is at Westminster School, and there is a suggestion that complaints stopped at Westminster after meat was introduced for supper as well as dinner (Frederick *et al.* 1864, 451). It is not possible from this evidence to identify the age at which children in upper class households began to receive the same food as their parents for every meal, since there is a suggestion that children ate meals separately with their governesses (Peterson 1970), but it is probable that this transition occurred before the age of eight years.

For children from working-class families, this transition is far more apparent.

Institutional dietaries reveal that children as young as two years of age received the same meals as adults, and at the age of 16 years they began to receive the same portion size. Comments from the authors of childcare manuals also suggest that in their own homes the poor fed food consumed by the rest of the family to their infants alongside

breastmilk. However, further evidence is necessary to establish other meals available at the time for older children.

After the outbreak of typhoid fever in September 1900 within three areas of London, Southwark, Lambeth, and Kensal Town, the London County Council commissioned an investigation into the occurrence by the Medical Office, which was carried out by Dr Hamer the Assistant Medical Officer of Health (Hamer 1900). Due to the rapid spread of the disease amongst a large number of people, its appearance in many different houses, and the odd age distribution of those who fell ill, the theory was that the fever was in the food supply (Hamer 1900, 1). In the introduction by the Medical Officer of Health, Mr. Shirley F. Murphy stated that “one fact presented itself to him [Dr. Hamer] with overwhelming evidence, viz., that fried fish purchased at particular shops, one in Southwark the other in Lambeth, was the one and only article of food of common origin which had been partaken of by the sufferers as a whole in those areas” (Hamer 1900, 1). After conducting a series of interviews, Dr Hamer identified one specific shop selling fried fish, which had been frequented by all those struck with the disease, and he further observed that “on examination of the distribution of affected houses, it was evident that they were grouped about this shop as a centre, and further, that the intensity of incidence of house attacks rapidly diminished at increasing distances from the shop” (Hamer 1900, 6).

Hamer provided a detailed appendix to his report, with details about the individuals who had contracted the disease, including their age, sex, and comments on their consumption of fried fish (Hamer 1900, 18-31). Within the appendix the majority of cases are of children aged 16 years or younger, representing 147 out of 225 cases (65%), and the descriptions made by their families about their consumption of fried fish make it clear that this was a particular favourite among children of all ages. The

youngest child on this list is 18 months old, although another child is referred to simply as a baby, and according to the statements made these children were frequently eating fried fish with their families (Hamer 1900). The whole family of the 18-month-old little boy is described as being “fond of fried fish”, and a description of the next youngest child recorded, a two year old girl, is as follows: “This child stayed during the daytime when her mother was at work with her grandmother who lived in the affected area. She played in front of Y’s [the fish shop under investigation] shop, and almost certainly ate fried fish purchased there” (Hamer 1900, 27). A five-year-old boy from the Southwark area is described as being very fond of both fried fish and of fruit, whilst a girl aged 11 years is called a “dreadful child for fish and taters” which she ate by herself on a Saturday night, as it is noted that the rest of her family, consisting of a mother, father, and five siblings, rarely ate any (Hamer 1900, 20). The value of these descriptions is the account they give not only of the children’s fondness for fish and chips and other food, but the responsibility that children had for procuring their own meals. A young boy of just four years old often bought fried fish for supper, while other members of the family rarely did the same, a nine-year-old boy was described as “Fond of fried fish and fruit. Had 1d. on a Saturday which he spent, as a rule, on one or the other”, and many other children from the ages of seven were procuring such food for their own consumption (Hamer 1900, 28).

In the report, Dr Hamer includes three small maps detailing the areas in Southwark, Lambeth, and Kensal Town which were affected by the outbreak in 1900 (Hamer 1900, 6) . By using distinguishing feature of these maps it is possible to locate the same areas in Booth’s London Poverty Map from 1898-9 (London School of Economics and Political Science 2016), and to identify the exact streets within which the outbreaks of typhoid fever occurred. In Southwark, the recorded cases of typhoid fever occurred on

the streets connected to the north of Great Suffolk Street, such as Kings Court, Queens Court, Sturge Street and William Street, inhabited by families classed as very poor or poor by Booth; in Lambeth, cases occurred around the areas of Fountain Street, Conroy Street, and Springfield, all classed as Poor; whilst at Kensal Town cases were found mostly on East Row and Middle Row, both streets classed as poor, with a scattered number occurring South Row where “fairly comfortable” families resided (Hamer 1900; London School of Economics and Political Science 2016). The majority of cases appear to have occurred among the poor and very poor, in families who presumably had little disposable income.

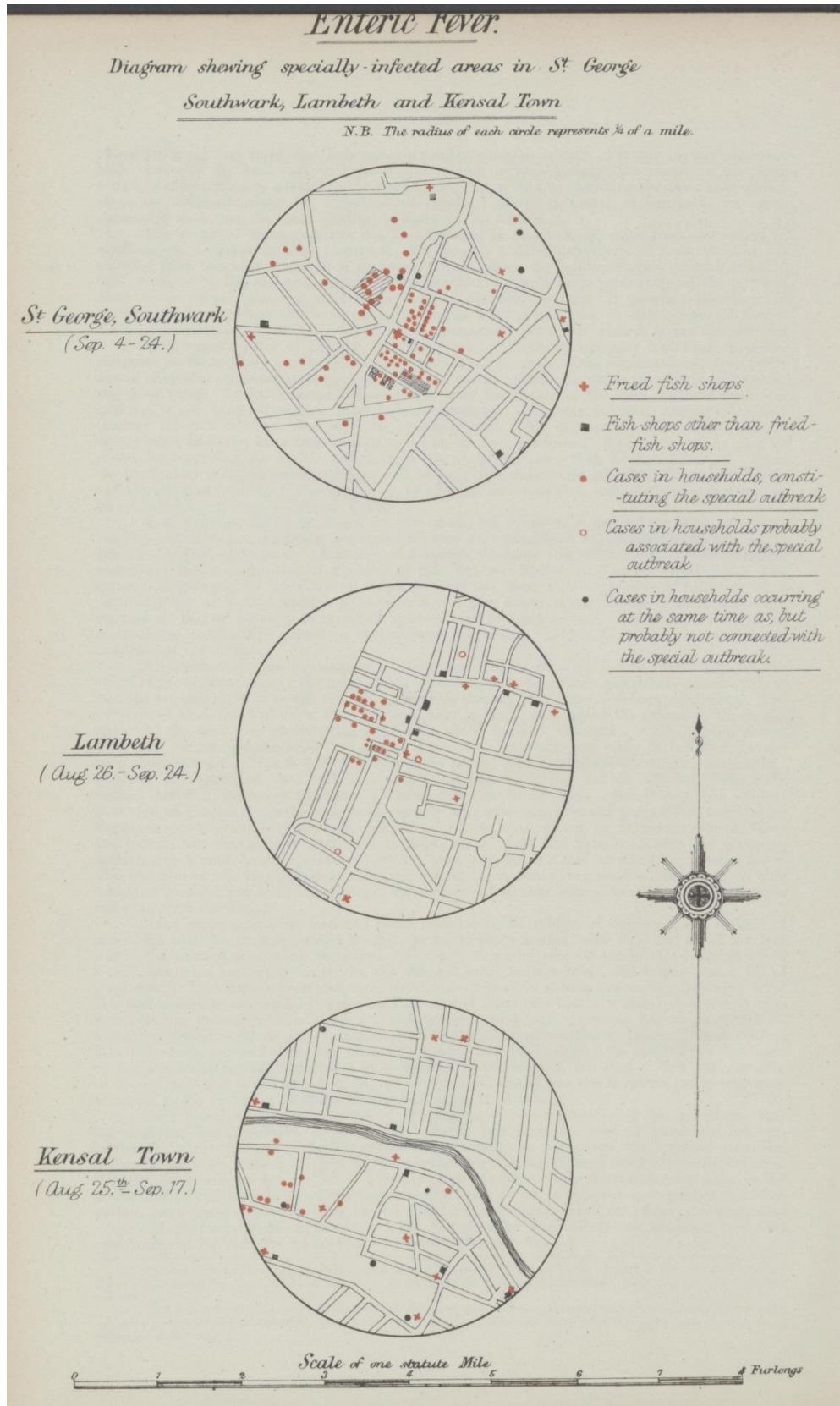


Figure 6.3 Map of the households affected by typhoid fever in 1900 (Hamer, 6)





**Figure 6.4 Booth's map of poverty (London School of Economics and Political Science 2016) showing a match to the map produced by Hamer (1900) for the site of the 1900 typhoid outbreak in Southwark.**



**Figure 6.5 Booth's map of poverty (London School of Economics and Political Science 2016) showing a match to the map produced by Hamer (1900) for the site of the 1900 typhoid outbreak in Lambeth.**





**Figure 6.5 Booth's map of poverty (London School of Economics and Political Science 2016) showing a match to the map produced by Hamer (1900) for the site of the 1900 typhoid outbreak in Kensal Town.**

The practice of children purchasing their own food from outlets in London is visible in other records, and it is likely that this behaviour may be related to the age at which children began to work. In a study of 617 autobiographies of working men born between 1791 and 1850, Humphries (2013) concluded that 10% of boys started work before the age of ten years, some as young as five years, and the majority were working by the time they were 15 years old. It follows that older children were likely to spend a large amount of their time away from home and the family food supply. It is possible that children took their own dinner with them to work, however evidence from an 1863 investigation into the diet of the labouring poor, by Dr Edward Smith, reveals that children in London more often bought their own dinner outside of the home; “Instead of taking food with them which the mother has prepared, each child is furnished with 1 ½ d. or 2d. per day for dinner, and of this 1d. is usually spend in pudding, and ½ d. in potatoes, at a cook shop” (Smith 1863, 223). Modern data reveals that density of fast food outlets is significantly associated with deprivation levels, with high numbers of fast food outlets found in areas of high deprivation (Public Health England 2017c), a finding which is supported by recent research (MacDonald *et al.* 2007). Few studies have been performed on the reasons that modern British consumers choose to eat food from fast food outlets, however research on the United States report that the most frequent reasons given were: fast food can be quickly acquired, the outlets are within easy travelling distance, and simply that fast food tastes good (Rydell *et al.* 2008). Although today low-socioeconomic status is often associated, at least in the media and public impression, with frequent consumption of takeaways, there is little evidence to support this assumption among adults. Only one study has been performed on the socioeconomic association with the consumption of takeaway meals in the UK (Adams *et al.* 2015). This research used data from the NDNS to analyse patterns of fast-food consumption according to age, sex, and income, and found that there was no difference

between the consumption of fast-food in adults from different socio-economic status (Adams *et al.* 2015). However, this research did find a significant difference in the consumption of takeaways between children from high and low socio-economic status, with children aged between ten and eighteen years of age from low-income households consuming takeaways more regularly than high-income children of the same age (Adams *et al.* 2015, 5). This suggests an interesting similarity in the behaviour of children across time, indicating that regardless of whether a child was born in the 19th century or the 21st, when given autonomy over their diets they may not make good decisions in terms of nutritional health. This may not have been such a problem during the 19th century, when many children were performing hard physical labour from a young age while employed. However, a large majority of modern children, as well as adults, are not participating in recommended activity levels (Riddoch *et al.* 2007), and are therefore not necessarily expending the calories they consume like they would have in the past.

As well as working, by the middle of the 19th century children from poor families could also attend one of the charitable schools established, although school attendance was not compulsory until the 1880 Education Act made it so for children under the age of 13 years (House of Commons Papers 1880a). These institutions provided education and food to poor children who otherwise would almost certainly have been living in poverty or attending work in potentially dangerous environments. An 1856 inspection of reformatory and parochial union schools gave details about the dietary employed in the south east Salop district school (Her Majesty's Inspectors of Schools 1857). At this institution breakfast consisted of bread, butter, and cocoa, dinner of bread or potatoes with the options of broth, soup, meat pudding, suet pudding, or cooked meat, and supper was bread and milk (Her Majesty's Inspectors of Schools 1857, 201). Since the schools

under inspection were intended for children with criminal backgrounds or who had parents in the workhouse, the dietary was approved by the Poor Law Board, thus had many similarities to those provided in workhouse institutions. By 1875, food within pauper schools for girls again seems to be very similar, with Irish stew, meat and potatoes, suet pudding, pea soup, and meat pudding given as examples of the types of dinner included on dietaries for these institutions (Lambert 1875, 12). However, by the close of the century these dietaries appear to have undergone an improvement in the variation of food available to children within such institutions. In addition to the usual breakfast, dinner, and supper items already stated, an 1896 report into the district schools reveals that cocoa, rhubarb, cheese, fish, rice pudding, jam roll, “Australian meat” (tinned meat), baked suet pudding with raisins and currants, egg pudding, and a greater inclusion of vegetables were incorporated into the dietaries of several establishments (Poor Law Schools Committee 1896, 88-96).

However limited these earlier school dietaries appear to the experiences of modern readers, it is likely that they were far more varied than the food available within the homes of the poor. In his 1863 report on the food of the poorer labouring classes, Dr Smith gathered evidence from interviews with families around the country about their dietary habits. Interviewing families employed as silk weavers, needlewomen, kid glovers, stocking and glove weavers, and shoe makers in town populations, Smith ascertained information on the meals commonly eaten by 125 urban families (Smith 1863). Bread was universally eaten for every meal, along with bacon or butcher’s meat, potatoes and other vegetables, butter, tea, and occasionally cheese, fish, and pudding (Smith 1863). Today bread, excluding that made with wholemeal flour, is required by law to be fortified with iron, thiamin, nicotinic acid, and calcium carbonate (British Government 1998), however in the 19th century there was no such mandatory

fortification legislation. Sugar or treacle was commonly purchased, as well as dripping and suet, and beer was consumed by some families in the place of tea for supper (Smith 1863). From these reports, it appears that many urban working families consumed a limited and monotonous diet consisting chiefly of bread, with vegetables, bacon and a little milk. The addition of pre-cooked food from street vendors must have provided relief to the otherwise mundane diet of working-class children.

### **6.2.6 Discussion**

By 1900, nutritional quality was mainly judged on the presence of protein and carbohydrates in the diet, and it was not until the advent of war in the early 20th century that vitamin intake began to be of concern (Carr 2003). Before this time, neither families nor the government would have been aware of the constituents of a healthy diet as we would judge it today. Modern children have this advantage of parental knowledge and awareness, as well as food safety standards. However, the low-prevalence of breastfeeding and the nutrient insufficiency resulting from dietary habits in the modern low-socioeconomic group suggests far higher levels of inequality between rich and poor today than during the 19th century. From the evidence presented here, children from poor families in the 19th century appear to have had a similar experience to those from the upper classes, at least until early childhood, in terms of the nutritional quality of their diet. Breastfed infants not only receive more nutritionally appropriate food, but would have been somewhat protected from disease. The potentially low prevalence of breast feeding among the upper classes may have resulted in inequality between infants from different socio-economic backgrounds, with many working-class children actually benefiting from healthier feeding practices. The role of wet nurses may have alleviated this inequality to some extent, but the cultural practice of raising children indoors is

likely to have led to the far higher prevalence of rickets in high-status skeletal remains.

The weaning practices among both groups appear to have been fairly similar in terms of the age that milk was entirely replaced by a more solid diet, but sources suggest that children from poor families were receiving adult food alongside milk during infancy. This behaviour may have acted to provide additional sustenance for working-class infants, but may also have introduced the danger of disease from contaminated food and water. There is a suggestion that upper class families regularly allowed access to foods high in fat, such as fruit pies and other sweet food, which may indicate the existence of unhealthy eating behaviours in young children. Similarly, today the advice for weaning time has remained virtually unchanged, but like the 19th-century children from low-income households were more likely to be introduced to other forms of food earlier than the recommended 6 months of age.

While the recommendations featured in advice manuals of the time were to provide specific food types to children at certain ages, to only allow boiled and finely minced meat to young children, and for parents, governesses or other domestic servants to supervise the child while they ate, the children of the poor appear to have regularly been given such food as fried fish and potatoes by the older members of their families, including other children, or were even sent out to acquire their own dinners from early ages. It is clear that children from poor families even outside of institutions were eating a range of food which also appeared on the adult dinner table from early ages.

As children grew older the nutrition they received appears to have diverged, where children within wealthy families were granted access to the varieties of the adult dinner table. The high meat consumption in upper class families, coupled with regular desserts and puddings, suggests that the diet available to the wealthy could have been excessive.

The dangers associated with overeating are very familiar today, and may have impacted on the health of the 19th-century upper classes. For older working-class children, the diet was likely to be one of monotony and limited variation, but which in London and other urban areas may have been punctuated by meals available from cook shops. The reliance on bread, milk, and vegetables, as well as a financial limit on the amount of meat and sweet, high fat foods, suggests that the nutritional quality of this diet may have been fairly good. However, it is possible that these children would have experienced inadequate quantity, particularly during periods of financial instability, such as a result of the illness or death of a breadwinner.

This chapter has so far highlighted the historical and existing nutritional inequality between high- and low-income groups, and three factors were identified which could account for the results established from the osteological data. Differing cultural practices depending on household social standing appear to explain the similarities between pathological signs of deficiency in 19th-century human remains, and the higher rate of vitamin D deficiency in high-income remains. The following sections will explore current policies concerning vitamin D sufficiency, breastfeeding, and the solid diet of young children, and will provide suggestions for new or improved policies concerning the health of modern British children.

### **6.3 Modern Policies: Young Child and Infant Feeding**

This section will provide a critique of current policies aimed at improving childhood nutrition. Discussion will begin with current advice concerning vitamin D intake, followed by a discussion of breastfeeding in the past and how practices during the 19th century could increase prevalence today. This chapter concludes with a brief overview

of the current state of nutrient intake during early childhood, and the potential for improvement.

### **6.3.1 Vitamin D**

The latest recommendations regarding vitamin D suggest that everyone in the population should be taking a daily supplement, particularly during the winter months (Public Health England 2016b). As discussed in section 6.1, vitamin D insufficiency is far more prevalent in children and adults from low incomes than it is among high-income groups, but the advice from Public Health England does not mention income or socio-economic status. Families who wish to follow the advice to take vitamin D supplements are advised to buy their own from a pharmacy or supermarket (NHS Choices 2017b). This advice is easy to follow if an individual or family has a disposable income. The cheapest vitamin D tablets are available from around £2.50 for 90 tablets, with a daily dose of one tablet, and can be taken by adults and children over the age of 12 years. Children from one to 12 years of age can take drops, which are available for around £5 per 25ml, with a daily dose of 0.6ml. Therefore, supplements cost around £3.32 per month per child under twelve and £0.83 per month per adult. For a family consisting of two adults and two children, recommended daily doses of vitamin D supplements will cost around £8.30 per month. For families in poverty this may be an expense which cannot be prioritised.

A household must be earning less than 60% of the median UK household income in order to be defined as living in poverty (Child Poverty Action Group 2017). The way that this figure is interpreted drastically affects the reported levels of poverty, and explains the differences in the figures released by the government and the figures released by charities and other organisations. The government often defines poverty as



households with incomes at 60% or less than the UK median income, *before* housing costs are deducted (i.e. the price of rent), whilst charities such as the Child Poverty Action Group define poverty as household income at or less than 60% of the UK median *after* housing costs are deducted, since this figure shows the actual funds that families have to buy items such as food and clothing (Child Poverty Action Group 2017). According to official government figures for 2015/16, 10.4 million people were in relative poverty before housing costs were deducted, while 14 million people were in relative poverty after housing costs were deducted (McGuinness 2016). The price of vitamin D supplements may make it difficult for families living in relative poverty to follow the advice provided by Public Health England, yet as the results in section 6.1 suggest, it is exactly these low-income families who are most at risk of vitamin D insufficiency.

In 1940, the Ministry of Food conducted the first National Food Survey which was to become the longest running survey of household food consumption in the world (Ministry of Food 1951). The purpose of the survey of working-class consumption was to provide an “independent check on the food consumption and expenditure of the population during the war and thus to assess the effectiveness of the Government’s war-time food policy” (Ministry of Food 1951: iii). In this survey, the role of such policies as the introduction of canteens in government factories, Local Authority based “British Restaurants” for the provision of cheap meals, and the expansion of the school meals service after the start of the war was discussed (Ministry of Food 1951: 9). The advent of war led directly to such nutritional policies as the National Milk Scheme, which provided free or subsidised milk to young children and pregnant women, and the Vitamin Welfare Scheme which aimed to supplement the diet of young children after war time rationing of fresh fruit, butter, and eggs created shortages in the diet (Ministry

of Food 1951). This scheme provided free supplements, such as cod liver oil and blackcurrant syrup, to children under two years of age from 1941, which was then extended to children up to five years and pregnant women with the replacement of blackcurrant syrup with orange juice in 1942, and from 1943 pregnant women were also provided with vitamin A and D tablets (Ministry of Food 1951). The 1951 report of the war years of The National Food Survey summarised that “these measures went beyond the replacement of losses in the diet occasioned by the war. They amounted to a positive policy for increasing the provision of those nutrients in which the pre-war diet of the majority who benefited from them had been deficient” (Ministry of Food 1951: 9).

Today vitamin D supplements, as well as folic acid, vitamin C, and vitamin A, are available to some low-income individuals for free through the Healthy Start Scheme (NHS 2017). However, these free supplements are only available to pregnant women, women with a child under 12 months of age, and children aged between six months and four years, and only if they are in receipt of Health Start vouchers (NHS 2017). To qualify for the Healthy Start vouchers, and to receive the vitamins, an individual must be at least ten weeks pregnant or have a child who is aged under four years *and* must be in receipt of one the following:

- Income support
- Income-based jobseeker’s allowance
- Income-related Employment and Support Allowance
- Child Tax Credit (with a family income of £16,190 or less per year)
- Universal Credit (with a family take home pay of £408 or less per month)

Individuals also qualify if they are aged under 18 years and pregnant, even if they are not receiving the above benefits. Men, women who are not pregnant or do not have a child aged under one year, and children aged over four years are not eligible for free vitamin supplements regardless of their income, or receipt of any benefits.

Improvements in the sufficiency of vitamin D intake among low-income adults and children could be made if the eligibility criteria for receiving free or discounted vitamins was reassessed. Currently there is little relationship between the definition of poverty and the eligibility for Healthy Start vouchers, and therefore free vitamin D supplements. In addition to this the benefits system which is used in determining Healthy Start voucher entitlement is currently (December 2017) undergoing a major overhaul and will re-emerge as Universal Credit, a single system to replace Child Tax Credit, Housing Benefit, Income Support, Income-Based Jobseeker's Allowance, Income-Related Employment and Support Allowance, and Working Tax Credit with a single payment system (Gov.uk 2017). At present it is unclear what the introduction of Universal Credit will mean for access to supplements for children from low-income families, since this has not been clarified by the government. Rather than depending on entitlement to benefits for vitamin supplements, a more widespread system similar to the Vitamin Welfare Scheme of the 1940s could help to improve health among those most at risk of vitamin D insufficiency and deficiency, who are currently not eligible for free vitamins but who are also unable to follow the latest health recommendations due to financial constraints. A specific focus on vitamin D in the Universal Credit scheme or widened eligibility outside of the benefits system is required because intake of this vitamin is not necessarily sufficient even with a healthy and balanced diet.

### **6.3.2 Breastfeeding**

Today, breastfeeding is recommended as the optimal method of infant feeding by all major health organisations (World Health Organisation and UNICEF 2003) and in the past, although breastfeeding underwent periods of popularity as well as times when it was deemed unfashionable, it was still the most commonly recommended feeding

method (Fildes 1991). In modernity, the decision to undertake breastfeeding is affected by a range of factors, including historical, socio-economic, and cultural aspects of an individual's background (Rollins *et al.* 2016). The 2010 UK Infant Feeding Survey found that socio-economic status was strongly associated with breastfeeding initiation, with 76% of mothers from the most deprived areas of England initiating breastfeeding, compared to 89% of mothers from the least deprived areas (McAndrew *et al.* 2012). Furthermore, prevalence of breastfeeding at six to eight weeks of age drops considerably from those of initiation, with just 44.3% of infants reportedly being breastfed at their six to eight week review (Public Health England 2017d). This figure drops to 30.3% for infants who are exclusively breastfed at this age (Public Health England 2017g). A survey of 3607 modern British parents found that 13% of infants were weaned before 17 weeks of age, 37% between 18 to 23 weeks, 25% between 24 to 25 weeks, and 25% after 26 weeks of age (Moore *et al.* 2014).

Evidence for past breastfeeding prevalence among high- and low-socioeconomic children suggest that there is more inequality now than existed in the 19th century. Furthermore, there has potentially been a reversal in the association between socio-economic status and breastfeeding prevalence, since evidence suggests the possibility that it was mothers from low socio-economic standing who more frequently practiced breastfeeding, whereas today the practice is more common among women from the least deprived areas. This growth in inequality and potential reversal in the practices of the two socio-economic groups is reflected in the results of nutrient inequality from section 6.1. We know that breastfeeding rates are associated with socio-economic status, and there is extensive evidence that breastfeeding is better for both the infant and mother in a number of ways. Many studies have indicated that there is a significantly lower risk of childhood obesity among children who are breastfed, and that longer breastfeeding

duration results in a greater reduction of obesity (Yan *et al.* 2014; Bider-Canfield *et al.* 2017; Modrek *et al.* 2017; Wang *et al.* 2017). Breastfeeding has also been associated with increased IQ points, a reduction in risk of type II diabetes, a reduction in necrotising enterocolitis (a medical condition found in infants where portions of the bowel become necrotic), a reduction in both respiratory tract infections and other infectious causes, and a reduction in infant deaths (Payne and Quigley 2016; Victora *et al.* 2016), as well as preventing an estimated 20,000 deaths in women caused by breast cancer (Rollins *et al.* 2016). A UNICEF report estimated that just a moderate increase in breastfeeding rates could save the NHS at least £40 million a year, although it noted that this figure would be likely to be much higher (Renfrew *et al.* 2012).

Whether fed with breastmilk or formula, the current guidelines for the transition from milk to solid food states that weaning should occur at around 6 months of age when developmental signs commonly occur (Department of Health and UNICEF 2008). Although there is a certain flexibility with these guidelines, it is recommended that solid food is not introduced to an infant before the end of four months (17 weeks) of age (Scientific Advisory Committee on Nutrition 2001). Interestingly, these modern weaning recommendations fit well with what we know about weaning times during the 19th century. However, it is clear that these recommendations have not always been practiced in either the 19th century or in the present day. Modern suggestions for weaning foods from the NHS and the Food Standards Agency are mashed vegetables or fruit, well cooked rice, oats, or other starchy food, blended meat such as fish or chicken, soft cooked lentils, split peas or other pulses, and full-fat milk products like yogurt (Eatwell 2010; NHS Choices 2015), similar to foods recommended during the 19th century.

Research has revealed several specific factors associated with deprivation which influence the decision and ability to breastfeed successfully among low-income mothers, such as previous experience of breastfeeding in their social environment, social disapproval, support from health providers, whether they live with a partner, alone, or with other family members, work, and maternal attitudes (Entwistle *et al.* 2010). Further factors which influence a woman's decision to breastfeed are paternal involvement, particularly during anti-social feeding hours where formula feeding splits the responsibility equally, and re-establishing identity aside from motherhood, which is often seen as difficult when breastfeeding as it restricts a woman's freedom (Whelan and Lupton 1998; Earle 2002). Support from a social network of friends, family, and partners in particular has been identified as a factor influencing successful breastfeeding, support which in turn derives from the breastfeeding experiences of that social network (Whelan and Lupton 1998; Entwistle *et al.* 2010). Research suggests that the uncommon nature of breastfeeding is further perpetuating reduced breastfeeding practice, because women have little visual experience of breastfeeding which perturbs mothers both from initiating and continuing to breastfeed (Entwistle *et al.* 2010).

Research exploring the reasons why women choose their preferred method of feeding has found that the majority make their decision before contact with health professionals, regardless of what advice that health professional gives (Earle 2002). Interviews conducted during this research also indicated that most women, whether they chose to breastfeed or use formula, were aware of the benefits of breastfeeding, suggesting that the choice not to breastfeed was not due to a lack of education or information about the practice (Earle 2002). An understanding of the benefits of breastfeeding has also been established among low-income mothers (Entwistle *et al.* 2010). Despite knowledge of the benefits of breastfeeding, a key point highlighted in the study by Earle (2002: 209)

was the reluctance of many women to breastfeed out of embarrassment or disgust at revealing their bodies in public, many reporting that they could not breastfeed in front of other people or in busy places. This is a response which has been identified as being caused by the cultural sexualisation of women's bodies, which leads to feelings of shame during the feeding process (Thompson *et al.* 2015). Using public comments left on UK internet news articles concerning breastfeeding, one study analysed public attitudes to the practice (Grant 2016). Grant (2016) found that comments which were positive about public breastfeeding were in the minority, with only 84 of 884 comments suggesting that the practice was acceptable. In total, 82% of comments were entirely negative about the practice of public breastfeeding or about women protesting their right to breastfeed in public (Grant 2016). Although over 800 comments were used in this study, caution should be taken when interpreting the results since all the comments were left on articles written and published to the Daily Mail Online, a right-leaning online platform, therefore the views of this readership is unlikely to be representative of the UK population.

A second analysis of public responses to breastfeeding in 2016 used comments left on the following websites: the Daily Mail Online, BBC News, The Guardian, Mumsnet Talk, The Telegraph, Sky News, Netmums.com, The Huffington Post, London Evening Standard, BBC News Youtube, the Express, The Independent, and The Caterer (Morris *et al.*). The use of a variety of different news sources in this study provides a more representative sample of the political and cultural beliefs of the UK population (e.g. people whose political views could be described as "liberal" or "conservative"). This study was based on an widely reported incident in which a woman was asked to cover up while breastfeeding in Claridge's, a high-priced London hotel (Morris *et al.* 2016a). It was found that the majority of commenters analysed were supportive of "discreet"

breastfeeding, and the mother's demeanour immediately before and during breastfeeding was found to be an important factor in the acceptance of the practice to onlookers (Morris *et al.* 2016a). The finding that a vocal minority of commentators were entirely against the practice of public breastfeeding was similar to the results of surveys conducted in other countries (Morris *et al.* 2016a). This research found that the sexualisation of breasts, disgust or aversion to body fluids, and embarrassment at being caught looking at a breastfeeding mother were all strong factors for the negative attitudes towards public breastfeeding (Morris *et al.* 2016a).

Clearly there is an active proportion of individuals in the UK who do not think that breastfeeding in public is acceptable, and women wishing to feed their infants this way may face challenges from both peers and strangers. This attitude is often captured by news outlets, reporting the abuse received by breastfeeding women, and the situation at Claridge's Hotel was not an isolated incident. In the 2017, news outlets reported incidents where a breastfeeding mother was prevented from boarding public transport (Pasha-Robinson 2017) and another notably asked to "cover up" in the Victoria & Albert museum (BBC News 2017). Situations such as these create a huge barrier to women in their attempts to feed their infants in the most optimal way, and suggests that social attitudes need to change before breastfeeding prevalence rates will improve.

Although there have been ongoing programmes aimed at improving breastfeeding rates, such as Unicef's Baby Friendly Initiative (UNICEF 2018), recent years have seen a reduction in government reports involving breastfeeding. The 2009 Healthy Child Programme (outlined in Chapter 3.8) focused much attention on breastfeeding practices, and the following suggestions to increase breastfeeding prevalence were made within the report:



- Raise awareness of the health benefits for and risks of not breastfeeding
- Adopt UNICEF's Baby Friendly Initiative in all hospital and community providers
- Raise the topic of breastfeeding during antenatal consultations
- Provide peer support to establish and continue breastfeeding
- Inform fathers about the health benefits and encouraging their support
- Increase awareness of breastfeeding among young and low-income mothers
- Raise the profile of the Healthy Start Initiative which provides breastfeeding advice
- Avoid the use of formula promotions (Shribman and Billingham 2009: 28)

The advice set out in the Healthy Child Programme report has been adopted in many instances since 2009. The Family Nurse Partnership Programme has been found to have a positive impact on breastfeeding rates, but this programme is only available for first time mothers aged 19 years or younger (Family Nurse Partnership 2015). Advice for pregnant women considering breastfeeding is available from the NHS Start4Life website, which provides support for all aspects of parenthood including infant feeding (National Health Service 2017). However, the Infant Feeding Survey which gathered data on feeding practices every five years since 1975 was cancelled in 2015, after its last publication in 2010, removing the main source of information about breastfeeding prevalence in the UK. Furthermore, recent government publications, such as 'Childhood Obesity: A Plan for Action' (HM Government 2016) and 'Childhood Obesity – Brave and Bold Action' (The Health Committee 2015), fail to mention breastfeeding at all. As a response to the lack of recent government interest in improving breastfeeding prevalence, the All-Party Parliamentary Group on Infant Feeding and Inequalities has been established (Thewliss *et al.* 2017). This group aims to explore British policies involving infant feeding which contribute to our low levels of breastfeeding practice, and to make recommendations to policy makers and the government about the most effective policies to promote healthy infant feeding. This same group was responsible for the 2017 'Feeding Products for Babies and Children (Advertising and Promotion) Bill' which called for the creation of a body called the Infant and Young Child Nutrition

Agency (House of Commons Papers 2017). The function of this agency, according to the Bill, would be to ensure that food and drink sold to infants meets nutritional standards, that the importance of breastfeeding is integrated into health policies, that breastmilk substitutes are safe and suitable for a diverse population, that the advertising of breastmilk substitutes does not mislead the public, and that marketing for formula is controlled (House of Commons Papers 2017). This parliamentary enquiry is a step in the right direction, and enacting their bill would potentially facilitate great changes to some of the hindrances to breastfeeding. However, research into the factors and policies which influence breastfeeding has clearly identified challenges to breastfeeding uptake and continuance which are yet to be targeted by any government intervention.

Research concerning breastfeeding prevalence and cultural attitudes are numerous and widely available, yet government policy for this issue remains ineffectual, even after years of inclusion in reports and discussions. The main method of increasing breastfeeding currently used by the government is support from health care professionals during and after pregnancy, yet research shows that the majority of women have already made their decision by this time, are unlikely to change their choice to feeding their infants breastmilk, and are more likely to change their practice to formula feeding after a short time. Despite the studies which explore why women choose not to breastfeed their infants and which also suggest the most effective methods for increasing breastfeeding prevalence in the UK, government policy has yet to adopt these findings in their approach.

Historical research indicates that breastfeeding practice underwent periods of prevalence, particularly relating to societal norms and cultural fashions. The results and discussion in section 6.2.2 suggest that in the past breastfeeding was more common among women from lower incomes, and the historical evidence supports this, with

contemporary authors of child care texts stating that women from the higher classes forwent breastfeeding since it was an activity associated with the working class. There are many similarities between breastfeeding attitudes in the 19th century and today, particularly the reasons why women decided against breastfeeding their children. In the past this was due to the cultural association that breastfeeding was not “done” by women of a certain station, and that it would interfere in their social lives. There are indications that there was a certain amount of shame associated with upper class women performing such a task, which is why wet nurses were often women from lower ranks of society. Shame surrounding breastfeeding still exists, and may also still be linked with the expectations of your peers. However, the changing rates of breastfeeding in the past indicate that prevalence can be improved today, if issues of cultural expectations and norms can be navigated. Attempts by 19th-century authors of childcare manuals to promote the uptake of breastfeeding among their middle- and upper-class readers clearly failed, since if anything prevalence rates fell among this group (Fildes 1992), and similar attempts to simply talk women into the practice today have proved to be equally as unsuccessful. Instead, historical and modern evidence suggests that it is the social norms which need addressing before breastfeeding rates will begin to rise.

The current policies in place to promote breastfeeding, based on the 2009 Healthy Child Programme suggestions, provide access to and guidance from nurses both during and after pregnancy, allow women the legal right to feed in public places, provide breastfeeding zones in community spaces and at work, and provide women the legal right to maternity leave. However, although these policies are helpful in practice, they do nothing to promote the image of breastfeeding as a normal and routine way of feeding an infant in the UK. Historically, breastfeeding was the only method of safely feeding an infant. Children would presumably have grown up witnessing their mothers

and neighbours breastfeeding their siblings and other infants in the community. Even in a society with strict rules of “moral” conduct, male doctors not only encouraged the practice of breastfeeding in their writing, but also performed physical examinations of wet-nurse candidate’s breasts. Such examinations are evidenced by advice texts published in the 19th century which recommend that mothers should employ a doctor to perform examinations on potential wet nurses before they were hired for the position. In such texts the examination was described in detail:

“The first thing, then, to which a medical man looks, is the general health of the women – next, the condition of her breast – the quality of her milk – its age, and her own – whether she is ever unwell while nursing – and, last of all, the condition and health of the child ... A good breast should be firm and well formed – its size not dependent upon a large quantity of fat, which will generally take away from its firmness, giving it a flabby appearance, but upon its glandular structure, which conveys to the touch a knotted, irregular, and hard feel – and the nipple must be perfect, of moderate size, but well developed” (Bull 1839, 231-232).

Again in 1889 we find similar advice on selecting a wet nurse in another text:

“The last quality can be estimated by inspecting the breasts, by examining some of the milk drawn by a pump, and by ascertaining the condition of the woman’s own child. The breasts of a good nurse are not necessarily large, but are firm to the touch and pyriform in shape, with well-developed, prominent nipples, and with the skin distinctly marbled with large blue veins” (Starr 1889, 165-166).

These unabashed descriptions of the method by which a woman's breasts should be examined in advance of her position as a wet nurse, include not just visual observation but also touching by a male doctor. The detailed description of the size, shape, and features of veins and nipples provides an interesting contrast to the well-acknowledged attitudes of "modesty" and "proper behaviour" which prevailed over Victorian society. In addition to the role of men in these examinations, these texts were clearly intended for women, named as they are 'Hints to Mothers' (Bull 1839) and 'Hygiene of the Nursery' (Starr 1889), women who presumably had disposable incomes and reading ability.

Finding a position as a wet nurse could be a respectable job for a woman, particularly working-class woman but occasionally also women from the middle and upper classes. A famous example of this are the women who nursed the infants of royalty. In 1817 *The Times* published a series of articles concerning the woman hired as wet nurse to the child of Princess Charlotte, who was the daughter and only child of King George IV (*The Times Digital Archive Online*). The woman was described as the "wife of a respectable yeoman near Claremont" and the paper speculates about how much money such a wet nurse could make (*The Times* 1817). It is reported that the woman who nursed Princess Charlotte was the wife of a respectable attorney and was still in receipt of 100 pounds a year even when Charlotte was a grown woman (*The Times* 1817).

Clearly the role of wet nurse to another woman's child was a source of income which could appeal to women from "respectable" social standing, and the idea and practice of breast feeding was reported both in national newspapers and childcare texts.

Unfortunately there is very little written evidence for the attitudes towards breastfeeding among the working classes, however from the evidence which suggests that breastfeeding was clearly supported among the upper classes of society, albeit only if

performed by wetnurses, it appears unlikely that breastfeeding would have been received differently among low-income groups. In addition to this, the archaeological and historical evidence discussed here indicates that breastfeeding was prevalent among working-class women, and it is difficult to imagine that, in the crowded accommodation in which the poor lived (Roger 1987), the image of a woman breastfeeding her child would have been hidden or seen as shameful, at least among her close family.

Today, the lack of visual representation of breastfeeding, the hyper-sexualisation of women's breasts, and the associated privacy required for this body part leads to low uptake of breastfeeding, feelings of shame for breastfeeding mothers, and poor response from the public to this healthy choice that women make (Whelan and Lupton 1998; Earle 2002; Entwistle *et al.* 2010; Thompson *et al.* 2015; Grant 2016; Morris *et al.* 2016a). To ensure that the existing policies of support, guidance, and legalisation of breastfeeding are useful, first the major factor of shame, embarrassment, and harassment that women face must be controlled.

Research on the impact of public health mass media campaigns such as Change4Life, launched in 2009 to promote healthy diet choices, and Stoptober, launched in 2012 to encourage attempts to quit smoking, has found that such campaigns have a significant impact on public behaviour concerning health (Brown *et al.* 2014; Wrieden and Levy 2016). The aim of media campaigns such as these are to highlight particular issues in public behaviour, in order that the public can be better informed to make healthier decisions. Recent campaigns include Public Health England's ACT. F.A.S.T which outlines the warnings signs of a stroke and how to react to it, and a series of adverts from the Home Office, 'Disrespect No Body', with information about consent and sexual assault. Advertising has long been a tool by the government to promote healthy behaviours or distribute useful information which is effective without resorting to direct

intervention in order to force change on the public. A similar campaign could be used to normalise breastfeeding in the UK, by changing the behaviour of the population and by promoting the practice using visual representation. Such a campaign could aid in a return to the breastfeeding norm of the past. It could act to show the realities of breastfeeding, thus reducing anxieties about pain or discomfort, and promote the act as a normal part of daily life for women who have other roles in society besides being mothers. An increase in the acceptance of this practice would reduce many of the main concerns that women have when considering their preferred feeding practice, such as support from their partner or family and from wider society. Such adverts viewed by the public would also promote breastfeeding among women who had not yet considered having children, which could have a greater impact on their decision than visits from health professionals after conception, by which time feeding decisions have often already been made (Earle 2002). This type of advert would need to be handled with sensitivity, to ensure that women who choose not to breastfeed, for whatever personal reasons, are not made to feel under pressure about their choices. Women have the right to choose which method of feeding is best for them, however they also have the right to receive the best information on which to make their decisions and to have no fear of the social repercussions of their choices.

Breastfeeding truly diminished after the introduction of infant feeding formulas towards the end of the 19th century, which could replace breast milk and allow women with infants to return to work very soon after birth (Stevens *et al.* 2009). Today, working women experience the same issues with breastfeeding; however modern technology such as breast pumps can facilitate an easier return to the workplace while still providing the child with breast milk. Unlike in the 19th century, families today should not have to make the choice between receiving wages and providing their infant with

the healthiest start in life. A cohort study performed in Australia followed the breastfeeding duration of 587 mothers, and found that those who expressed breast milk were more likely to continue breastfeeding up to six months of age than those who had never expressed milk (Win *et al.* 2006). In Norway, a country with one of the highest rates of breastfeeding in the developed world, there are strict laws regulating formula adverts and the rights of women to spend time away from work. In 1983, the WHO International Code of Marketing of Breast-Milk Substitutes was enacted, and a voluntary agreement was entered into between Norwegian health authorities and the two infant formula manufacturers in Norway, Nestle Norge and TINE Småfolk Barnemat (The Department of Health 2012). Under these regulations, a label must include information about breastfeeding and must state that formula should only be used on the recommendation of a health professional (The Department of Health 2012). Furthermore, no pictures of infants or images which idealise the act of formula feeding are permitted on such products, and companies are not allowed to use promotional methods such as free samples (The Department of Health 2012). As well as regulations surrounding formula products, the Norwegian Government also established paid breastfeeding breaks during the work day and introduced vitamin D supplements for infants (The Department of Health 2012).

Currently in the UK, infant formula cannot be advertised within shops, and no promotions for these products, such as displays and coupons, are allowed (House of Commons 2007). However, tougher guidelines on formula advertising in the UK may contribute to further normalising breastfeeding, since currently there are many formula products advertised on television and other forms of media, which are suggestive of normal practice, particularly considering the absence of visual examples of breastfeeding. Furthermore, although now officially labelled as “follow on milks” in all



advertising, often the children featured in such formula adverts appear young enough to be breast fed. Recent adverts from Aptamil and Cow & Gate feature young babies being bottle fed. If the Feeding Products for Babies and Children (Advertising and Promotion) Bill is enacted, it may begin to address some of these concerns.

In August 2017, the Royal College of Paediatrics and Child Health released their position statement on breastfeeding in the UK (Royal College of Paediatrics and Child Health 2017). In it, the College recommended that breastfeeding be taught in lessons at schools in order to promote familiarity with the practice and to ensure that it is part of the personal health education received by children (Royal College of Paediatrics and Child Health 2017). Lessons introducing breastfeeding to young people could act to replace the experiences of breastfeeding which were available to children in the past. This could begin the process of normalising natural infant feeding among new generations of parents, and coupled with a government media campaign to promote it could see the increase in breastfeeding rates in the UK.

To return to the breastfeeding rates of the past, we must recover those same social attitudes to the practice. Whilst once there was a visual lead for young people, an understanding that breastfeeding was the norm, and little influence from other potential feeding methods, today we have little representation, public hostility, and huge coverage of the multi-million pound industry of formula feeding. The government cannot directly influence the choices that adults make in their lives, banning infant formula is not a viable option, and as the 2010 white paper states, government nannying and dictating how people live their lives does not work (HM Government and Department of Health 2010). We also learn from history that medical experts merely telling their readers to breastfeed their children was just as futile. However, the role of the government is to facilitate people to make healthier choices based both on

information and accessibility. The government could play a vital role in increasing breastfeeding prevalence rates, by promoting the role of breastfeeding in child raising, not just to recently pregnant women, but to everyone. Displaying this practice as the norm in society could prevent the abuse or shaming of mothers by enforcing policies which indicate, both to the wider public and to companies, that breastfeeding is a legal right.

### **6.3.3 Diet for Young Children**

Following weaning, modern children are gradually introduced to solid food, with over 90% of those aged 7 months eating solid food three or more times a day (Lennox *et al.* 2011). From the age of 12 months, children are included in the NDNS/LIDNS data from section 6.1, and we see inequality between the nutritional sufficiency of children from the high- and low-socioeconomic groups. Recent research has shown that children who eat the same meals as their parents have significantly better nutritional health, pointing to the role of “child friendly” food in reducing the quality of nutritional intake at meal times (Skafida 2013). At four to six months of age, only 10% of children were found to often eat the same food as their parents according to the 2011 Diet and Nutrition Survey of Infants and Young Children, this figure gradually rising to 63% of children aged between 12 to 18 months (Lennox *et al.* 2011). The even greater nutritional inequality between adults from different socio-economic status suggests that this phenomenon in the child data may be due to the dietary knowledge and habits of their parents’, and this is reflected in the dietary intakes of children. For example, on average (mean) children aged between 12 to 18 months from low-socioeconomic backgrounds consume far smaller amounts of vegetables (65g) and fruit (74g) per day than children of the same age from high-socioeconomic backgrounds (83g and 122g respectively) (Lennox *et al.*

2011). Fruit and vegetable intake has also been found to be associated with socio-economic status among adults surveyed in the NDNS, with the low-income group consuming around 97g fewer fruit and vegetables per day than the high-income group (Maguire and Monsivais 2015). This suggests that the dietary habits of the parents affect the nutritional intake of their children from the age that they begin to eat solid food.

The food supplied to children in 21st-century Britain is directly controlled by parents and guardians and as such is likely to be affected by the knowledge, income, and dietary habits of adults. In terms of the control that children had on the meals they received at school, little has changed since the 19th century, although historically some older children may have had more autonomy over their meal choices in the past. However, the food provided to children was still directly controlled by the adults around them, as it is today. In both the 19th century and in modern Britain the diet of children during childhood was and is associated with socio-economic status, due to the decisions and knowledge of the adults around them.

Modern data suggests that the majority of children eat the same meals as their parents at 18 months of age. This practice is likely to result in the nutritional inequality found between children from different socio-economic groups, creating an intergenerational cycle of dietary habits. Currently, there is much focus on the health of school aged children in England, but eating behaviours have already been enforced and normalised by the time a child enters reception, by which time around one in ten children is obese (Public Health England 2014). Clearly, leaving intervention to occur only within schools is too late to be effective.

In 2012 the Children's Food Trust created a set of voluntary food and drink guidelines for early years organisations across England (Children's Food Trust 2012), and in 2016 Public Health England commissioned the Children's Food Trust to develop menus available to early years childcare settings and to parents (Children's Food Trust 2016; HM Government 2016). According to the government report *Childhood Obesity: A Plan for Action*, these menus were planned to be made available by December 2016, and an awareness campaign was planned to be launched in early 2017 to promote the new healthy guidelines among parents and early years professionals (HM Government 2016). On its website, the Trust reports that over 1000 nurseries, pre-schools, and children's centres were using the Eat Better, Start Better programme which includes the voluntary food and drinks guidelines (Children's Food Trust 2016), but it is not clear how many organisations are not using these guidelines and, as a result, may be providing inadequate meals. This same problem has been picked up in a recent study on pre-school and school meal policies (Lucas *et al.* 2017). This research also found that there is limited evidence on the quality of meals provided in early years settings, but states that most nurseries in England provide meals which are high in salt but low in energy (Lucas *et al.* 2017). In addition to limited information and control over the food provided in these early years settings, a second concern is the nutritional inadequacy supplied through the use of packed lunches (Lucas *et al.* 2017), which have also been found to be nutritionally inferior to school meals in a previous study (Evans *et al.* 2016). Of particular significance is the absence of a measure of quality in the meals provided within early years settings to children from different socio-economic backgrounds. Although there are clear developments in place targeting healthy eating practices among young children, it remains to be seen what impact these voluntary and unmonitored approaches are having on child health.

The prevalence of nutrient insufficiency, particularly among low-income children, could be improved if food served in early years settings was to face more centralised enforcement of guidelines. Such regulations could be used to increase the consumption of nutrients which have been identified to be insufficient in children's diet, by serving food and drink which is either fortified or naturally contains these vitamins and minerals. This approach could also act to target particularly at risk groups, for example by ensuring that all early years organisations in deprived areas are serving food with appropriate nutritional content.

## **6.4 Chapter Summary**

This chapter developed from the analysis of 19th-century human skeletal remains, which revealed that individuals from both high and low socio-economic status were at equal risk of a range of pathological conditions relating to diet. As a result of these tests further research exploring historical infant and child feeding practices revealed the many similarities between working- and upper-class childhood diet. These similarities between social groups of the types of food supplied to 19th-century children and the ages of feeding transition, for example weaning age, explain the results from the analysis of the archaeological material. The analysis of modern NDNS and LIDNS survey data supported the previously established (see Chapter 2) observation that modern low-income groups have worse nutritional health than modern high-income groups. The archaeological and historical evidence coupled with the modern results showing disparity between the nutrient intake of different socio-economic groups pointed to three specific areas of public health which, if effectively targeted, could improve nutritional health in the UK and narrow the socio-economic gap: nutrient supplementation, breastfeeding, and food served in early years settings.

## Chapter 7 Results: Height Data

This chapter presents the results of analysis performed on the height data collected from 19th-century criminal records (see 5.6.2 for details on how this data was acquired).

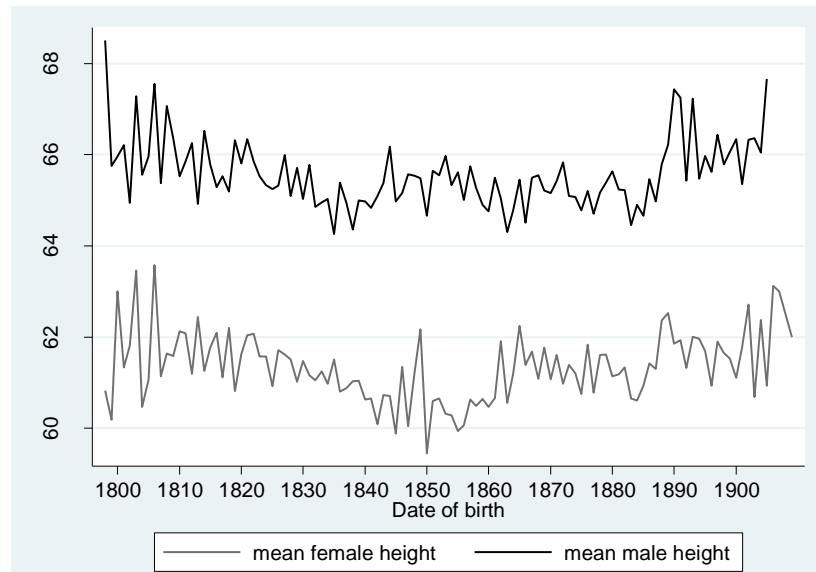
Where the previous chapter provided evidence for differences between the nutrient intake of high- and low-socioeconomic groups to explore how the impact of wealth on nutrition has changed since the 19th century, the height data presented here focuses on trends in nutritional health in the past. The results and subsequent discussion presented here argue that height began to increase significantly during the final 15 years of the 19th century, and continued to increase steadily until it plateaued during the 1970s.

Historical sources reveal the potential causes behind changes to height in the English working-class population, and this chapter presents evidence that the introduction of compulsory schooling during the 1880s improved environmental conditions for children, and the introduction of free school meals for the very poor improved childhood nutritional health. Both of these factors were likely to not only improve the health of children, but health across their entire lifetimes, and is likely to be behind the increase in adult height found among birth cohorts from the 1880s onwards. The importance of school in shaping the nutritional health of the nation is clear in the historical evidence presented, therefore the final part of this chapter develops a critique of modern policies concerning nutritional health and food in schools.

### 7.1 Results of 19th-Century Height Analysis

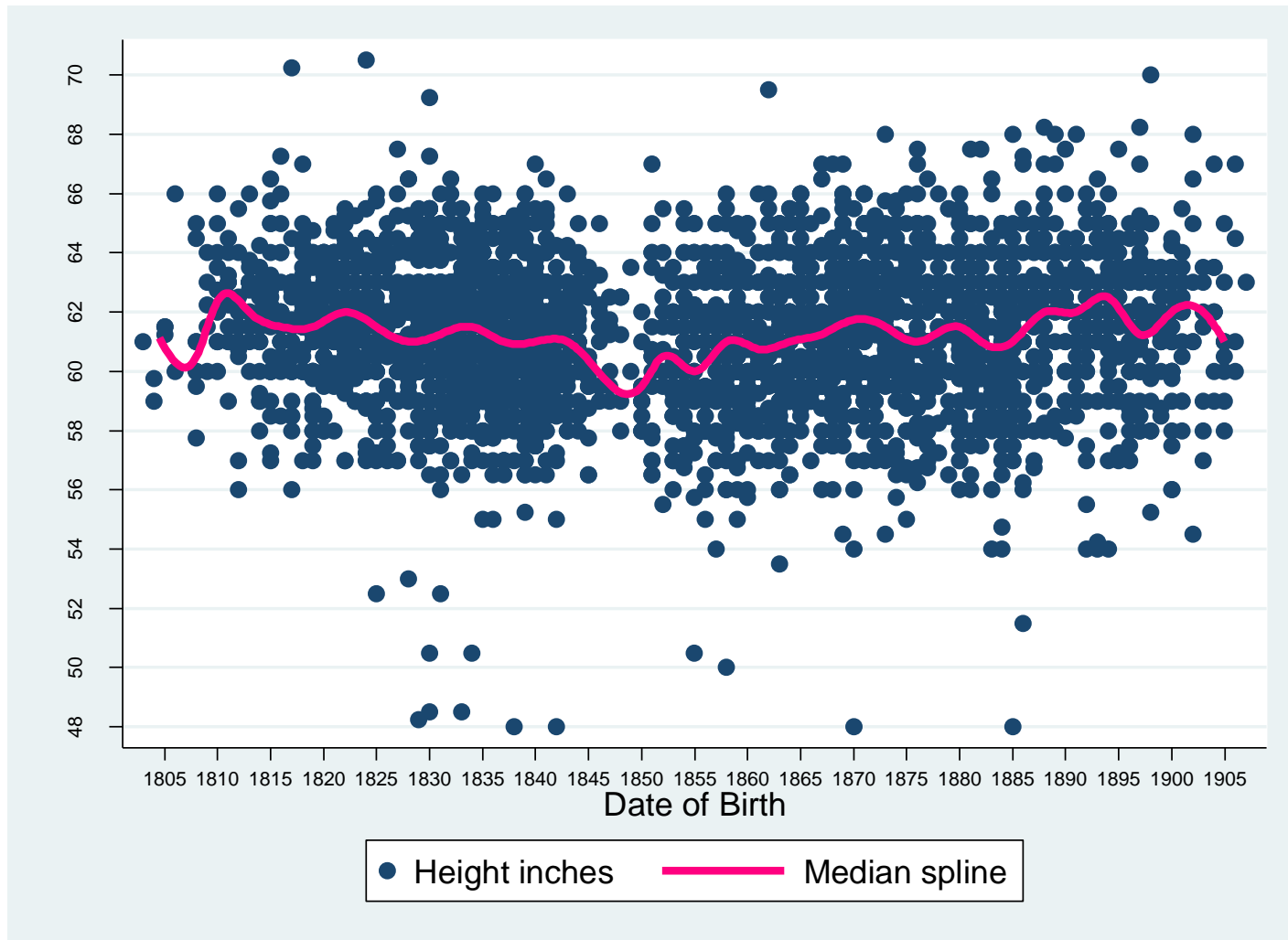
Results for average heights across the 19th century are based on data from the records of 5371 convicts – 3117 women and 2254 men – and show the changes in height for each year between 1798 and 1909. The averages represent final *adult attained height* for

individuals *born* in each year of the 19th century. Therefore, the tables and graphs displaying this data show the average height for *year of birth*, rather than for year of measurement. All the data below is presented in the same way, with final adult height for birth cohorts. The raw yearly average heights displayed in Figure 7.1 show a non-linear series of jagged peaks and troughs which can make it difficult to establish trends.



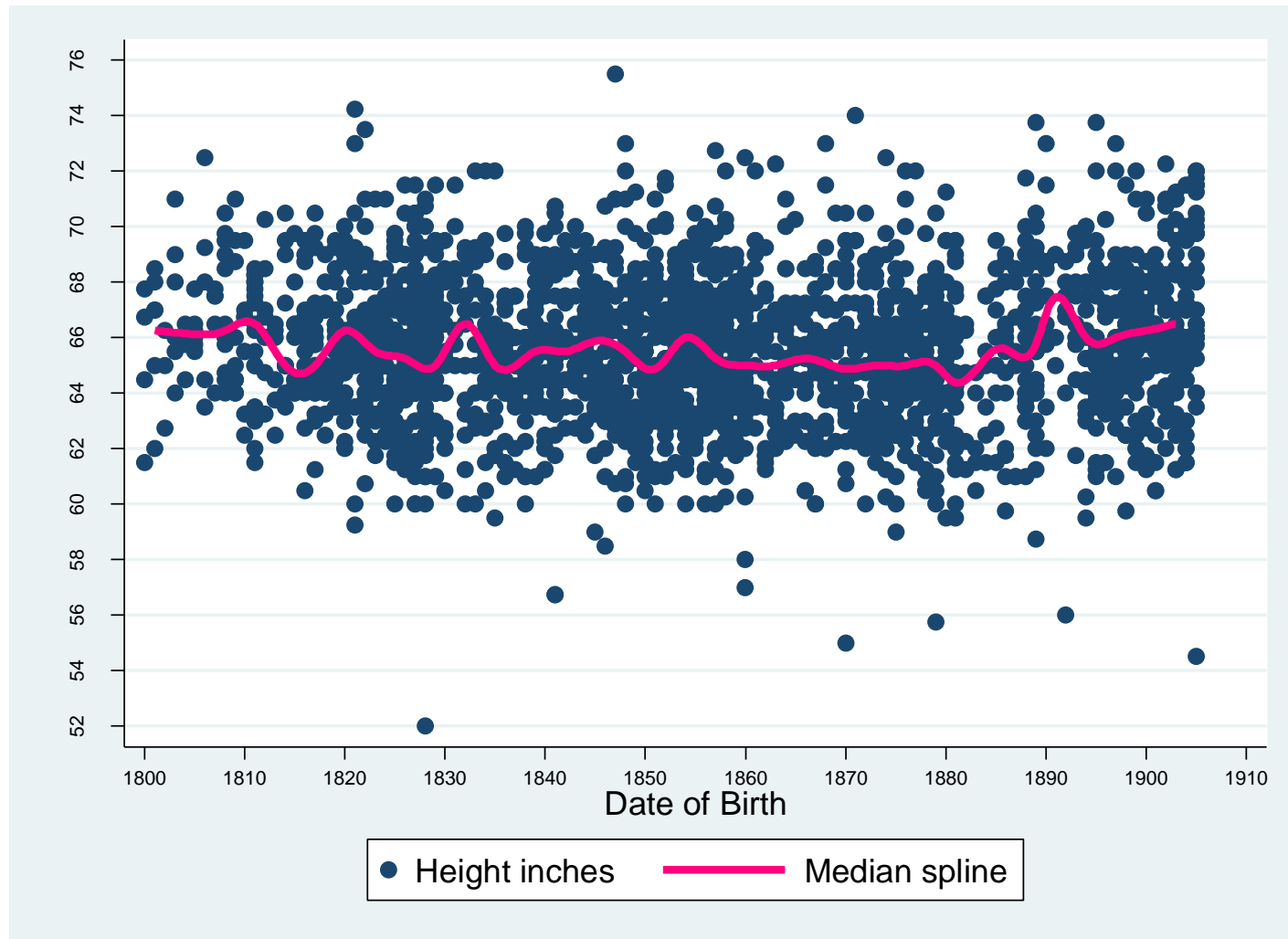
**Figure 7.1 Average height per year**

By fitting median splines to the scatter graph of height by five-year periods, or quinquennials (Figure 7.2 7 Figure 7.3), the trends across the century can be displayed more clearly. This also highlights quinquennials where the results are skewed from a lower sample size, such as 1840-50 in the female sample and around 1890 in the male sample.



**Figure 7.2** Female average height across the 19th century





**Figure 7.3 Male average height across the 19th century**

Although the first decade of the dataset contains fairly small samples, particularly for women, our average heights for females (5ft 1 inches (1.56 metres)) for the decade of 1810, are consistent with the larger dataset for this decade presented by Johnson and Nicholas (1997) which show the average of female prisoners from Newgate to be 5ft 1 inches (1.56 metres) in 1810 . This suggests that a smaller sample size did not appear to overly affect our average for this decade, although any interpretation of our results for this specific decade should factor in the sample size. The analysis of all the height data suggests that changes in adult height according to year of birth only became statistically significant in the final 15 years of the century (Figure 7.2, Figure 7.3, and Table 7.1). For women, there is an increase in height by 0.35 inches for the birth cohorts of 1885-90 was followed by a similarly significant decrease of 0.39 inches in the averages of those born between 1890-95, which returned height back to the levels of 1885-90. After this fluctuation the sample size for women decreases, and any significant changes to height are obscured. For men, the data follows a similar pattern of an increase in the 1885-90 birth cohorts of 0.5 inches, followed by a decrease of 0.6 in those from 1890-95. After this point the male data contains a greater sample size than the female, and another increase of 0.3 inches can be observed for those born between 1895-1900 (7.1).

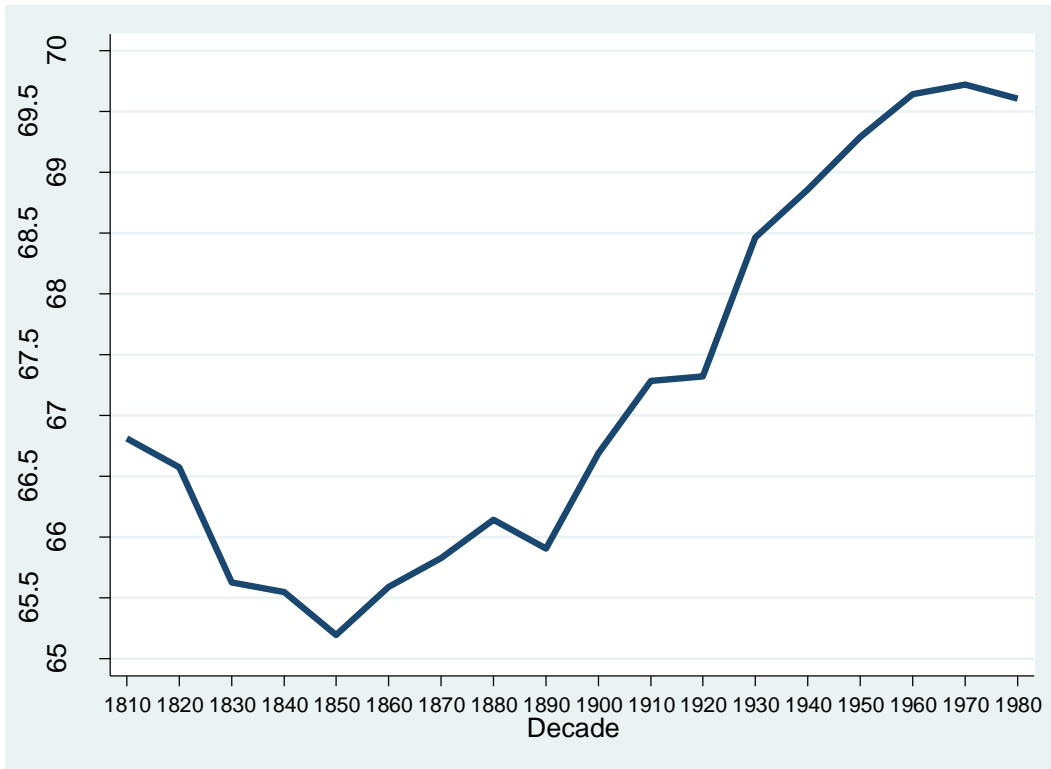
Quinquennial	Female			Male		
	Regression coefficient ( $\beta$ )	P	CI	Regression coefficient ( $\beta$ )	P	CI
1800	0.83	0.49	-1.57, 3.23	0.37	0.14	-0.12, 0.86
1805	-0.64	0.64	-3.35, 2.06	-0.55	0.17	-1.32, 0.23
1810	-0.29	0.38	-0.96, 0.37	0.06	0.83	-0.51, 0.64
1815	0.14	0.49	-0.25, 0.53	0.29	0.22	-0.17, 0.75
1820	-0.07	0.67	-0.37, 0.24	-0.38	0.05	-0.76, -0.00
1825	0.01	0.91	-0.25, 0.28	0.32	0.06	-0.02, 0.66
1830	0.02	0.86	-0.19, 0.23	-0.26	0.15	-0.62, 0.09
1835	-0.04	0.69	-0.23, 0.15	0.17	0.40	-0.22, 0.55
1840	0.07	0.53	-0.16, 0.30	0.10	0.59	-0.27, 0.47
1845	-0.29	0.12	-0.63, 0.06	-0.22	0.20	-0.57, 0.12
1850	0.34	0.11	-0.08, 0.75	0.18	0.28	-0.14, 0.50
1855	-0.06	0.75	-0.40, 0.29	-0.22	0.17	-0.53, 0.09
1860	0.12	0.43	-0.18, 0.42	0.20	0.25	-0.14, 0.54
1865	-0.13	0.39	-0.41, 0.16	-0.09	0.66	-0.49, 0.31
1870	-0.05	0.73	-0.32, 0.23	0.03	0.89	-0.34, 0.39
1875	0.06	0.66	-0.20, 0.32	0.01	0.96	-0.33, 0.34
1880	-0.12	0.34	-0.38, 0.13	-0.12	0.53	-0.50, 0.26
1885	0.35	0.01	0.08, 0.62	0.51	0.04	0.03, 0.99
1890	-0.39	<0.01	-0.68, -0.09	-0.57	0.01	-1.01, -0.13
1895	0.17	0.16	-0.07, 0.39	0.28	0.04	0.02, 0.54

**Table 7.1 Beta coefficient shows changes in height between 5 year birth cohorts of the 19th century, adjusted for sex, age, and county of trial. Statistically significant values are  $P < 0.05$ , and are present in the female data for 1885 and 1890, and in the male data for 1885, 1890, and 1895.**

After 1900 the dataset presented here ends, and any further trends are not visible.

However, data collected by the University of Tübingen on the adult height of British men by year of birth similarly shows growth after 1890 (Roser 2016) (Figure 7.4). Once again in this height survey no data for women were collected, and the data for men includes the height of enlisted soldiers, so suffers the same issues as previous datasets (full discussion of these challenges can be found in Chapter 5.6.2). This data is also only available for the United Kingdom as a whole, not specifically for England, however, it displays a similar peak around 1880 and dip around 1890 as does the data presented in this chapter. Furthermore, after the dip in 1890, height for men shows an almost uninterrupted pattern of growth until around 1970 (Roser 2016). This data lends

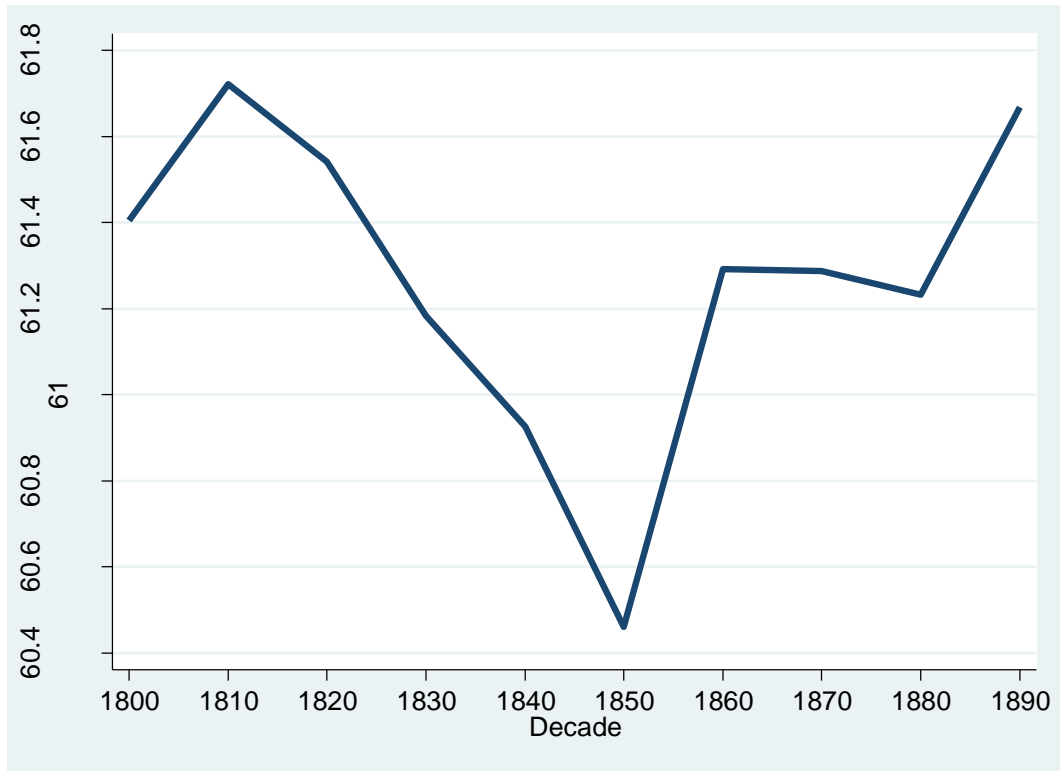
support to the argument presented here that height began to see significant increase among the birth cohorts of the 1880s and 1890s onwards.



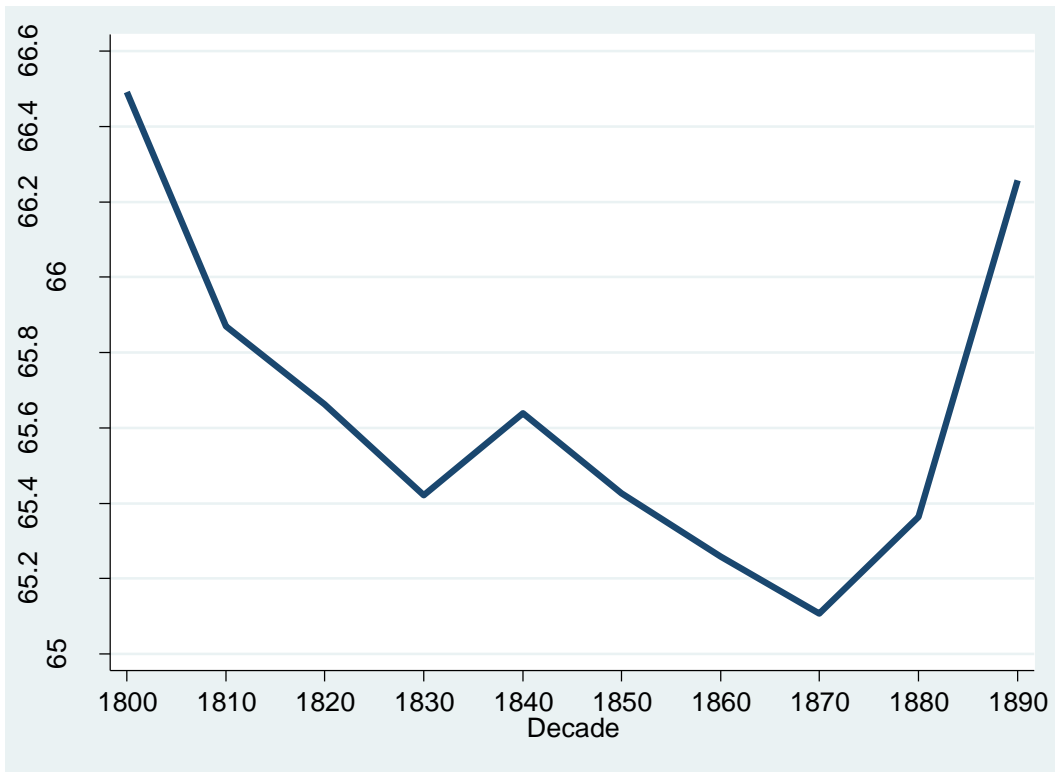
**Figure 7.4 Average height from UK men born between 1810 and 1980 (Roser 2016)**

Comparing the mean height trends shown in the University of Tübingen data (Figure 7.4) with the mean height trends for female (Figure 7.5) and male (Figure 7.6) data presented in this thesis reveals many similarities between the three trends. All three sets of data show a drop in height from the start of the 19th century, reaching lowest points between 1850 and 1870 (although the very low female average in 1850 is skewed by a low sample size for this decade). Height then appears to recover to early 19<sup>th</sup>-century levels around 1880 and 1890, before the University of Tübingen data shows a continuous growth until the 1970s. Taken together this evidence suggests that the changes in height from 1880, identified by analysis of the male and female convict data presented in this thesis, marks the start of a long and extensive period of growth which increased the height of the English population to current levels. The mid-century drop in

height represented by the raw plots of data is not deemed significant in the median splines analysis, and as such may be a result of skewed data, for example there are fewer sampled heights in 1830 and 1850 for males and females respectively.



**Figure 7.5 Mean female height trends from the presented convict height data**



**Figure 7.6 Mean male height trends from the presented convict height data**

In addition to height data, the place of birth or arrest was recorded for 5227 individuals. Using population size records from Parliamentary census returns (White 1861), each individual within the height dataset was assigned to one of five categories based on the population size of their place of birth or arrest (Table 7.2Table 7.2). These five categories represent cities, towns, or villages with population sizes from most rural areas with less than 1000 residents (category 5), to most urban areas with greater than 300,000 residents (category 1).

Urban Category	Population size	N=	Regression coefficient ( $\beta$ )	CI	P=
1 most urban	>300,000	2277	Comparator		
2	100,000-300,000	439	-0.11	-0.37, 0.15	0.41
3	20,000-100,000	1311	0.03	-0.15, 0.2	0.77
4	1000-20,000	1078	0.36	0.18, 0.55	<0.01
5 most rural	<1000	112	0.63	0.15, 1.12	0.01

**Table 7.2 Results of regression analysis testing for the association between the population size of place of birth/arrest and adult attained height, with the most urban category (1) as the comparator. Adjusted for sex.**

There was found to be a positive association between height and rural place of birth/arrest (Table 7.2). The groups from two least populated rural categories, category four and five, were 0.36 (CI 0.18 to 0.55) inches and 0.63 (CI 0.15 to 1.12) inches taller respectively than the group from the most populated urban regions. These result suggests that individuals from rural regions were taller than those who originated from urban settings, indicating better childhood environmental and nutritional health in less populated areas compared to areas with a large population.

### 7.1.1 Interpretation

These results indicate that for the majority of the 19th century, working-class height may have fallen somewhat during the mid-19th century, but that this fall in height was not significant when tested. Height then recovered and increased after the 1880s. This would suggest that environmental conditions during childhood were fairly similar for each decade, and it is unlikely that there was improvement or decline in factors such as disease exposure and nutrition for children over the century.

The raw data presented here is in agreement with previous research into average height in the 19th century, which mostly describe a decrease in height beginning between 1825

to 1840 (Johnson and Nicholas 1997; Floud 1998; Steckel 1999; Steckel 2001). Other than in the study by Johnson and Nicolas, this trend has only been observed in military recruit heights. However, from their publication it appears that Johnson and Nicolas (1997) used linear regression analysis on the convict height data in a similar test as that performed in this thesis, using dummy variables at 5 year intervals for birth date. In this way the data was grouped into 5-year categories and the average height was tested in association with these birth categories. Although they do not present their full statistical output, including any significance values or confidence intervals, they conclude that the height and well-being of women declined after 1825 (although state that the birth-year dummies were only significant after 1845), and that men's height and living standards fell after 1815 (although only significantly in men born after 1840) (Johnson and Nicholas 1995, 480).

The difference between the results from Johnson and Nicolas in comparison to those presented here lies in the interpretation of the results, since both datasets derive from similar sources and should be representative of the working-class population. This appears likely since the averages for the first half of the century presented in this thesis are similar to those from Johnson and Nicolas (1995, 477). The decline reported by Johnson and Nicolas can be seen in the female results presented here, however the p-values suggest that we can accept the null hypothesis, that there is no association between these quinquennials of birth and adult attained height. A significant result for the decrease in height between 1800 and 1850 can only be replicated in the present data if a simple linear regression model is fit to the period. However, the height data across the century is not linear, therefore it is necessary to use linear splines to allow the estimation between year of birth and adult attained height as a piecewise linear function (a function composed of intervals which create the whole).



The decrease observed during the 1840s is notable, since this was a period of economic and agricultural hardship during which time around one million people died of starvation or disease in Ireland as a result of widespread potato blight (Kinealy 1994; Geber 2015). In England, the effects of harvest failure, economic depression, and policies such as the Poor Law and the Corn Laws occurring simultaneously with the Irish famine signalled the period now known as the ‘Hungry Forties’ (Boyce 2012). The impact of this on the lives and well-being of the English was far less severe than occurred in Ireland and even other European countries (Beaumont *et al.* 2013a), and research into the economic impact of this period has found that the price of grain in England was not significantly above average, but instead the cost of living remained within normal variation for the time (Berger and Spoerer 2001). Berger and Spoerer (2001, 300) argue that unlike other European countries, such as France and Prussia, England did not experience what they term a price “shock”, defined as a fluctuation so large that it severely diminishes the budget of a large proportion of the population. Although England appears to have remained relatively unscathed by this period in comparison to other countries, particularly Ireland, any rise in grain prices, even when it does not result in such a price “shock” would likely have a detrimental impact upon the very poor. It is well documented that those on low incomes during the 19th century were adversely affected by periods of unemployment or disability due to their inability to save for such situations as a result of having only subsistence level incomes (Mayhew 1861). Individuals with incomes which only covered a simple subsistence lifestyle are likely to have faced health consequences as a result of increase in grain prices such as this. The decrease in average heights in 1850 may be a reflection of these families who did not have the income to cope with increased grain prices at the end of the 1840s, but since this result was not statistically significant no conclusion can be drawn for the height trends during that decade.

The results presented here suggest that environmental stress during childhood consistently stunted growth in working-class children across the 19th century. However, environmental factors which caused this stress may have had differing influence on growth across the century, and it is not possible to identify the main cause of stunting during a particular decade based on this data alone; whether nutritional health, energy output, or disease played the major role. Because of this it is necessary to examine further types of evidence to enable a more precise understanding of the nature of height changes. The following sections explore the legislation, political theory, and social developments across the 19th century which could provide explanations for the increasing height at the end of the century presented within this chapter.

## **7.2 Historical Evidence for Social Policy and Childhood Health**

Results from the analysis presented here of the average height of convicts across the 19th century revealed that individuals born in the last 15 years of the century experienced conditions during childhood which increased their height. The pattern in height changes occurs in both the female and the male sample, although the male sample experiences a second significant rise in height between 1895-90, indicating more than a random spike of growth or unreliable data. Rather, it suggests that around 1885 the growth of infants and children improved, and despite the temporary drop between 1890-95, the overall height trend at the end of the 19th century was increasing.

As previously discussed (Chapter 5.6.2), final adult attained height is dependent on a mixture of both genetics and environmental and nutritional health during childhood. The increase in height for individuals born around 1885 is unlikely to be the result of a genetic change, since there is no indication that this period saw a dramatic change in population movement which would be required to introduce new, taller genes to the

English population. Instead, the greater height recorded after this date points to an improvement in childhood health, but from the data alone it is not clear whether this improvement was nutritional or environmental, or what the cause behind it was (Harris 1994). Insults to health during childhood can have an impact on adult attained height unless a child undergoes “catch-up growth”, wherein the child resumes growing after a period of growth disruption at a higher rate than is normal for an unaffected individual (Tanner 1981). This period of catch-up growth can re-establish an individual along their growth trajectory, masking any signs of poor health in their final height, but only if there is an increased intake of energy during the period of catch-up growth, which may not have been accessible to working-class children during the 19th century (Tanner 1992). According to Omran (2005), there are three major determinants of disease during an epidemiological transition; “ecobiologic” which is the balance between the virulence of disease in the environment and the resistance in the population, socioeconomic, political and cultural determinants, which include standards of living, nutrition, and hygiene, and medical and public health determinants which combat disease through preventive or curative means. We can narrow down such possibilities to five areas in which improvements may have led to healthier children, thus taller adults;

1. Wealth: an increase in real wages, thus living standards.
2. Disease: advancements in medical intervention leading to a more controlled disease environment
3. Home: improvements to living conditions and sanitation in the home
4. Workplace: improvements to working hours and conditions
5. Diet: improvement in the quality and quantity of food eaten by children

The following sections will examine each of these potential factors in turn, before modern legislation concerning childhood nutritional health is addressed.

### 7.2.1 Wealth

Real wages – wages which are adjusted for inflation in terms of the amount of goods and services that can be purchased – are a good indication of the living standards of a population. An increase in real wages generally points to improved living standards, since individuals have greater purchasing power for housing, food, and recreation, which in turn means that they have greater choice about the quality and quantity of the products that they buy. There has been some debate over the pattern of real wage growth across the 19th century. Feinstein (1990) outlined how prices fell between 1882 and 1899, only to rise again with little improvement to wages between 1899 and 1913, suggesting that real wages were rising during the 1880s and 1890s. However, Greasley (1986, 421) argued that the data used by Feinstein, wage data which had previously been collected by Bowley, had over-weighted the coal-mining wages for the period after 1880, leading to a much higher indication of real wages as a result. Using the amended wage data, Greasley found that wages showed faster growth into the early 1880s, followed by a much slower growth thereafter (Greasley 1986). Although the research suggests that there may have been growth during the 1880s and 1890s, Crafts and Mills (1994) show how real wages increased from the beginning of the 19th century, and continued to grow throughout the 1800s until the turn of the 20th century. However, the average height data does not indicate a gradual increase in adult height relative to the growth in real wages at any other point in the century, suggesting that the sudden significant increase in heights around 1885 could be due to other causes besides real wages. There is nothing to suggest that, if there was growth in real wages after 1880, it was a new phenomenon in Britain. If the century of growth as identified by Crafts and Mills (1994) did not result in dramatic increases in average height it seems unlikely that the debated growth after 1880 could be behind the rise in stature.

### 7.2.2 Disease

It was during the final decades of the 19th century that germ disease began to be accepted in place of miasma theory which had existed previously. This was primarily due to the discoveries of scientists such as Louis Pasteur and Robert Koch, who identified bacteria as the infecting agents of disease from the 1870s onwards (Blevins and Bronze 2010). Improvements in medical interventions and advances in science at this time could potentially have led to better population health, since children who were not exposed to infectious disease, perhaps having been vaccinated (a method first conducted in 1796 by Edward Jenner on a smallpox patient (Riedel 2005)), would not have experienced illness with the potential to disrupt their growth. One issue with using height data is that both malnutrition and infection can impact on growth, and since they are synergistic it is not possible to determine from height data whether a change could be due to infectious disease prevalence or changes to nutritional health (Guha 1994). However, analysing mortality rates by cause of death can reveal whether there was a significant change to the numbers of deaths by infectious disease during this time period.

Analysis of the top 20 causes of death (contributing to over 82% of all deaths, Table 7.3) for children aged below 16 years for the years 1870, 1880, and 1890 show there to be little difference between the prevalence of deaths over 20 years (Data from Davenport 2011). Although there were significant changes in the proportions of children who died from each cause between 1870 and 1890, the same 20 conditions caused over 80% of deaths at that time. Furthermore, out of these 20 causes, we see an increase in deaths from infectious diseases such as bronchitis, pneumonia, measles, diphtheria, while others remained as deadly across time, such as tubercular meningitis.

The long debate about the causes behind reduced mortality from infectious disease which led to a population increase, mentioned in section 2.2, saw McKeown (1962; 1976) argue that it was due to an improvement in nutritional status, while Szreter (1988; 2002) argued that it was caused by improvements to the environment brought about by public health movements. Both authors use data from mortality statistics available from the 19th century, focusing on infectious disease, and this is comparable to the method used here. However, since the aim of these authors was to discover the cause of population increase across the century, rather than to establish factors which could have improved childhood health during a specific period, they only briefly break down their discussion into age groups. This means that the mortality statistics presented in McKeown and Szreter's arguments are based on data encompassing the entire population, and this makes it difficult to use their findings here where our focus is on the prevalence of infectious disease mortality during childhood development. As McKeown states, "for the population as a whole the decline [in mortality from infectious disease] began in the eighth decade, but experience was quite different in different age periods. There was no improvement in infant mortality or in mortality at ages over 45" (1962, 118). Similarly, Szreter concludes that "whereas the reduction in the mortality of elder children and younger adults throughout the last third of the nineteenth century reflected improvement of the urban environment at the strategic level outside the home, that of infants had to await the more probing and detailed regulations and the expansion of skeletal social services, which had only just begun by the turn of the twentieth century to penetrate into and improve the conditions existing in the infant's 'environment': the working-class domestic household itself" (1988, 32). The data presented here suggests that children were exposed to high levels of infectious diseases during the last three decades of the 19th century, differing only by the type of pathogen. Although, according to Szreter and McKeown, older children saw reduced

rates of death by infectious disease, the mortality data present here suggest that this was not because there was less disease prevalence. Rather, disease prevalence remained high, meaning that older children must have had a new capacity to survive illnesses. Clearly, there was no real progress during this decade in eradicating infectious diseases, suggesting that any improvements in health during childhood were unlikely to be due to preventative medical advances. This is supported by McKeown, who argued that the decline in mortality during the 18th and 19th centuries could not have resulted from a change in the virulence of disease, nor was it influenced by medical intervention until well into the 20th century (McKeown 1976) and also by later work examining mortality rates across the century (Haines and Shlomowitz 1998).

<b>Cause of death 1870</b>	<b>% 1870</b>	<b>Cause of death 1880</b>	<b>% 1880</b>	<b>Cause of death 1890</b>	<b>% 1890</b>
Scarlet Fever	12	Bronchitis	10	Bronchitis	11
Convulsions	10	Diarrhoea, Dysentry	10	Convulsions	8
Debility, atrophy, inanition	10	Debility, atrophy, inanition	9	Debility, atrophy, inanition	8
Diarrhoea, Dysentry	9	Convulsions	8	Pneumonia	7
Bronchitis	7	Scarlet fever	6	Premature birth	6
Pneumonia	6	Phthisis	6	Diarrhoea, dysentry	6
Whooping-Cough	5	Pneumonia	5	Phthisis	5
Phthisis	4	Whooping-cough	5	Whooping-cough	5
Premature birth	4	Premature birth	4	Measles	5
Measles	3	Measles	4	Inflammation of brain	3
Tubercular Meningitis	3	Tabes mensenterica	3	Tabes mensenterica	3
Tabes Mesenterica	3	Tubercular Meningitis	3	Scarlet fever	3
Enteric Fever	2	Inflammation of brain	2	Tubercular meningitis	3
Croup	2	Enteric fever	1	Diphtheria	2
Dentition	2	Dentition	1	Dentition	2
Inflammation of brain	1	Croup	1	Tuberculosis, scrofula	2
Simple fever	1	Diseases of respiratory system	1	Enteritis	1
Non-specified cause	1	Tuberculosis, scrofula	1	Croup	1
Diphtheria	1	Diphtheria	1	Enteric fever	1
Disease of respiratory system	1	Disease of circulatory system	1	Disease of circulatory system	1
<b>Total</b>	<b>87</b>		<b>82</b>		<b>83</b>

**Table 7.3 Top 20 causes of death for children aged below 16 years ranked by most prevalent to least prevalent for the years 1870, 1880, and 1890.**



### 7.2.3 Home

During the 19th century the poorest paid in society commonly spent the highest proportion of their income on accommodation, which became increasingly more expensive as the century progressed (Roger 1987). This situation for low-income households is similar today. A 2016 report from the Resolution Foundation, an organisation which examines British living standards, found that households with the lowest incomes spend far higher proportions of their incomes on rent than higher income households (Clarke *et al.* 2016). This report found that modern low-income families spend up to 33.9% of their income on rent, while high-income families spend 25.6% of their income on rent (Clarke *et al.* 2016). However, today there is a far improved standard for living environments, whereas in the past the quality of accommodation available to such low-income groups was extremely poor, and even by the start of World War One huge numbers of British families had very limited access to running water and sanitary living environments (Roger 1987). By 1911, it is estimated that over 758,000 Londoners, as well as around 10-12% of the population of Liverpool, Manchester, Birmingham, and other large cities, were living in overcrowded conditions of more than two people per room (Roger 1987). This level was higher in Northumberland and Durham, where over 30% of the population lived in overcrowded housing, and reached over 50% of the population in Glasgow (Roger 1987, 113).

These overcrowded areas were seen as more than simply a problem for health or quality of life by government officials. Rather, they were seen as areas in which immorality and vice festered among the lowest classes, who were heavily stigmatised as habitual

criminals, “prostitutes”, and paupers (Mansfield 2008). As such, slum<sup>1</sup> clearance schemes began in order to clear areas which were hazardous to health and to morality, and The Artisans’ and Labourers’ Dwelling Improvement Act of 1875 (also known as The Cross Act) was passed, displacing around 22,868 people who had lived within 5,555 mainly one roomed homes (Mansfield 2008). This Act aimed to make housing available for the better class of workers by clearing unsanitary sites, mostly inner city slums, and allowing private housebuilding enterprises to begin in the suburbs (Yelling 2007). However, demolition and rebuilding took many years, with some of the newly built housing not finished until 1912 in London, and 1913 in Liverpool (Roger 1987). Furthermore, placing new housing in the suburbs put it out of reach both geographically and financially for many of the poor who had been displaced from the slums, due to the problem of irregular, poorly paid working hours for many, coupled with limited train timetables (Steffel 1973; Mansfield 2008). Even if low-income families could afford such housing, former slum tenants who were deemed morally undeserving of aid (an attitude continuing from the Poor Law categories of deserving and undeserving poor) were not entitled to the limited rehousing schemes (Mansfield 2008). Due to the adoption of high building standards by London County Council, tenants were unable to rent a single room, but had to pay for the entire property (Steffel 1973; Yelling 1982). All of these issues with slum clearance forced families who had previously inhabited the cleared slums to find new, cheap homes, generally achieved by crowding into the surrounding areas (Mansfield 2008). Thus, the government attempt to ease issues of

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<sup>1</sup> The United Nations defines a slum as an urban area which has inadequate access to safe water and sanitation, poor structural quality of buildings, overcrowding, and insecure tenancy (592. United Nations Human Settlements Programme (2003) *The Challenge of Slums: Global Report on Human Settlements 2003*. London: Sterling: UN-Habitat.)

overcrowding, unsanitary and immoral living conditions only acted to worsen the situation by moving displaced people from one overcrowded area to another.

There is plenty of evidence to suggest that conditions within the homes of the poor and working classes did not improve during the last two decades of the 19th century, and much to indicate that there may well have been worsening conditions for the very poor. Since the average height dataset is composed of habitual criminals and many individuals who were convicted of petty crimes, as well as a number of vagrants and sex workers, it is likely that many of these people lived in extremely overcrowded and unsanitary conditions, and some were probably among the number displaced from their homes at this time. The evidence indicates that it is unlikely that conditions within the home could have improved health in the period around 1885.

#### **7.2.4 Workplace**

In 1833, the first Factory Act that prohibited the employment of children in textile mills (apart from silk mills) was passed (Nardinelli 1980). As well as this, the Act introduced limited working hours for children aged 9 to 12 years and also required that they attend school (Nardinelli 1980). This was followed around a decade later by the Factory Act of 1844, which required that children employed in textile mills work half-days and attend school half-day, while also lowering the employment age to 8 years (Nardinelli 1980). Although these Acts were clearly a step in the right direction in terms of child welfare, children aged under 9 and 10 years made up less than 2% of the labour force in every textile industry except for silk (Nardinelli 1980). This suggests that the Factory Acts did not change the working conditions of many children who were employed in other industries or at home.

It was not until the 1880 Elementary Education Act that all children between the ages of five and ten years were required to attend school (Sheldon 2007). This Act enforced the original Elementary Education Act of 1870 by making compulsory attendance by-laws take precedence over legislation regarding factories and allowing authorities to prosecute for truancy (Sheldon 2007). Compulsory education is still in force in the UK today, with children aged between four and sixteen years of age legally required to attend formal schooling or other forms of education (i.e. homeschooling). National data for school attendance indicates that in the year the compulsory school attendance was enacted (1880), only 70% of children were in school, a figure which rose to 90% by 1909 (Sheldon 2007). As Sheldon notes, “the expansion of school rolls to include almost all working-class children of school age and to a level of attendance approaching modern equivalents signified a major change in patterns of behaviour. It meant regular schooling for at least 6 years (from age 5-11) had become the norm, whereas prior to 1870 most working-class children had experienced truncated and intermittent school career” (Sheldon 2007, 50). Research by Rose (1993) on first-hand accounts of the working-class experience of the school room found that around two thirds of all working people included in the study saw their school days as a good experience. It follows that if many children enjoyed their experience at school, and there was a large increase in attendance, the environment of the classroom could have resulted in better childhood health and subsequently taller adults. This supports a theory previously presented by Hopkins (1994), who used historical government records to suggest that the introduction of compulsory schooling may have led to an improvement in children’s lives during the final decades of the 19th century. To explore the possibility that the height data presented in this thesis supports this claim, the environmental quality of the schoolroom must be established. If compulsory schooling was the cause behind the

increase in height, thus improved health, of the 19th-century population, then this evidence would support a modern approach of interventions in schools for improving health.

In 1880 the Report of the Committee of Council on Education in England and Wales published their report consisting of school inspector's accounts of the quality of schools in each district of the country (House of Commons Papers 1880b). Many of the school buildings were reported on positively: for instance, schools in the Durham district were said to be "frequently very handsome, and form the one bright spot in many a 'pit village' and colliery district" (House of Commons Papers 1880b, 222). The inspector of schools in the Liskeard district of Cornwall, Herbert Cowie Esq, placed high praise on Cherry Garden Street infant school, which he describes as "the best I have ever seen. The children, though drawn from the lowest class of a dockyard town, are clean, bright, and intelligent under excellent discipline, and thoroughly well taught" (House of Commons Papers 1880b, 251). The East Devon school at Bow was described as "the lighting, ventilation, and general aspect of the premises are thoroughly satisfactory" (House of Commons Papers 1880b, 303). For Leeds district, inspector Legard notes how improvements had been made; "When I wrote my last report few permanent board schools had been completed, and very sorry 'makeshifts', - premises without playgrounds or proper classrooms, and badly ventilated and lighted - were in many cases rented by the board and used as schools. Very few of these are now retained, and a network of solid substantial buildings cover the town." (House of Commons Papers 1880b, 318). Similarly, changes are also recorded for school in the district of Bristol; "one board school (Counterslip) has at last been closed on account of the unfitness of the premises. One new building has been erected in Mina road. Though on the very edge of the district, it is practically suitable for the wants of a very poor population ... I

must add a word of praise of the building. The board have gained by experience; and this, their last venture, is (in my judgement) by far their most successful” (House of Commons Papers 1880b, 331). The inspector at Bristol also goes on to note how two schools have been closed, one moved, and a new schoolroom and block built to accommodate the students (House of Commons Papers 1880b, 333). The inspector for the Manchester district notes similar admiration for his school buildings “the large and handsome buildings for which the board are responsible are well constructed and ventilated, and in every way suited to their purpose, except that in some cases the class rooms are too small. Each new school is an improvement on the others, and one now being built in Cheetham will be an ornament to the neighbourhood” (House of Commons Papers 1880b, 349).

These many words of praise by inspectors for school buildings could be regarded as simple prejudice or false reporting by government officials in an attempt to save money in building and renovation costs. However, there are just as many criticisms of schoolrooms made by the same inspectors. Returning to Durham, district inspector Bernays notes how “ventilation is a defective point in most schools, and even in new buildings it is only secured at the expense of a thorough draught. I find it necessary to insist upon the introduction of ventilators either in the roof or chimney” and also that “the want of sufficient class-rooms is often a serious drawback, especially in the case of large schools” (House of Commons Papers 1880b, 222). Liskeard district received equal criticism; “the interior, however, sometimes left in a very rough state, but I have succeeded in inducing the boards in several cases to plaster and wainscot the internal walls. Unless this is done the walls become coated with dust, which it is difficult to dislodge and which is both unsightly and injurious to health. Ventilation too, even in buildings of considerable architectural pretensions, is frequently defective, and the

rooms are either stuffy or draughty” (House of Commons Papers 1880b, 246). The architects and builders of Ipswich schools are said to have “not paid adequate attention to the details of internal arrangements and organisation, such as desks, lighting, warming, ventilation, and the like” (House of Commons Papers 1880b, 263). There are many more such examples of critical reports from these inspectors, and many share the common theme of issues with ventilation. However, the quotes above also reveal that improvements were both suggested and were occurring in many areas, with new buildings built, old ones closed, and many which had been improved since the last inspection. This indicates that the school board was active in enforcing the upkeep of classrooms to a certain standard.

In order to see how school environments improved after these reports, we can return to them with our inspectors in the 1888 Final Report of the Commissioners Appointed to Inquire into the Elementary Education Acts (House of Commons Papers 1888). In one chapter about the structural suitability of schools they report:

“Since the provision of school buildings has been going on without intermission for half a century, great differences exist in the suitability of school premises for the purposes for which they have been erected. The standard of what is required in the way of buildings and appliances has during that period been very properly raised, though uniformity has of necessity not been insisted upon. And many groups of schools, which at the time they were built conformed to the requirements of the Education Department, or to the most advanced public opinion of the time, would now be deemed unsuited for educational purposes, were it not that from time to time they have been improved to meet the demands made by Her Majesty’s Inspectors.” (House of Commons Papers 1888, 61)

In comparison to the measures taken for ensuring sanitary housing, the quality of the school environment would almost certainly have been infinitely better than that found in the homes of poor children. The compulsory attendance laws introduced by the 1880 Elementary Education Act, and the resulting rise in the number of children who went to school full-time, fits well with our data for increasing average height for men and women born around 1885. Improvements to the environmental conditions in which children spent large proportion of their days, access to light, exercise in school yards, and also the removal of those children from labour intensive work environments may have contributed to the rise in growth rates for this period.

### **7.2.5 Diet**

Having considered the potential impact of environmental conditions on the health of the 1885-1890 birth cohorts, we now turn to question of nutritional improvements. The most obvious issue with the nutritional quality of food during the 19th century was the practice of food adulteration and the ineffective legislation regarding contaminated and rotten food which was widely available for purchase and consumption throughout the century (Oddy 2008). The end of the Napoleonic Wars in 1815 marked an explosion in the food adulteration trade, which reached its peak in the 1850s, and continued beyond the passing of the first Food and Drugs Act in 1860 (Collins 1993). Until at least the 1870s, flour was the most adulterated food, often cut with other substances to raise revenue for dealers and bakers, and bread accounted for between 40% and 60% of expenditure on food in low-income families (Collins 1993). Just as serious, outbreaks of food poisoning from contaminated canned foods occurred throughout the 1880s and 1890s since, although canning had been invented decades earlier, it was only from the 1880s that scientists began to understand that bacteria in unsanitary food caused such



illness (Collins 1993). Clearly, food adulteration continued to be an issue even after legislation was passed in 1860, and deaths from contaminated food continued well into the 20th century, suggesting that there was little change in the sanitary measures required to cause changes in the health of the population.

But did the overall quality or quantity of food available to those on low-incomes improve at this time? According to Oddy (1970b) they did not. Using data from 151 family budgets collected during the late 1880s and 1890s, Oddy estimated the average working-class nutritional intake . Between 1887 and 1900 these budgets revealed that each member of the household received an average intake of 2077 kcal per day, although this figure dropped to 1578 kcal for incomes under 18s per week, and 1964 kcal for incomes between 18 and 21s per week (Oddy 1970b, 319). Oddy concludes that “with a diet of 2000 kilocalories and 50 grammes of protein per day, it is impossible to envisage how the diverse physiological needs of wage-earner, wife, and growing children could be met adequately” (Oddy 1970b, 321). This analysis of diet does seem to suggest that most working-class people had entirely inadequate intakes of energy and nutrients during the last decade of the century. However, there are two issues with the analysis presented in Oddy’s paper.

First, due to the lack of information regarding how food was distributed within the family, Oddy creates his averages by dividing the total budgeted food equally between each member of the family. Due to physiological differences in the nutritional requirements of men, women, and children, to split the food data in this way will act to overestimate the kcal intake for children and underestimate the kcal intake for men. Since adult women require more calories than children and fewer than men, it seems likely that these averages would also be incorrect for women. Unfortunately, Oddy does

not include the raw figures from his sources within the article, so we cannot attempt to redistribute intakes based on the requirements of different sex and age.

Second, Oddy's conclusion that 2000kcal and 50g of protein does not constitute a healthy diet is somewhat more complicated than it appears. Reference intakes found on most food packaging today recommend that the average male and female requires around 2500 kcal and 2000 kcal a day, respectively, while the average adult requires around 50g of protein per day (British Nutrition Foundation 2016a). Oddy makes no explanation for his belief that this intake level would not be sufficient for men, women, and children. One assumption might be that the kcal intake did not approach the average intakes of families during the 1960s, which were quoted as being "about 2,600 kilocalories per head per day. For larger working-class families ... however, which is perhaps a close comparison with these families in the 1890's, the daily intake was only 2,200 kilocalories per head" (Oddy 1970b, 319 (n.1)). However, without heavy exercise, 2200-2600 kcal per day for women and for children is far in excess of reference guidelines and physical needs.

The issue with directly comparing the kcal intake of individuals from 1890 with modern intakes is twofold. First, many modern people consume diets with excessive calories and, if this quoted figure of 2200-2600 kcal per person is correct, this was also the case during the 1960s. Second, average body size has increased since the 19th century, and many modern people would tower over families from the 1890s. Average height in England today is 69.8 inches (177cm) for men and 64.2 inches (163cm) for women (European Health Interview Survey 2015), whereas data from convict records presented in this thesis indicate that during the 1890s average height in England for working-class men was 66.2 (168cm) inches and for working-class women 61.7 inches (157 cm). With

the increase in body size, more kcal are required for the body to function today than in the 1890s. That being said, the working classes in the 1890s almost certainly undertook far more physical activity on a daily basis than the modern population.

We can estimate the energy requirements of individuals (kcal per day) from the 1890s, factoring in levels of physical activity using equations developed for men and women (Otten *et al.* 2006, 82). For men over 19 years of age, the EER (Estimated Energy Requirement) can be calculated as follows:

$$= 662 - (9.53 \times age[y]) + PA \times [(15.91 \times weight[kg]) + (539.6 \times height[m])]$$

While a similar calculation for the EEW of women over 19 years of age is:

$$= 354 - (6.91 \times age[y]) + PA \times [(9.36 \times weight[kg]) + (726 \times height[m])]$$

PA in these equations stands for physical activity level, which is classes as sedentary, low active, active, and very active (Otten *et al.* 2006, 84). Each of these classifications have a numeric value for use in the EER estimation equations (Otten *et al.* 2006) (7.4).

Sex	Sedentary	Low Active	Active	Very Active
Men over 19 years	1.00	1.11	1.25	1.48
Women over 19 years	1.00	1.12	1.27	1.45
Boys 3-18 years	1.00	1.13	1.26	1.42
Girls 3-18 years	1.00	1.16	1.31	1.56

**Table 7.4 Physical Activity values for men, women, boys, and girls depending on activity level for use in EER estimations (Otten *et al.* 2006)**

Using the convict data presented here, the mean age of male criminals during the 1890s was 34 years (this dataset excludes men below 22 and above 50 years of age), and their average height was 66.2 inches (1.68 m). For a BMI score in the mid-healthy range, a

man of this height would weigh around 61.2kg. From the female data, the average age was 30 years, and their average height was 61.7 inches (1.63 m). For a BMI score in the mid-healthy range for this height, a woman would weigh around 53.5 kg. If we assume that men and women were likely to be ‘very active’, the kcal per day can be estimated using the EER equations presented above. To illustrate this method, here is the equation for the energy requirements of an average woman born in the 1890s:

$$= 354 - (6.91 \times 30) + 1.45 \times [(9.36 \times 53.5) + (726 \times 1.63)] = 2589$$

The result of EER estimations for females and males with different levels of physical activity is presented in Table 7.5.

<b>Sex</b>	<b>Activity level</b>	<b>EER</b>
<b>Female</b>	Very active	2589
<b>Female</b>	Active	2286
<b>Female</b>	Low active	2033
<b>Female</b>	Sedentary	1831
<b>Male</b>	Very active	3121
<b>Male</b>	Active	2688
<b>Male</b>	Low active	2425
<b>Male</b>	Sedentary	2218

**Table 7.5 EER estimates for 19<sup>th</sup>-century height and weight, differentiated by level of physical activity**

The results in Table 7.5 suggest that the energy requirements of the average man and woman in the 1890s (with the most physically demanding activity) would far exceed the average amount consumed per person as indicated by Oddy’s budget data. For women, Oddy’s estimated calorie intake would sustain those with sedentary or low active daily routines, while only sedentary men could have required so few.

More recently Clayton and Rowbotham (2008a) quote a similar intake of at least 3770 calories per day as necessary for individuals undertaking strenuous work, and suggest

that previous dietary reconstructions which put working-class adult intake at just 2099 calories a day must be incorrect. Their reasoning is that, with this clearly insufficient calorie intake, 19th-century adults would have been unable to work in their physically demanding jobs, procreate, or even survive into old age (Clayton and Rowbotham 2008a). Further work by Gazeley and Horrell (2013) and Gazeley and Newell (2015) also argue that working-class men would have received sufficient nutrients and calories from their diets. These arguments are supported by the results from this thesis, which suggest that the working-class diet cannot have been entirely insufficient for the majority of people for three reasons, which will now be outlined.

Firstly, even if nutritional health was so poor that it could not sustain life, suggested by Oddy's figure which is around 1700 kcal lower than their requirements, it is possible that individuals could survive long enough to reproduce the next generation before succumbing to nutrition-related disease. In this way, the 19th-century working class could have been dying from complications as a result of malnutrition, but we would see no impact upon the population size. However, was this the case we would not see individuals living into old age. But 13% (864 people) of individuals from our height dataset were over the age of 50 years, with the oldest person aged 80 years, suggesting that old age for both men and women was not uncommon among the working classes. This observation by Clayton and Rowbotham (2008a) is therefore supported by this thesis.

Secondly, the premise for this low-calorie intake among the working classes is based on the assumption that this is all the working classes could afford on their meagre incomes. But evidence from the skeletal data included in this thesis suggests that any malnutrition experienced by low-income groups was matched by those from high incomes. This

equality between the prevalence of indicators of metabolic disease suggests that if the working-class diet was insufficient, then the same may also have been true for the diet of the upper classes. But the upper classes with their high and steady incomes would have had access to as much food as they desired, perhaps suggesting that these incidents of malnutrition recorded in the skeletal data were more the result of the types of food eaten, than the quantity. This may suggest that these incidents of malnutrition recorded in the skeletal data presented here could have been the result of a lack of knowledge about healthy diets and the types of food that should be eaten, rather than the quantity.

Thirdly, there are written records of the tendency for families to eat pre-cooked meals from street vendors, at least from the mid-century onwards (discussed previously in this chapter). These meals do not appear in the budget of such families since street food such as fish and potatoes would not have been present on grocery shopping lists. Similarly, as Clayton and Rowbotham (2008b, 352) attest, fruit and vegetables were so cheap and widely available that many housewives did not include them in their budgets. Likewise, any home grown food was missing from such budgets, including eggs from hens kept in back yards (Clayton and Rowbotham 2008b). So, the questions remain about where the figures presented by Oddy originated, how accurate they are, and by what methods they were established.

Oddy states that the average daily calorie intakes were estimated from the budgets collected by Rowntree between 1899 and 1901 (Oddy 1970b). Using the budgets presented by Rowntree (1908, 268-294), the calories consumed by these families can be calculated since information is provided about the weight of foodstuff bought each week as well as details about the family members associated with each budget. Using information for calories contained within the United States Department of Agriculture

Food (USDA) Composition Database (National Agricultural Library 2017), it is possible to make an estimation of the total calories consumed per day within each family (Table 7.6).

Budget number	Average weekly wage	Family construct	Food bought in a week	Calories/day
One	17s 6d	Father, mother, five children; four boys aged 11, 9, 7, and 2, and a girl aged 4. Father is a labourer, mother is a housewife.	1.5 st (stone) flour, 0.25 st wheatmeal, 1 lb butter, 2.5 lbs bacon, 1 lb currants, 1 lb lard, 1.24 lbs fish, 1 tin condensed milk, onions, 4 lbs beef, 5 lbs sugar, 0.5 lb dripping, 0.5 st potatoes, 8 eggs, lemons, cabbage, milk, lettuce.	9908
Two	22s	Father, mother, three children between 2 and 8 years. Father is a labourer, mother housewife. Also own an allotment.	1.5 st flour, 1 lb butter, 1 lb bacon, 4 lbs sugar, 5 lbs beef, 0.5 lb cheese, 1 st potatoes, 6 eggs, week's milk, 0.75 lb sausage, 1 lb rice.	8136
Four	15s	Father, mother, and three children under 4 years. Father is a labourer, mother a housewife.	1 lb butter, 6 lbs sugar, 1 tin condensed milk, a week's milk, 1.5 st flour, 1 lb fish, rabbit, 0.5 st potatoes, 1 pint milk, 4 eggs, 1 lb bacon, 0.5 lb brawn, 1.4 lbs beef, 0.5 lb pork chops, 0.5 lb bacon	6804
Five	20s	Father, mother, three daughters; 22, 13, and 8 years. Father is a labourer, mother housewife.	1.5 st flour, 1 st potatoes, 0.5 lb lard, 4 lbs sugar, 0.25 lb brawn, greens, milk, 0.5 lb butter, rhubarb, lettuce, radishes, 2 lbs bacon, rabbit, 0.5 lb cheese, eggs, 1 mackerel, 2.5 lbs pork, onions, 0.25 lb suet, 0.25 lb brawn	7674
Six	11s 9d	Mother and daughter aged 20. Mother an office cleaner, daughter employed in a confectionary factory	0.5 st flour, 2 lbs sugar, 1 tin milk, 0.5 lb butter, 0.5 st potatoes, 0.5 lb beef, 2.5 lbs beef, 3 eggs, 1 lb onions, 0.25 st flour, 0.2 lb dripping, 0.5 lb liver.	7185



Seven	20s	Father, mother, two children; boy aged 5 and girl aged 2. Father is a carter, mother a housewife	1.5 st flour, 4 lbs sugar, 1 lb butter, 8.5 lb bacon, 0.5 lb lard, 6 eggs, 0.5 st potatoes, cabbage, 3 lbs pork, 1 lb onions, 1 quart oil, 0.5 lb rice, milk, kippers, 2 tins condensed milk.	9877
Eight	25s	Father, mother, and 3 girls aged 8, 6, and 2.5 years. Father is a labourer, mother a housewife	0.75 st flour, 2 lbs sugar, 1 lb raisins, 1 lb sweet, 0.5 lb lard, 0.5 lb butter, 1 lb 2 oz bacon, 2 lbs bread, 0.5 lb beef steak, 5 lbs beef, milk, 0.5 lb fish, 0.5 lb liver, 1 lb onions, 1 lb cheese, 2 lbs treacle, 1 lb brawn, 0.25 lb butter, 1 lb bacon.	6687
Nine	18s	Father, mother, and 10 month-old baby. Father is a labourer, mother a housewife	0.5 st flour, 2 lbs sugar, 0.5 lb butter, 2 pts milk, 0.5 lb currants, 2.5 lbs bacon, 1 lb sausage, 2 lbs beef, 2 pts milk, 1 tin Neave's food, 0.5 st potatoes, 2 tea-cakes, 8 pts milk, loaf of bread.	4363
Ten	25s	Father, mother, three children; two boys aged 12 and 8, and a girl aged 5. Father is a polisher, mother a housewife	0.5 lb beefsteak, 1 lb onions, 1 lb sugar, 0.25 lb cheese, 0.25 lb potted meat, 0.5 lb bacon, 3 lbs jam, 4 lbs beef, 6 lbs sugar, 1 lb lard, 1 st potatoes, cabbages, weeks milk, 1 lb currants, 0.5 lb dripping, 2 st flour, 0.25 lb cheese.	10242
Eleven	24s	Father, mother, and girl aged 8. Father is a labourer, mother occasional charwoman.	1 st flour, 4 lbs sugar, 1 lb butter, 1 lb peas, 0.25 st potatoes, 4 lbs beef, onions, radishes, 0.5 lb sausages, eggs, 4 lbs bacon, cabbage, fish, 0.5 st potatoes, 4 lbs mutton, cabbage, 10 oz steak, 0.5 lb brawn	7715

**Table 7.6 Estimation of the calories for each budget presented in Rowntree, as well as the demography and income of each family.**

Oddy's (1970b) approach to calorie estimation is to take the total calories provided from a budget and to divide it equally between the family members. To take the example of budget number ten in Table 7.7, this gives a total of 10,242 kcal per day which, divided equally among all five family members who were eating the food bought on this budget, is 2048 kcal per person per day. This is far below what an active adult would need to function. However, rather than dividing the total calories equally between the family, we can instead divide it by the calorific requirements of each person. The father for this family is recorded as being a polisher, an occupation which would not require the extensive physical activity found in other roles. If we suppose that he was active, our EER equation estimates that he would need around 2689 kcal per day. Subtracting this from our total calories leaves us with 7,553 kcal. His wife spends her days mending and cleaning their home, a daily routine which we will assume requires her to be at most active. Therefore, the EER for her is around 2286 kcal per day. Leaving us with 5,267 kcal for their three children, who by this point in the century would be required to attend school, thus would be fairly inactive. Unfortunately, data on the size of children at this time is not available. However, if we take the requirements for modern boys and girls, we can assume that the five-year-old girl would need 1362 kcal/day, taking us down to 3905 kcal, the eight-year-old boy would require 1745 kcal/day, leaving 2160 kcal for the twelve-year-old boy, who in modern estimates would need 2247 kcal/day. This means that for this family there is only a deficit of approximately 87 kcal per day. That our average estimate of calories when divided equally among the family members is low, yet we can still successfully divide the calories depending on the requirements of age and sex suggests that the assumptions about deficient calorie intake in the past may be due to the method by which it has been calculated.

Budget	Family member	Calories	Calories required/day	Calorie difference
1	Father Mother Boy 11 Boy 9 Boy 7 Girl 4 Boy 2	3122 2033 2127 1840 1649 1291 1004	13,066	-3158
2	Father Mother Child 2 Child 5 Child 8	3130 1998 968 1422 1685	9203	-1067
4	Father Mother Child 3 Child 2 Child 1	3206 2067 1123 968 741	8105	-1301
5	Father Mother Woman 22 Girl 13 Girl 8	2978 1915 1886 2223 1625	10627	-2953
6	Mother Daughter 20	1805 2102	3907	+3278
7	Father Mother Boy 5	2425 2033 1482	6872	+3005

	Girl 2	932		
8	Father Mother Girl 8 Girl 6 Girl 2.5	3122 2033 1625 1482 932	9194	-2507
9 <sup>1</sup>	Father Mother Baby 10 mo.	3187 2088 717	5992 (5275)	-1692 (-912)
10	Father Mother Boy 12 Boy 8 Girl 5	2678 2012 2247 1745 1362	10,044	+837
11	Father Mother Girl 8	3159 2033 1625	6817	+898

**Table 7.7 Estimation of the calories required for each member of each family, the total calories required per day for the whole family, and the difference between total calories required and total calories available from the budget data.**

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<sup>1</sup> Listed in dietary number 9 is a brand of baby feeding formula. It is unclear what the calorie content of this formula would be, therefore it was not included in the total calorie estimation. As a result there are two estimates of calorie intake for this budget, one for the calorie intake for all three individuals, and a second, in brackets, for the two adults only, since it is likely that the child took most of their calories from the missing formula values.

Once broken down by requirements of age, sex, and physical activity, the different distribution of calories between family members changes the overall outcome of adequacy. Using this method, four out of ten of the families have adequate calorific intake for their physical needs, while six have a calorie deficit (Table 7.7). One issue with all reconstructions of historical diet is that there is limited evidence for the distribution of food within households between family members. Historians have theorised that male heads of household received the greatest share of food available due to their energy requirements as the main breadwinners (Oddy 1970b; Horrell and Oxley 1999). However, this is difficult to establish from records, and it relies on an assumption that other family members were not contributing significantly to the family income, which is unlikely to have been the case. This practice would surely have been decided by individual families, and cannot be argued to have been a universal phenomenon. In her analysis of 19th-century autobiographies and budget data, Griffin (2018) finds such mixed practices, with some women in families giving up food for their children, while in others it was the children who went without. The income of men was also found to be no good measure of women's food security, with higher male wages not necessarily being shared with their families (Griffin 2018). Also missing from dietary reconstruction is food purchased from vendors or grown in the home, and at least one of the families with a calorie deficit had an allotment in which they grew food, which did not appear on their shopping list (Rowntree 1908). Furthermore, these estimates involve the EER of modern children, which may be different to the requirements of 19th-century children.

It is difficult to identify changes to the nutritional intake of working-class families between small periods of time, and no evidence could be found which would suggest a change occurred in the 1880s. However, the report of a survey conducted by Dr Edward

Smith in 1863 lists the food consumed by families of men with different occupations, including agricultural labourers (Smith 1863). Although no weights are given for the quantity of such meals, we can see the types and frequency of food eaten at that time, including for labourers in York:

<b>Location</b>	<b>Breakfast</b>	<b>Dinner</b>	<b>Tea</b>	<b>Supper</b>
Lepton	Boiled skimmed milk and oatmeal with bread and cheese	Hot or cold meat daily with potatoes, bread, and cheese	Tea, bread, and dripping, with butter on Sundays	Bread, cheese, and beer, or milk porridge
Swinton	Beef or bacon pies, with milk and bread	Beef, bacon, and vegetables, broth on two or three days, meat pies and milk twice a week		Beef or bacon pies, with milk and bread
Buckton	Cold meat and bacon, or cold meat pie, cheesecakes, or custard puddings, milk and bread	Hot boiled meat and broth three days, hot meat pie four days, with vegetables, fruit pies, or milk pudding and bread. Beer		Cold meat and bacon, or cold meat pie, cheesecakes, or custard puddings, milk and bread
Specton	Bread and milk	Dumpling, beef and bacon, with vegetables and beer		Bread and butter
Beverley	Cold beef and bacon, and beer, fruit pies, milk	Hot meat pies, with fruit pies or pudding, bread and vegetables		
Howden	Cold meat and bacon, rhubarb tarts and treacle, with milk and bread	Hot beef and bacon, with vegetable on Sundays, and fruit or treacle pudding.		Cold meat and bacon, rhubarb tarts and treacle, with milk and bread

**Table 7.8 Example of the diets of labourers in 1863, reported by Smith.**

In comparing these diets with those provided by Rowntree (1908) in 1899, we can see that very little had changed in the types of food consumed by labourers, and perhaps that there was more meat included in the diet during the 1860s. However, on this evidence alone we cannot rule out a significant improvement in diet around 1885 as a contributing factor to the increase in average working-class height.

### **7.2.6 Discussion**

The previous sections in this chapter examined the potential causes behind the rise in average height which began to occur during the 1880s: wealth, disease, environments in the home or workplace, and diet. Wealth, home environment, and diet are intricately connected, with an increase in real wages often leading to improved living conditions and diet. However, not only is there evidence to reject the theory of increasing real wages, there is also evidence for a deterioration of living standards at this time as slum clearance caused huge issues of overcrowding within cities. This leaves two further options: improvements in diet or improvements to the environment of workplaces. We cannot conclude that there were no improvements to the diet of children during the 1880s, since evidence for this period is sparse other than the small sample of families surveyed by Rowntree in the 1890s and Smith in the 1860s. These small samples are not enough to conclusively accept or reject the possibility that working-class height was affected by diet at that time.

Our final influence predicted to have an impact on height is the environmental conditions of the workplace. The evidence for this factor shows that children during the 1880s experienced improved conditions outside of the home as the Education Act actively prevented young people from entering into unhygienic and dangerous



workplaces. This Act also saw the rise in concern over the environmental quality of school buildings, and an active process of improving these places was undertaken. The increasing number of children attending school meant that their days were no longer spent in the unsanitary conditions of the home, street, or factory, and instead they were placed into the comparatively warm, dry, and clean environment of the classroom. Furthermore, school life would have reduced the stress on the bodies of these young people by removing the intense physical activities which were necessary in many occupations. Although school-children were expected to do household chores (Davin 1996a), such chores would have also been required before compulsory education was introduced (Horn 1989). This means that, although children were still engaging in physical activities such as housework, it is likely that they were using less energy while in school in comparison to working children. This is contrary to McKeown and Record's (1962) claim that physical stress was not an aspect of environment conditions which needed serious consideration, and which they dismissed as a potential factor behind population increase. That all of these contributing factors occurred around the time that we see an increase in average working-class height suggests the strong possibility the advent of compulsory schooling had a significant impact on the health of the working-class British population at the end of the 19th century.

This conclusion would support Szreter's (1988) argument that it was the various public health movements which caused improved health in the English population, as shown by his population increase and by the increase in adult attained height presented here. However, Szreter pointed to sanitary reform within cities, such as the introduction of systems of waste disposal with the advent of sewage systems, while the discussion presented here would support an addition to this – that the introduction of compulsory schooling was second important force behind improved environmental conditions.

In addition to compulsory education, the 1880s also saw the introduction of cookery classes in all Boarding schools and many voluntary ones, where girls learnt the technical skills necessary to create meals (Akiyama 2008). Aside from the creation of meals based on the budgetary limits of their families, the schoolgirls also learned important lessons in hygiene and sanitation during these cookery classes, which were supported by such prominent healthcare leaders as Florence Nightingale and Charles Booth (Akiyama 2008). Such cookery classes were subsidised by grants from 1883, where schools were paid four shillings per pupil (only girls) who attended them, which allowed schools to purchase the necessary equipment (Heggie 2011). In addition to removing children from the dangerous and physically demanding environments of the workplace, compulsory schooling may well have also improved both nutritional quality of the family and the sanitary environment of the home through educational means.

The government focus on schools as a place to promote population health began to develop at the start of the 20th century, when school meals were introduced across England and Wales in 1906 (House of Commons Papers 1906). Observation during recruitment for the Boer War (1899-1902) on the inadequate physique and bodily health of many of the young men attempting to enlist led to the creation of The Royal Commission on Physical Deterioration in 1903 (Fitzroy 1904; Kuh and Davey Smith 1993; Passmore and Harris 2004; Juzda Smith 2014). In their Report, the Commission provided evidence that “degeneracy” was not the result of the genetic nature of the working class, which was a widely held narrative across Europe at the time, but that it principally originated from poor nutrition during childhood (Fitzroy 1904, 69). The recommendations from this report were to introduce school meals for all children, and in 1906 the Education (Provision of Meals) Act was passed, allowing Local Education Authorities to provide meals for children who were undernourished (Welshman 1997).

In this Act, the cost of these meals was to be charged to the parents of the children receiving them, apart from in exceptional circumstances where the child was malnourished and the parents could not afford to pay, in which case the associated costs were to be taken from the local rates (House of Commons Papers 1906). By 1920, one million children were taking school meals across Britain, but there were no nutritional standard requirements for such meals until the National School Meals Policy of 1941 introduced the required levels of protein, fat, and calories (Evans and Harper 2009). In 1950, a standardised charge for school meals was introduced, with the arrangement that those children from families unable to pay would receive their lunches free, the cost of which was covered by the government, and this system remained until 1980 (Passmore and Harris 2004).

As discussed previously in this chapter, the increases in height from convict data occurred in cohorts who were born before changes to the sanitation of housing, the increase in real wages, and a check to childhood disease prevalence occurred, suggesting that, at least at the turn of the century, increased height was likely to be facilitated by the improvement of environments for children largely due to compulsory schooling, and possibly to the improvement of childhood diet after the introduction of school meals in 1906. This evidence from height data and supporting historical records suggest that the school environment is a crucial opportunity to implement policies which will bring about public health improvements.

### **7.3 Modern Policy: School Meals**

In January 2015 as part of the School Food Plan, a new set of food standards was made mandatory for all meals cooked and served in maintained schools, new academies, and

free schools (School Food Plan 2014). These school standards ensure that all meals meet appropriate nutritional requirements for children for energy, protein, fat, carbohydrate, and vitamins and minerals, while also providing easy to follow recipes, giving school caterers a wide choice in the food they serve (School Food Plan 2014). The mandatory nature of these guidelines means that children from the most deprived areas of the UK can receive nutritious meals during their school day, potentially improving their nutrient intake and reducing diet-related health issues such as obesity and dental decay. This is excellent progress and a good policy for tackling a broad range of public health issues, many of which can be prevented by introducing healthy lifestyle choices early on in life (i.e. obesity, diabetes type II, cardiovascular disease, nutrient insufficiency). However, not all children consume these regulated school meals, and more could be done to ensure that those children are targeted for whom a eating a healthy diet is more challenging.

### **7.3.1 Free School Meals**

At present, the government offers free school meals which follow food standard guidelines to every pupil in reception, year 1, and year 2, (between the ages of 4 and 7 years) (Department for Education 2016). Above this age children are eligible for free school meals only if they or their parents are in receipt of any of the following: income support, income-based Jobseeker's Allowance, income-related Employment and Support Allowance, support under Part VI of the Immigration and Asylum Act 1999, the guaranteed element of Pension Credit, Child Tax Credit (provided the family is not entitled to working tax credit and has an annual gross income less than £16,190), Working Tax Credit run-on, or Universal Credit (British Government 2017). These eligibility criteria are similar to the way that free vitamin supplements are provided

(Chapter 6.3.1), and neither free vitamin nor free school meal eligibility is tied in any way to the measure that the government and charities use to determine household poverty in the UK. Although clearly many children who are receiving free school meals will be living in households below the poverty line, not all children in households below the poverty line will be entitled to free school meals, since they will not all be in receipt of the various income support required to be eligible. Working families who earn over the threshold to receive any of the eligibility benefits, but under 60% of the median UK income, will lose out on the benefit of free school meals for their children, as will families who have recently been termed “Just About Managing”, described by the government as people who are neither rich nor the poorest in society, but despite being in work find daily life a struggle on their incomes (Citizens Advice 2016). In 2012, the Children’s Society found that one third of children, living in poverty, around 700,000 children, remained ineligible for free school meals beyond the universal meals available until year 2 of primary school (Royston *et al.* 2012). The Children’s Society report found that the main reason that children in poverty were not eligible was because their parents were in work, since those receiving working tax credits are not entitled to free school meals even if they have a low income (Royston *et al.* 2012).

The 700,000 children in poverty who are not entitled to free school meals is due largely to the way that eligibility is tied to receipt of various benefits. Because Universal Credit has not yet fully replaced the existing benefits system, it is not clear what final changes there will be to eligibility criteria nor how this will affect children and families and their entitlement to free school meals. However, a consultation is currently underway, due to close in January 2018, inviting views on the proposed changes to free school meals eligibility for pupils in primary and secondary education as well as for students in further education and the early years pupil premium (Department for Education 2017).

Within this consultation the government states that the current eligibility criteria means that some of the most disadvantaged low-income households do not qualify for free school meals (Department for Education 2017, 4), an admission which supports the findings made by the Children's Society (Royston *et al.* 2012). The consultation report goes on to claim that the proposed method of determining free school meal eligibility in the new Universal Credit system, which is based on household net earnings before benefits, "would make around 50,000 more pupils eligible for free school meals by the time Universal Credit is fully rolled out" (Department for Education 2017, 9). To ensure that children do not lose their school meals during the transition period, the government proposes that children currently receiving free school meals will have their eligibility status protected until the end of their current phase of education (e.g. until they finish primary or secondary school) (Department for Education 2017). The proposed net income eligibility is explained as follows:

"3.4 To enable a greater number of children to benefit from free school meals, we are proposing a net earnings threshold of £7,400 per annum for a household's eligibility for free school meals. We estimate that, under this threshold, an extra 50,000 children would become eligible for free school meals, compared to today's number of claimants. It is important to note that the net earnings threshold does not represent a household's total income, as it does not include their income from benefits, which significantly increase a household's overall income. A typical family earning around £7,400 per annum would, depending on their exact circumstances, have a total household income of between £18,000 and £24,000 once benefits are taken into account.

3.5 We propose to introduce this net earnings threshold in April 2018. New free school meals claimants earning above this threshold after its introduction would not be eligible." (Department for Education 2017, 9)

According to the proposals made by the government, the introduction of Universal Credit will see the eligibility criteria change from the receipt of benefits and an income of less than £16,190 per annum, to an income of less than £7,400 per annum regardless of the benefits received (Department for Education 2017, 13). It is unclear how the

figure of an additional 50,000 pupils eligible for free school meals has been estimated, but from the information provided in the consultation report it is possible that this figure relates to additional pupils *while current eligibility is still protected*. Just how many children will be entitled to free school meals after the protection period ends is not estimated or discussed. The proposal potentially leaves many children in the future who would currently be eligible, but whose household income is above £7,400 a year, vulnerable to losing out on healthy school meals, including those from families with low-incomes or who have parents living with disabilities.

In 2015, over 40 leading consultants, dentists, and health officials signed a letter to The Sunday Times calling for protection for free school meals, stating that such meals should form the basis for any new anti-obesity policies (Griffiths 2015). Signatories of this letter included the president of the Royal College of Physicians, Jane Dacre, head of the British Dental Health Foundation, Nigel Carter, and President of the Faculty of Public Health, John Ashton (Griffiths 2015). Around the same time, progress was made in improving the nutritional quality of free school meals, with the introduction of school food standards (School Food Plan 2014). However, in the most recent general election, the Conservative Party revealed plans to discontinue free school meals for all children in the first three years of primary school, and instead to introduce free breakfasts for all and lunches for children from “low-income families”, a plan which is mentioned within the party manifesto (The Conservative Party 2017, 51-2). However, if this plan were to occur and the same eligibility requirements were used here as they are for the free school meals available outside of these three years, the danger is that children from deprived backgrounds whose parents work and earn over £7400 a year will lose out on a free and nutritious lunch.

Unless families over the threshold for free meals choose to pay for the healthy lunches provided by schools, the alternative is for children to take in a packed lunch. A study of 2709 children from Year 2 classes around England found that those sent to school with a packed lunch consumed higher levels of sugar and salt, and were more likely to have sweet and savoury snacks and sugary drinks, while they also consumed lower levels of protein, fibre, zinc, and folate than children who ate lunches provided by the schools (Evans *et al.* 2016). This disparity between meals packed at home and those provided by schools, as well as the associated costs of paying for school food, goes some way towards explaining the differences in nutritional health found between children from high and low incomes (Chapter 6).

In 2004 Jamie Oliver conducted the ‘Feed Me Better’ campaign in the London borough of Greenwich, in which all 80 schools within the borough received radical changes to their school lunch menus, improving the nutritional quality of food served to children (Feed Me Better 2005). Using this campaign, Belot and James (2011) found that these changes to school menus coincided with improvements in educational achievements within Greenwich, and resulted in a 14% average decrease in authorised absences which they argued were likely to be linked to sickness. As well as having a positive impact on the educational attainment of children, healthy meals help to prevent childhood overweight and obesity and other conditions which result from poor dietary intake.

Targeting schools with healthy lifestyle policies may seem like the obvious approach to making public health improvements. However the threat which currently faces the availability of school meals for the most deprived children in the UK makes it clear that this is an area which requires a range of evidence to highlight the importance of schools for the health of the nation. The apparent increase in height following the introduction



of compulsory education in England during the 1880s found in the data presented here, supported by similar trends shown in data produced from other sources (Roser 2016), suggests that improvements in public health during the 19th and 20th centuries was likely the result of intervention in schools.

### **7.3.2 The Healthy Child Programme**

The benefits of a healthy school diet are recognised and promoted by the Healthy Child Programme 5-19 years (Department of Health 2009). In addition to healthy school meals, the HCP also recommended that schools should play an important role in promoting healthy lifestyles by providing physical, personal, social, health, and economic education, which would be facilitated by appointed School Health Teams (Department of Health 2009: 14-15). The School Nursing Development Programme was initiated in the Department of Health's report, "Maximising the Contribution of the School Nursing Team: Vision and Call to Action", and was created within context of the HCP (Department of Health 2012). This ongoing project is part of a government led initiative to increase the role of nurses and midwives in resolving public health issues (for further details see Public Health England 2017f). However, even within the Call to Action report, which intends to convey the new role of nurses in promoting school health, the methods by which this will be achieved remain vague. The tasks for school nurses, according to this document, are as follows:

- Promote "community capacity building" to enable families and communities to build on their strengths and promote health and wellbeing of children and young people.
- Maximise their public health contribution, including representation on Local Authority bodies concerned with designing new strategies for local public health services, and contributing to the Joint Strategic Needs Assessment strategy.

- Work directly with children, young people, and families and lead teams to provide preventative health care services, including providing links between health visitors, schools, primary health care, and children's services, and effectively delivering the HCP.
- Provide care for children, young people, and families who need extra support.
- Work with partners in schools and social care where children, young people, and families have on-going needs and require multi-agency support.
- Access nationally sponsored programmes to refresh and update knowledge on public and community health skills and approaches. (Department of Health 2012: 31)

Although this list describes actions which should be taken, it does not provide details on the methods by which these actions should be delivered.

A critical analysis of the government's vision for the role of nurses was published in the *British Journal of School Nursing* and picks up various issues with the programme (Fong 2014). Training is one such issue, and although the Call to Action report mentions access to nationally sponsored programmes which will provide nurses with the skills they require to address public health issues, the planned training of school nurses only received 198 places in 2014/15 (Fong 2014). A second major problem highlighted is that the method behind the implied partnership between health visitors, schools, and children's services etc. in order to effectively deliver the HCP is not given (Fong 2014). How collaboration between these services and families is to be organised and used effectively is not explained by the government's report, and although it is suggested that school nurses should lead this partnership, there is no mention of the resources which will be required to do this, and the role of other health professionals and services are not made clear (Fong 2014). These new roles for nurses to deliver an effective, collaborative, and engaged HCP in schools also raises concerns about the increased workload of health practitioners and heightened responsibility for child protection (Fong 2014). However, although it is strongly suggested that these roles are filled by school nurses, the only mandatory element of the HCP is the National Child

Measurement Programme (NCMP), meaning that it is not mandatory for directors and commissioners in public health to allocate resources for school nurses to carry out such roles (Fong 2014). Finally, in 2014 there was no facility in place to evaluate the impact that school nurses have on the health of children by implementing the HCP (Fong 2014).

The HCP itself has its own system to monitor the effectiveness of the programme in implementing good health care. The process involves a number of national monitoring mechanisms which measure the quality of health services (the Public Health Outcome Framework, the NHS Outcome Framework, the Clinical Commissioning Group Outcomes Indicator Set, the Health Visitor Dashboard, the UK National Screening Committee, and the Ofsted Framework), and Key Performance Indicators (KPI) which are used to measure progress towards specific organisational goals (Healthy Child Programme 2017). However, despite school nurses being identified as the front line of delivering the HCP to school aged children, there are no current reviews of the effectiveness of this role in reducing childhood health issues.

In 2016, it was recommended in a second publication from the British Journal of School nursing that, although there were some academic studies indicating the positive impact of school nurses on health outcomes, national guidance was required to provide a framework for evaluation (Turner and Mackay 2016). Following this, the same authors developed a school nurse toolkit for self-evaluating intervention success (Turner and Mackay 2017). Unfortunately, at the time of writing the outcome of these evaluations is not available. Similarly, to date there is no report concerning the implementation or success of the HCP in schools.

One of the most direct measurements for success of the HCP in improving childhood nutritional health comes from the data recorded by the National Child Measurement Programme. This data comprises of height and weight measurements of children in reception (aged four to five years) and year six (aged ten to eleven years) from state maintained schools in England, and the programme measures over one million children annually (Office for National Statistics 2016). The latest report found a downward trend in obesity for Reception aged boys and no change for girls between 2006/7 to 2015/16, but an increase in obesity for year 6 boys and girls over the same period, both of which were found to be statistically significant (Public Health England 2017b).

Although the HCP began in 2009, school nurses received additional responsibilities in 2012 and the National Child Measurement Programme (NCMP) has been implemented every year, but it appears that few changes have been achieved in childhood obesity prevalence rates. Furthermore, the NCMP is the only measurement of the nation's health which is conducted annually, and it only measures obesity rates in children. The most comprehensive surveys of national nutritional health came from the NDNS and the LIDNS, however both of these surveys were performed before school nurses received additional roles and therefore cannot be used to measure outcomes of government preventative strategies.

In many ways, government policy is blind. Not only do many of the current actions to increase breastfeeding prevalence rates fall short due to the time that they are implemented and the audience that they reach (Chapter 6.3.2), but there are no good measurements for the success of interventions in schools. Making changes to the health of children at school has the potential to be an effective approach to improving the nutritional health of the nation. Yet there is little guidance for school nurses on how to

perform their roles within the HCP, few mandatory actions besides the NCMP, and no effective measure of the success of the HCP in terms of actual improvements to child health. Reducing the eligibility for school meals among deprived children will prevent the full benefit of mandatory food standards from reaching many children, and continuing to implement a vague and unmeasurable Healthy Child Programme could result in greater inequality in child health, since schools in Local Authorities with greater funding can provide more services than those in disadvantaged areas. Successful improvements to childhood health result in healthier adults, and historical evidence suggests that implementing policies within school does much to improve public health. However, modern approaches must act to tackle socio-economic determinants of poor health, or continue to face huge inequalities.

### **7.3.3 Healthy Schools Rating Scheme**

In 2016 the government report *Childhood Obesity: A Plan for Action* set out its intention to introduce a healthy rating scheme for primary schools, which was due to begin in September 2017. The scheme would be voluntary within primary schools, and would aim to help schools “recognise and encourage their contribution to preventing obesity by helping children to eat better and move more” (HM Government 2016, 8). The scheme was intended to involve parents in the rating process and would be taken into account during Ofsted inspections (the official organisation responsible for inspecting schools). At time of writing (June 2018), this scheme has yet to materialise, and chapter 2 of the *Childhood Obesity Plan* (Department of Health and Social Care and Global Public Health Directorate 2018) did not reveal when the scheme might begin or how it would operate.

## 7.4 Chapter Summary

This chapter presented the evidence for adult height trends for birth cohorts across the 19th century. Tests revealed that height began to increase significantly after 1880, a result which is supported by previous research concerning average height. Examining the historical evidence for wealth, disease, diet, and environment in the home and workplace suggested that the introduction of compulsory schooling, followed shortly after by the introduction of free school meals, is the most likely cause behind the increase in working class height and the associated improvement in the nation's health at that time. This historical evidence suggests that nutritional health policies within modern schools are likely to influence the health of the nation. Improving both the quality and availability of to all children within these settings could help to tackle the rising rates of childhood obesity and poor nutritional intake in the UK. However, at present this research finds that the plans in place to provide quality nutrition to all students in Britain is under threat due to the introduction of the Universal Credit welfare system. The effect of Universal Credit on school meal availability remains to be clarified, creating uncertainty surrounding the future role of schools in shaping the nutritional health of the UK. In addition to this, the existing plans to monitor and improve health education and provision within schools have been either delayed or are not fully explained.

## Chapter 8 Results: Historical Dietary Reconstruction

This chapter presents the results of dietary reconstruction of upper-class meals from a cookery book and working-class meals from prison and workhouse dietaries. Food in the Victorian era, much like today, had cultural and social significance depending on the income of a family and also their status (Daly and Forman 2008). As such, the food that was found at the dinner table of a middle- or upper-class family was probably very different to that found in the working-class home.

The results presented were established using methods outlined in Chapter 5.6.1. The nutritional tables presented for upper-class households are estimated from meal plans suggested in *Mrs Beeton's Book of Household Management* (Beeton 1907). Specimen menus are presented over 40 pages, including menus for simple family breakfasts, lunches, and dinners, and the recipes which appear in each menu are included in the volume with their appropriate serving size. Although this text originates from seven years beyond the end of the 19th century, the simple menus presented within it contain such foods as fish, meats, tarts, some vegetables, and other items which would have been available earlier to households in the 19th century. Although often credited to Isabella Beeton, even the 1861 version of *did not contain original recipes, but recipes borrowed from other works available at the time* (Beetham 2008; Broomfield 2008). It was necessary to use this version because earlier publications of the *Book of Household Management* do not contain sample menus, but it is likely that the recipes included in this early 20th-century text were in circulation during the 19th century. Isabella Beeton herself was an aspiring middle-class woman, and many of the recipes included in her publications were probably aimed at the middle classes (Hughes 2006) although we cannot conclude that middle-class families ate this food in these quantities, the menus

for “simple” or “economical” family meals suggest the types of food commonly consumed in such households and can provide an insight into the standard of food for the middle classes, thus a baseline of the meals that upper-class families could have had access to.

Nutritional tables presented for working-class households are derived from 173 workhouse and prison dietaries in use across the 19<sup>th</sup> century in 44 institutions. Although these are a reflection only of food served to the institutionalised, they are more representative of the food commonly available to working families during the 19<sup>th</sup> century than those meals suggested in cookery books. The diets presented in institutional records were almost certainly less adequate than food available to working-class families in their homes (Drummond and Wilbraham 1957), and as such we can assume that the nutritional health of the average working-class family was better than that reflected here.

## **8.1 Historical Dietary Reconstruction**

The mean intake of calories and nutrients from suggested meals for breakfast, lunch, and dinner were estimated (Table 8.1) and are compared to the Reference Nutrient Intakes (RNI) of modern adult men and women (RNI value tables can be found in the appendix). Since the process of cooking acts to reduce the vitamin and mineral content of certain foods by varying percentages, the typical maximum nutrient loss was also included in the “total cooked” row, showing the total nutrients remaining after maximum loss. The different methods of cooking between households and institutions would have varied, so the maximum nutrient loss is used here to account for all styles of cooking. The inclusion of simple or economical meals and the estimation of maximum



cooking nutrient loss is intended to show the lowest and most basic nutrient intake for the upper class, in order to provide a “baseline” of nutrition for the wealthy 19th-century family. This nutritional baseline is likely to be less substantial than the diet that would have been consumed within such households.

Meal	Energy kcal	Protein g	Fat g	Carbohydrate g	Fibre g	Sugar g
Breakfast	368	23.56	17.5	28.75	3.02	4.04
Lunch	763	36.03	27.87	95.43	9.42	29.95
Dinner	845	45.15	46.92	62.63	6.03	23.97
Total/day	1976	104.74	92.29	186.81	18.47	57.96
RNI Men	2605	56	70	260	30	90
RNI Women	2079	45	70	260	30	90

Meal	Calcium mg	Iron mg	Magnesium mg	Potassium mg	Sodium mg	Zinc mg
Breakfast	73.31	2.92	57.64	416.67	576.57	2.77
Lunch	245.92	5.94	130.03	1902.8	449.56	7.49
Dinner	148.78	5.31	93.54	894.7	383.44	7.14
Total/day	468.01	14.17	281.21	3214.17	1409.57	17.4
Total cooked	374.41	9.21	210.91	2249.92	1057.18	13.05
RNI Men	700	8.7	300	3500	1600	9.5
RNI Women	700	8.7	270	3500	1600	7

Meal	Vitamin C mg	Thiamin mg	Riboflavin mg	Niacin mg	Vitamin B6 mg	Folate µg	Vitamin B12 µg	Vitamin A µg	Vitamin D µg
Breakfast	1.08	0.27	0.46	5.15	0.38	67.66	3.72	149.87	1.73
Lunch	59.39	0.47	0.58	9.02	1.15	152.12	6.69	278.26	1.08
Dinner	18.69	0.5	0.78	11.09	0.79	71	8.24	249.27	0.83
Total/day	79.16	1.24	1.82	25.26	2.32	236.78	18.65	677.4	3.64
Total cooked	39.58	0.56	1.36	19.11	1.16	71.03	10.26	508.05	-
RNI Men	40	1	1.3	17	1.4	200	1.5	700	7
RNI Women	40	0.8	1.1	13	1.2	200	1.5	600	7

**Table 8.1 Reconstruction of the nutritional intake derived from simple and economical specimen menus for breakfast, lunch, and dinner from Beeton (1907 pp. 1720, 1724, 1753), as well as the amount of each nutrient remaining after maximum loss during cooking, and the Reference Nutrient Intake (RNI) for adult men and women.**

Unfortunately, at present the average height for the upper classes has not been established, so it is not possible to accurately determine the number of calories sufficient for such individuals in the 19th century. However, according to average requirements for modern people with low levels of physical activity, the calories of these meals when divided equally for adults would be insufficient for men and around 100kcal short of sufficiency for women. However, this does not necessarily mean that wealthy individuals consumed too few calories, for three reasons. Firstly because these nutrient intakes shown were purposely selected to be the lowest possible values from the most basic meals suggested by Mrs Beeton, and it is likely that many wealthy families did not eat such basic meals every day. Secondly because, as illustrated in Chapter 7.2.5, dividing calories equally between members of a household results in inaccurate calorie intake values, and men are likely to have eaten more than women, who in turn would have eaten more than children. Thirdly, many of the suggested meals contain additional, and vague, additions such as bread, butter, marmalade, and milk on the breakfast table, and cheese and bread alongside lunch and dinner which were not included in the final nutrient estimations since the measures are unknown. As a result, it is likely that far more bread and dairy products were consumed than are included in the tables above, which would have acted to increase the number of calories and some nutrients. However, the estimated nutrient intake provides an idea of the dietary balance for wealthy families in the 19th century.

According to these estimations, this diet would provide sufficient levels of protein, iron, phosphorous, zinc, vitamin C, riboflavin, niacin, and vitamin B12. Meanwhile, intakes of carbohydrate, fibre, calcium, magnesium, potassium, sodium, thiamin, folate, vitamin A, and vitamin D are below the RNI levels, although the addition of bread and dairy to this diet would greatly increase these carbohydrate, calcium, and vitamin A levels. Fat

is around 20g in excess of the recommended maximum of 70g per day. Much of the fat from this diet originated from meat and fish, consumed at every meal, which also explains the high levels of protein, iron, zinc, and vitamin B12. Although the fat intake is high, this would mostly consist of saturated and unsaturated fats which are naturally occurring in meat and other animal products. There was very little trans fat in this diet, since commercially processed foods were not prevalent until the start of the 20<sup>th</sup> century. These meals also frequently featured potatoes, which would provide much of the vitamin C intake found here.

Each lunch and dinner menu included a dessert, often involving apples, which would indicate in a modern diet that large amounts of sugar were being consumed. However, the value for sugar sits at around 30g below the daily RNI, despite the inclusion of so many sweet desserts. The current recommended intake of sugar for the average adult is 90g a day (British Nutrition Foundation 2016b), although only 30g a day of “free sugars”, which is sugar added to food or drinks, should be consumed by adults (NHS Choices 2017a). Using the recipes and serving size for the puddings and desserts listed in the suggested meals, which contained added sugar, each person would consume an estimated 19g of free sugar a day. These estimates suggest that despite the quantity of desserts consumed, sugar intake remained relatively low. Once again, the challenge here is that we cannot be certain that individuals ate the suggested quantities of this food; however, if we compare the 19th-century recipes with their modern day equivalents we see that there has been a huge rise in the amount of sugar added to such dishes. For example, Mrs Beeton’s recipe for baked rice pudding requires around 18g of sugar, and serves up to 4 people (Beeton 1907: 963), meaning each serving contains around 4.5g of added sugar. A very similar recipe from the BBC Good Food website (the online presence of a recipe magazine published by the BBC), which is also

intended to serve 4 people, contains 50g of added sugar, or 12.5g of added sugar per serving (Good Food 2006). This is almost 3 times more sugar than required in the 19th-century recipe. Similarly, the 19th-century recipe for apple charlotte calls for 113g sugar to serve up to 7 people (Beeton 1907), while the BBC Food recipe asks for 120g of sugar to serve 4 people (Martin 2017). Breaking this down per serving, the 19th-century recipe provides 16g per person, while the modern recipe provides 30g, almost double the amount of added sugar. Furthermore, ready-made products often have even greater levels of sugar, such as popular brand Ambrosia's tinned rice pudding which contains 17.8g per serving, 5.3g more than is added to the modern home-made recipe, and 13.3g more than the 19th-century recipe.

Although we cannot be sure that upper-class families in the 19th century followed these exact recipes and ate the suggested portions, the menus presented here suggest that their diet would have been high in protein, fat, and starch, and many vitamins and minerals, but low in sugar. The lower levels of sugar in these recipes, as well as the absence of processed food, suggests that the upper classes are likely to have had the option to eat a balanced diet. However, the inclusion of large amounts of meat, particularly bacon and red meat, increased fat intake beyond modern recommended levels. The meal suggestions presented here were chosen for their description as economical and simple in an attempt to establish a baseline of what an average upper-class family might consume when they ate alone in their homes. But there are many more extravagant suggested meal plans, as well as the opportunity to eat at restaurants and at social events, which are likely to have increased exposure to less healthy food. There is evidence that middle- and upper-class Victorians frequented restaurants, particularly by the final decade of the 19th century, and many of these restaurants served international foods to their customers (Assael 2013). Research into the history of restaurants during

the 19th century is fairly new (Burnett 2004; Assael 2012; Assael 2013), and it is not currently possible to discern the numbers of diners going to meals at restaurants or what impact this had on their nutritional intake.

Although these recipes were available to families in middle- and upper-class households, it is unlikely that infants and young children were accessing such foods. Evidence from Chapter 6 suggests that there were separate dietaries for children in wealthier homes, which did not include the types of food in these recipes. The result of this, as discussed previously, is that the children of the wealthy were consuming diets of pap, animal milk, and soft puddings which were not nutritionally adequate, and which were potentially worse for the infants than the food provided to the children of the poor. Therefore, although there was clearly plenty to eat in upper-class homes the meals outlined in these recipes are unlikely to have been provided to children.

For a multitude of reasons, the option to eat a healthy diet was not necessarily available to the working class. This is due to their budget, restricting choice of the food that they could purchase, their living conditions, which may have limited their ability to cook certain foods, and their working hours, which would limit the time of adults to prepare and cook meals. Furthermore, adults and children in dire poverty could resort to entering the workhouse, within which special dietaries were provided, or may have entered other institutions such as prisons which also provided set meals.

Reconstruction of workhouse and prison dietaries reveal the nutrient intake of men, women, and children aged between two and five years and five and nine years (Table 8.2). Since these averages were derived from 173 dietaries which would have been used to feed thousands of inmates, Table 8.3 presents the percentage of dietaries which provided sufficient nutrient intake according to age and sex.

Calorie intake was found to be adequate for the majority of inmates, with over 90% of dietaries for women and children providing the necessary energy (kcal) requirements. Energy sufficiency dropped much lower in male dietaries, with only 40% of them providing the necessary requirements for this group. This partially supports previous analysis of working-class diets undertaken by Oddy (1970b), who concluded that the calorific needs of families were not being met. However, the evidence presented here only supports Oddy's (1970b) argument for men, not for women and children. Of course, this may not be a reflection of the dietary practices within the working-class home, but considering the deterrent nature of workhouses it is probable that the diet within the majority of homes was no worse than that provided by such institutions.

Intake improved significantly across the century for prisoners, but there was no change in the calorie component of workhouse diets. This is likely to be the result of set workhouse dietary tables which were established in 1835, and which continued to be used across the century. These estimates included the levels of physical activity that prisons engaged their inmates in, but workhouses records did not note whether physical labour was practiced, so adequacy was estimated based on active physical levels.

Over 90% of these dietaries also provided adequate intake for men, women, and children in protein, fibre, sugar, iron, magnesium, phosphorous, sodium, zinc, thiamin, niacin, and folate. All of the dietaries provided carbohydrate intake which exceeded the maximum daily recommended value (DRV), while sugar intake was once again very low, with 100% of dietaries containing sugar below the maximum DRV. Moreover, free sugars were very low, with adults receiving no added sugar, and children receiving 1 oz. in a single dietary. All children's dietaries provided fat intakes below the DRV, while

this figure was over 55% for adult dietaries, with between 45% and 49% of dietaries exceeding DRVs in fat.



<b>Nutrient</b>	<b>Men</b>	<b>RNI Men</b>	<b>Women</b>	<b>RNI Women</b>	<b>Children 5-9</b>	<b>RNI Children 5-9</b>	<b>Children 2-5</b>	<b>RNI Children 2-5</b>
Energy (Kcal)	2457	2605	2190	2079	1923	1600	1392	1370
Protein	90	56	85	45	79	24	55	17
Fat	67	70	59	70	53	56	44	48
Carbohydrate	396	260	343	260	295	-	203	-
Fibre	54	30	48	30	40	20	25	15
Sugar	28	90	25	90	27	-	31	-
Calcium	416	7000	423	700	488	550	548	450
Iron	25	8.7	22	8.7	18	8.7	12	6.1
Magnesium	650	300	566	270	502	200	338	120
Potassium	3405	3500	3022	3500	2661	2000	2051	1100
Sodium	3669	1600	3538	1600	3863	1200	3182	700
Zinc	17	9.5	16	7	14	7	10	6.5
Vitamin C	40	40	36	40	26	30	20	30
Thiamin	2.6	1	2.3	0.8	1.9	0.7	1.2	0.7
Riboflavin	1.7	1.3	1.5	1.1	1.2	1	0.8	0.8
Niacin	30	17	26	13	23	12	15	11
Vitamin B6	2.1	1.4	1.8	1.2	1.6	1	1	0.9
Folate	575	200	506	200	279	150	384	100
Vitamin B12	2.8	1.5	2.8	1.5	3	1	2.4	0.8
Vitamin A	76	700	115	600	190	500	219	400
Vitamin D	0.7	7	0.7	7	3.1	10	4.8	10

**Table 8.2 Average nutrient intakes for men, women, and children aged between 5 and 9 years and 2 and 5 years based on nutritional composition of prison and workhouse dietaries, and the modern RNI for each nutrient according to age and sex (British Nutrition Foundation 2016b).**

Nutrient	Men	Women	Children 5-9 yrs	Children 2-5 yrs
Energy	40	92	91	91
Protein	96	100	100	100
Fat*	55	61	100	100
Carbohydrate*	0	0	-	-
Fibre	99	98	100	91
Sugar*	100	100	-	-
Calcium	18	18	27	82
Iron	99	98	100	91
Magnesium	99	100	100	100
Potassium	45	22	100	100
Sodium	92	91	100	100
Zinc	98	100	100	91
Vitamin C	36	37	36	18
Thiamin	100	100	100	100
Riboflavin	87	96	73	91
Niacin	98	100	100	91
Vitamin B6	80	96	100	91
Folate	98	100	100	100
Vitamin B12	64	76	91	100
Vitamin A	0	0	0	0
Vitamin D	0	0	0	0

**Table 8.3 Percentage of dietaries from prisons and workhouses across the 19th century which provided sufficient energy or nutrients according to age and sex requirements. Figures for fat, carbohydrate, and sugars show the percentage of dietaries which provided intakes lower than the maximum Dietary Reference Values, all other figures show the percentage of dietaries providing intakes above the RNI**

Nutrients which are present in particularly low values in the majority of dietaries are calcium and vitamin C, with vitamins A and D found in insufficient amounts in 100% of the sampled dietaries. Potassium was sufficient in 100% of children's institutional dietaries, but only in 45% of men's dietaries and 22% of women's. Similarly, vitamins B6 and B12 were sufficient for children in over 90% of the dietaries sampled, with sufficient levels of vitamin B6 present in 80% of male and 96% of female, and vitamin B12 in 64% of male and 76% of female dietaries.

Most of the prison and workhouse dietaries provided sufficient amounts of vitamins and minerals for the inmates, with the exception of vitamins A and C and calcium which were found to be in very low levels. None of the dietaries provided sufficient levels of vitamin A, between 18-37% of the dietaries provided adequate vitamin C, and adequate levels of calcium were only provided for 18% of adults and 27% of children aged 2-5 years.

<b>Nutrient</b>	<b>Men</b>	<b>Women</b>	<b>Child 5-9</b>	<b>Child 2-5</b>
Iron	99	98	92	91
Magnesium	98	100	100	100
Potassium	9	0	100	100
Sodium	77	65	91	100
Zinc	79	92	100	91
Vitamin C	20	12	0	0
Thiamin	67	84	64	64
Riboflavin	48	55	18	64
Niacin	54	84	55	91
Vitamin B6	13	8	9	18
Folate	23	4	18	82
Vitamin B12	35	41	64	100

**Table 8.4 Nutrient intake accounting for maximum loss during cooking**

Table 8.4 presents the percentage of dietaries meeting RNI levels for nutrients after maximum loss through cooking is accounted for. Calcium was not included in this estimation, since sources of calcium in these dietaries were mainly through drinking milk, milk added to gruel, and cheese, so would not have been liable to loss during cooking. Vitamin A and D were also not included as none of the dietaries met RNIs in these nutrients even before cooking loss. This estimation shows that the majority of dietaries provided sufficient iron, magnesium, and phosphorous even after cooking, and most also provided adequate sodium and zinc. Potassium, vitamin C, vitamin B6, and folate are all much reduced after cooking, and this suggests that institutional dietaries could have been particularly low in these nutrients. The remaining nutrients thiamin, riboflavin, niacin, and vitamin B12 are also lower, with around 50% of dietaries

providing sufficient intake of these nutrients. This supports the conclusions made by Smith and Thornton (2008) that workhouse dietaries were sufficient enough to sustain growth in children. This stands contrary to the diet provided to children in upper-class households, and supports the argument presented in Chapter 6, that similarities between metabolic disease rates in human skeletal remains were likely due to the specific diets allowed to infants and children in upper-class families.

In comparison with the study performed by Clayton and Rowbotham (2008a); (2008b; 2008c; 2009) regarding the nutritional sufficiency of working-class diet (as opposed to the calorific content examined by Oddy (1970b)), these results do not support such bold claims that 19th-century diet was superior to that in modern Britain. Although many nutrients were being provided in sufficient amounts, key vitamins and minerals are missing in the majority of these institutional diets. However, as previously mentioned, this could be because institutional diets were purposefully made sparse and food provided in the family home may well have provided improved nutrition than is found here. Additionally, it has been long established that the diet of working-class families living in rural areas was far more nutritious than that of families in urban regions (Horn 1974). In rural areas, where food was more plentiful, Clayton and Rowbotham (2008a; 2008b; 2008c; 2009) may well be correct in their assertions, but we cannot make a blanket statement for the entirety of the working-class.

## **8.2 Comparison of Historical and Modern Diet**

There are a number of similarities between the mean intake of nutrients from modern populations (Table 8.5) and those from historical sources. Daily energy (kcal) intake from the cookery book meal suggestions is similar to those energy intakes for modern

men and women, while workhouse and prison dietaries suggest higher mean intakes of energy for male and female inmates.

The mean values for protein and zinc were higher in the historical sources than in the modern data, while there were similar values between past and present for iron, potassium, vitamin B6, and riboflavin. Both historical sources also showed lower mean values for sugar, calcium, vitamin C, niacin, and vitamin A than modern mean intakes. The historical cookery source suggested higher values for fat and vitamin B12 than modern mean intakes, lower carbohydrates, sodium, and thiamine, and similar levels of magnesium. The institutional dietaries show higher values for carbohydrates, sodium, thiamine, and folate than modern mean intakes, lower levels of magnesium and vitamin B12, and similar levels of fat.

<b>Nutrient</b>	<b>Men</b>	<b>Men RNI</b>	<b>Women</b>	<b>Women RNI</b>
Energy Kcal	2078	2605	1561	2079
Protein (g)	80	56	61	45
Fat (g)	79	70	60	70
Carbohydrate (g)	250	260	194	260
Sugar (g)	110	90	86	90
Calcium (mg)	895	700	726	700
Iron (mg)	11	8.7	9	8.7
Magnesium (mg)	266	300	207	270
Potassium (mg)	2944	3500	2408	3500
Sodium (mg)	2718	1600	2027	1600
Zinc (mg)	9	9.5	7	7
Vitamin C (mg)	78	40	74	40
Thiamin (mg)	1.6	1	1.3	0.8
Riboflavin (mg)	1.8	1.3	1.4	1.1
Niacin (mg)	39	17	30	13
Vitamin B6 (mg)	2.5	1.4	1.8	1.2
Folate (µg)	279	200	219	200
Vitamin B12 (µg)	6	1.5	4.7	1.5
Vitamin A (µg)	1040	700	928	600

**Table 8.5 Mean nutrient intake of modern English population based on data from NDNS and LIDNS surveys**

<b>Nutrient</b>	<b>Mrs Beeton</b>	<b>Institutional</b>	<b>Modern</b>
Energy Kcal	1976	2457	2078
Protein (g)	105	90	80
Fat (g)	92	67	79
Carbohydrate (g)	187	396	250
Sugar (g)	58	28	110
Calcium (mg)	374	416	895
Iron (mg)	9	25	11
Magnesium (mg)	211	650	266
Potassium (mg)	2250	3405	2944
Sodium (mg)	1057	3669	2718
Zinc (mg)	13	17	9
Vitamin C (mg)	40	40	78
Thiamin (mg)	0.56	2.6	1.6
Riboflavin (mg)	1.36	1.7	1.8
Niacin (mg)	19.11	30	39
Vitamin B6 (mg)	1.16	2.1	2.5
Folate ( $\mu$ g)	71.03	575	279
Vitamin B12 ( $\mu$ g)	10.26	2.8	6
Vitamin A ( $\mu$ g)	508.05	76	1040

**Table 8.6 Comparison of Mrs Beeton suggested meal plans and Institutional (male) dietaries with modern NDNS/LIDNS nutrient intake (male), showing whether the historical sources had higher values, similar values, or lower values than modern intakes.**

The historical sources suggest that sugar in the past was present in food in far lower quantities than at present, with modern mean adult sugar intake exceeding the RNI of 90g per day. There have been clear improvements to some nutrient intake, particularly vitamin A, vitamin C, calcium, and niacin. Although the historical sources suggest higher values for protein and zinc, the average modern intake meets RNIs for these nutrients. Unlike the other nutrients, intake of sugar is found to be both lower in historical sources and also exceeds the recommended levels in the modern data. This suggests that sugar intake has changed dramatically since the 19th century to become a particular problem in modern diets.

The rise in sugar consumption began in the 18th century when the introduction of tea, coffee, and chocolate saw the more widespread use of sugar as a sweetener, although sugar had been introduced to Britain long before this (Mintz 1985). By the mid-18th century, sugar-sweetened tea had become a common staple in British, working-class households, becoming more economically available by the start of the 19th century after duties were lowered on tea (Mintz 1985). As well as acting as a sweetener for tea, which became a particularly important aspect of the 19th-century diet, the incorporation of sugar into working-class diet would also have acted to provide greater calories for families and a break from the monotonous daily diet, particularly after the introduction of fruit preserves like jam (Corbett and Moore 1976; Mintz 1985). Tea in itself can also have deleterious effects on nutritional health, as excessive tea drinking can lead to reduced nutrient absorption (Drummond and Wilbraham 1957). Research has found notable increases in dental caries prevalence in skeletal remains from this time, which has been linked to an increase in the consumption of refined carbohydrates, from the improvement of flour milling, and sugar (Pezo Lanfranco and Eggers 2012) as well as poor oral hygiene (Whittaker and Molleson 1996). Although sugar intake did increase during the 19th century and become a common aspect of the diet in England, leading to higher caries prevalence, it was still consumed at far lower levels than it is today. The variety of food available in modern Britain and our access to high energy food, suggests that our high sugar intake today is unlikely to be driven by the same factors which led to the increase in sugar consumption during the 19th century. However, sugar consumption in Britain has increased since the 19th century, with dangerous effects on the nation's health.

### **8.3 Modern Legislation: sugar**

The 2016 Childhood Obesity: A Plan for Action report (described previously in chapter 3.8) outlined several plans to tackle childhood obesity, two of which target sugar intake (HM Government 2016). The first is a soft drinks industry levy, which will impose a tax on UK producers, importers and retailers of soft drinks, which will apply at a lower rate to drinks with a total sugar content of >5g per 100ml and a higher rate for drinks with >8g per 100ml (HM Government 2016; HM Revenue & Customs 2016). The aim behind such a levy, also termed the “sugar tax”, is that companies either reduce the amount of sugar by reformulating their products or reducing sugar in future products, or pass a monetary incentive on to the consumer to buy drinks which contain less sugar. However, in their follow-up report, the Health Committee voiced concerns about the effectiveness of this levy due to the prospect that companies could fail to pass the price differential on to consumers, instead charging more for low-sugar drinks to subsidise money lost to the levy for their high-sugar products (The Health Committee 2017). In addition to this, milk-based drinks will not be included in the levy, regardless of their sugar content, which does little to combat high-sugar dairy beverages.

The second proposal to reduce sugar intake to tackle childhood obesity is the plan to take out 20% of sugar in food and drinks products (HM Government 2016). This plan is described as follows:

All sectors of the food and drinks industry will be challenged to reduce overall sugar across a range of products that contribute to children’s sugar intakes by at least 20% by 2020, including a 5% reduction in year one. This can be achieved



through reduction of sugar levels in products, reducing portion size or shifting purchasing towards lower sugar alternatives (HM Government 2016, 4).

This process to reduce sugar in food and drink products will be beneficial and is a good step in the right direction. By reducing sugar levels in such products, specifically those aimed at children, over time the tastes of the UK population should become accustomed to less sweetness in food. The benefits of consuming less sugar, thus fewer calories, would be huge, both for public health and for NHS spending.

However, there are two issues with this policy. Firstly, by using a voluntary mechanism the government is allowing companies to choose whether to reduce sugar levels. This has the potential risk of being bad for business, since consumers may simply switch to brands which have not chosen to voluntarily reduce sugar in their products. The potential result of this would be that companies who initially volunteer to reduce their sugar levels eventually increase them again once sales drop. There is also the danger that companies will increase other ingredients to ensure palatability for modern tastes, such as fat or artificial sweeteners. Giving no mandatory rules or any motivations, such as the levy in the sugar sweetened beverages, there is little incentive for companies to make a potentially unprofitable changes to the formulation of their products.

The second issue with this plan is the inclusion of portion size as one measure of sugar content. This allows producers to simply reduce the size of their product rather than the sugar content, and similar to the soft drinks levy, the price differential can again fall on consumers who may pay more for less product. This would do nothing to combat the root of the issue concerning sugar intake; the palate of the nation for high-sugar content.

As the historical dietary reconstruction evidence suggests, there has been a huge increase in the amount of sugar included in recipes and products, with up to three times more sugar per portion today than was included in a 19th-century recipe for the same item, and even more sugar added to ready-made products. These historical recipes also suggest that the current level of sugar added to food is not required for palatability, and an acquired taste for reduced sugar is possible. The Childhood Obesity Plan does introduce a plan for reducing sugar levels in food and drink, however this reduction depends entirely on the voluntary action of manufacturers, and is not a mandatory requirement (The Health Committee 2015, 4). Recent research on the topic of sugar tax in the UK gathered grocery purchasing data from around 32,000 households to reveal which products contributed most to sugar intake according to household income (Smith *et al.* 2018). This extensive analysis found that households from all incomes consume more sugar from sweet snacks (e.g. chocolate, biscuits, cake) than from all types of beverages combined (alcoholic and soft drinks), and also that sweet snacks have far higher sugar content per 100g compared to 100mL of beverages (Smith *et al.* 2018, 3). Furthermore, this study revealed that price increases in sugar sweetened beverages are associated with *increased* purchase of other soft drinks and sweet confectionery, while an increase in the price of chocolate is associated with *reduced* purchasing of sugar sweetened beverages and other snacks (Smith *et al.* 2018, 7-8).

The evidence presented here suggests that returning the nation's taste for sugar to lower levels will only be possible if mandatory reductions gradually reduce sugar levels in high-sugar food products, particularly confectionery. By reducing sugar levels, perhaps by a percentage amount in all sugar sweetened products at a time, it may be possible for the nation to reacquire the healthier taste for lower sugar levels which was the norm during the 19th century. A major concern raised by the Health Committee in their

follow-up report (The Health Committee 2017) is the absence of any clear proposal for monitoring the impact that the Childhood Obesity Plan will have on obesity levels. The only measure which is explicitly stated is to measure the sugar and calorie levels in food and drink after the voluntary sugar reduction programme. The final line of the plan states that “over the coming year, we will monitor action and assess progress, and take further action where it is needed”, but there is nothing to suggest what will be measured to assess the progress of this plan or what “further action” would entail (HM Government 2016: 12). This policy appears to have been created with no accurate method in place in order to measure its impact. Similar to the issues of breastfeeding prevalence surveys and the absence of impact reports for the HCP, childhood obesity action proposals also have no method for measuring outcome and success.

### **8.3.1 Update to Sugar Tax and the Childhood Obesity Plan**

In April 2018 the Soft Drinks Industry Levy came into effect in which companies were required to pay 24p/litre of drink if it contained 8g of sugar per 100ml, or 18p/litre of drink if it contained between 5-8g of sugar per 100ml (HM Treasury 2018). This is a hugely important moment in the step towards controlling disease rates associated with high energy diets, but at time of writing there is not yet enough evidence to discuss the success of this action.

Due to the heavy criticism that the Childhood Obesity plan faced from many medical practitioners and campaign groups, the government released Childhood Obesity: A Plan for Action, Chapter 2 in June 2018 (Department of Health and Social Care and Global Public Health Directorate 2018). This plan introduced additional actions intended by the government to succeed in their new goal to **halve childhood obesity by 2030** (Department of Health and Social Care and Global Public Health Directorate 2018, 6).

The update focuses on five key areas: sugar reduction, calorie reduction, advertising and promotion, local areas, and schools. Despite the report's claims that bold and ambitious actions are required to tackle obesity endemic among children, there are no actions included in the report which will be implemented right away. Instead, the majority of the new plans are, in fact, further consultations on plans. With regards to sugar reduction, the government acknowledges that voluntary reduction in food has not been successful, stating that "overall, industry has delivered a 2% reduction in sugar content across these foods. This does not meet our 5% year one target" (Department of Health and Social Care and Global Public Health Directorate 2018, 6). In light of this, the following actions were presented:

- HM Treasury will consider the sugar reduction progress in sugary milk drinks in its 2020 review.
- Consultation will occur before the end of 2018 on intentions to legislate the sale of energy drinks to children.
- The government "may consider further use of the tax system to promote healthy food if the voluntary sugar reduction programme does not deliver sufficient progress".
- An assessment will take place in 2020 to monitor the level of progress towards a 20% sugar reduction in the foods most commonly eaten by children.
- Consultation will occur before the end of 2018 on the introduction of legislation requiring calorie labelling for the out of home sector (restaurants, cafes, and takeaways) (Department of Health and Social Care and Global Public Health Directorate 2018, 8).

Overall, the government update appears to suggest that it may update the original Childhood Obesity Plan after consultation. However, as already stated in the report, the voluntary sugar reduction programme has failed to meet targets in the two years that it has been active. The government states that further tax may be considered if there is not sufficient progress, but it is arguable that there has not been sufficient progress in the two years that the voluntary reduction programme has been active. Without a definition of "sufficient progress", there is no clarity on when further actions will be implemented, or what form those actions will take.

## 8.4 Chapter Summary

This chapter presented nutritional estimates for households from different socio-economic standing in an attempt to examine how nutrient intake may have differed in the past and changed over the proceeding years. These estimates are not claimed to be accurate representations of the diet for all high- and low-income groups in England, rather they provide insight into the potential dietary habits of 19<sup>th</sup>-century families. The most intriguing result from this analysis is the huge increase in sugar consumption from well below the RNI in the reconstruction of both high- and low-income diets to excessive levels in the modern population. What this suggests is not only that the inclusion of excessive sugar in the diet has been a fairly recent phenomenon, but that the taste for sweetness in food is. The introduction of more regulated control over the proportion of sugar present in food and drink products could help to both reduce sugar intake and to modify the populations taste for sweetness. Furthermore, effective changes to food production could result in more variety and a greater choice for consumers to purchase more healthy products with reduced sugar.

## Chapter 9 Public Health Policy Implementation

Having reviewed the evidence for historical nutrient intake and modern public health policies, the aim of this chapter is to reflect on how future policies concerning nutrient intake in the UK can be improved. Each of the previous sections has discussed current policies which aim to improve aspects of dietary health, and through these discussions several similarities were noted concerning modern approaches to legislation. The first is the current absence of information gathering by government departments to establish the state of modern nutritional health. Examples of this are the lack of information regarding what meals pre-school children currently receive from early years settings in England (Chapter 6.3) and the discontinuation of the Infant Feeding Survey (Chapter 6.3.2). The second issue highlighted is the absence of measures in newly created government plans to indicate the success of the policy or method. This problem was particularly obvious in the Healthy Child Programme (Department of Health 2009) (Chapter 7.3.2), in the original Childhood Obesity Plan (HM Government 2016), and in chapter 2 of the Childhood Obesity Plan 8.3), which provided no indication of whether the methods employed had been successful in improving childhood nutrition (Department of Health and Social Care and Global Public Health Directorate 2018). A third challenge to improving nutritional health is the apparent reluctance of government departments to fully incorporate recommendations from public health professionals and select committees into new plans or policies. For example, the introduction of a voluntary sugar reduction scheme for food distributors by the Department of Health in their plan to tackle childhood obesity, rather than introducing new and enforced legislation as suggested by the Health Committee (Chapter 8.3).

The first policy relating to the nutritional health of the population, aside from legislation concerning the adulteration of foods, was the 1906 Education (Provision of Meals) Act

(House of Commons Papers 1906). After this, policies concerning food and health began to emerge, particularly during the Second World War (Caraher *et al.* 2009). After the end of WWII, there were no further public health nutrition guidelines created except the 1983 report of the Nutrition Advisory Committee on Nutrition Education, which set out guidance on the healthy amounts of fat, salt, sugar, and fibre for the UK population (Caraher *et al.* 2009).

Although there was little legislation involving food, the 19th century was a period of huge change in society. As discussed in Chapter 4.2, it was during this time that movement began towards a state which provided for its citizens, but how easily did this movement occur? What did it take for such legislative changes to be made in the 19th century? The following sections will discuss how some of the radical changes to English society and welfare came about, and the roles that government inquiries, surveys, and reports had in new legislation. The aim of this chapter is to identify how decisively such changes were made, and to what extent the government of the 19th century heeded advice provided by their own commissioners. Three significant changes which occurred during the 19th century will be explored: poverty relief, sanitation, and the Factory Acts. Following from the examination of these significant changes, this chapter will conclude with an discussion of the current workings of government, the extent to which advice from committees is used in the development of new policies, and a critique of current nutritional health policies.

### **9.1.1 Poverty Relief**

Poverty relief was a highly contentious issue during the 19th century and received much attention from government and from the public, even resulting in commercialised “slum

tours” from the 1850s, where middle- and upper-class customers could be given a tour of London’s poverty-stricken East End (Steinbrink 2012). Although the poverty of the time was well known, and conditions in workhouses were highlighted by novelists such as Dickens, changes to improve the lives of England’s poorest residents took most of the century to be enacted, despite calls for change by commissioners and charities.

#### **9.1.1.1 Attempts by Commissioners**

Despite the clear abuses and neglect which occurred in the early years of the system (Chapter 4.2.4), the New Poor Law remained in place. Throughout this time, Commissioners and Assistant Commissioners remained highly active in the workings of the Poor Law, and frequently made suggestions to improve individual Unions based on observations of the way their workhouses functioned.<sup>1</sup> Records of inspections suggests that the actions of these Commissioners and the subsequent orders sent out to Unions were the result of frequent contact with workhouses, during inspection and by correspondence with Guardians. Individuals assigned by the Poor Law Board conducted investigations of workhouses in their districts, making inquiries into abuse claims, living conditions, food provided etc. and writing their reports for the Board. The result was that these inspection reports were commonly used in parliamentary debates concerning workhouse conditions, and the inspectors were also ordered by Parliament to conduct further investigations into specific workhouse practices. Evidence for this link between workhouse inspectors and Parliament exists in the records of debates and proceedings of the House of Commons. For example, in 1855 the report of an inspector on the “horrible” conditions of St Pancras Workhouse led to intervention from local

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<sup>1</sup> Evidence discussed here for correspondence, recommendations, and observations of workhouse unions across the country by Poor Law Board Commissioners can be found in The National Archives MH12 series. This series includes letters between commissioners, union guardians, and the Poor Law Board, as well as reports and inquiries into allegations of abuse.



authorities, a debate in Parliament, and a request for the report to be brought before the house (HC Deb 22 February 1856). Later, in 1874 the report of an inspector of St Pancras Union on childhood mortality in the institution sparked further debate in the House of Lords, and once again a motion to produce a copy of the report for the House was agreed to (HL Deb 16 June 1874). As well as initiating debate, inspectors also received orders to investigate certain situations, such as the events of a night in the summer of 1883 when a 78 year old woman was refused entry to a workhouse in Westminster and was left on the pavement outside until 7.30am the next day (HC Deb 2nd July 1883). As a result of this allegation, the Local Government Board directed an inspector to visit the workhouse in question, and to inquire into this abuse. Such debates suggest that Parliament was well aware of the issues and incidents occurring within workhouses, and although there were some investigations into conditions at individual workhouses no attempt was made to reform the system as a whole.

Depending on the location of the workhouse, many received frequent visits from inspectors and chairmen alike, sometimes as often as every three weeks, and Workhouse Inspection Reports filled out by inspectors after such visits reveal much about the system in place to ensure that workhouses were functioning in accordance with the law. Answering questions on pre-printed forms following a standard format, each inspector would include information about the union being visited, the date of the visit, and their name, as well as the following questions:

1. Date of last previous visit
2. Is the Workhouse generally adequate to the wants of the Union, in respect of size and internal arrangements?
3. Is the provision for the sick and for infectious cases sufficient? Are the receiving wards in a proper state?
4. Is the Workhouse School well managed?

5. Are there vagrant wards in the workhouse, and are they sufficient? Are the arrangements for setting the vagrants to work effective, and is the resolution of the Guardians under 5 & 6 Vict., c. 57, s. 5 duly observed?
6. Does the visiting committee regularly inspect the workhouse? Do any of their answers to the queries in the workhouse regulations suggest the propriety of any interference on the part of the Commissioners?
7. Has the maximum number of inmates of the workhouse, fixed by the Commissioners, been constantly observed since your last visit?
8. Have all appointments of new officers, and changes in salaries and districts, since your last visit been reported to the Commissioners?
9. Is there any officer whose appointment has been sanctioned provisionally? If so, state your opinion of his fitness.
10. Are all the accounts and books prescribed by the regulations of the Commissioners properly kept?
11. Have you observed any illegal practice, or any departure from the regulations of the Commissioners?
12. Has any marked change taken place in the state of the Workhouse, the number of the inmates, or the general conditions of the Union, since your last visit?
13. Observations not falling under any of the preceding heads.

(e.g. Graves 1847; Hawley 1849)

As well as insight into the conditions in the workhouse, these reports also provide an idea of the frequency of inspections, and the expectations of inspectors that Guardians act on their recommendations. For example, in January of 1847, Robert Weale visited Newport Pagnell Union workhouse twice in the same month, on the 6<sup>th</sup> and 25<sup>th</sup>, reporting that “this union is altogether working very satisfactorily”, and he also recorded that his last visit had been only a few weeks earlier on December 30<sup>th</sup> 1846 (Weale 1847). Reports selected at random by the author for different unions reveal that the majority of workhouses received visits from officials fairly regularly throughout the century, a sample of which is shown in Figure 9.1 for workhouses around England.

Record no. MH 12/	Inspector	Workhouse	Date of inspection	Previous inspection	Question 6.
490/10	Robert Weale	Newport Pagnell	6/01/1847 25/01/1847	30/12/1846	The visiting committee inspect the workhouse pretty regularly – The answers to the queries do not require any interference on the part of the commissioners.
9158/8	William Hawley	Tynemouth	13/02/1847	11/06/1846	Yes – and some of the answers imply the necessity of interference on the part of the Commissioners.
11364/346	H. B. Farnall	Newcastle Under Lyme	14/01/1850	14/09/1849	Yes. No.
491/214	Greville Pigott	Newport Pagnell	09/08/1854	08/02/1854	Yes. No.
9362/268	Robert Weal	Mansfield	02/07/1855	02/02/1855	They do not, there are only two visits recorded since my last inspection on the 2 <sup>nd</sup> February & only 4..[text illegible] the 14 <sup>th</sup> of July last – repeated appeals have been ... by the Poor Law Board to the Guardians on this ... and they promise to visit but do not. I advise to ... Poor Law Board to call for monthly reports from ... Guardians and if not sent to appoint a visiting ... under the Act of Parliament.
11001/364	W.H.T. Hoovey	Southampton Incorporation	10/08/1858	29/12/1857	Yes. There are no remarks in the visitors book requiring observations.
14589/372	Norman Edward Hurst	Reeth Union	22/03/1861	10/09/1860	They do.
14589/552	Norman Edward Hurst	Reeth Union	13/04/1863	10/11/1862	They do.
14590/393	Robert Hedley	Reeth Union	24/03/1871	19/09/1870	The queries have been answered three times since my last visit.

**Table 9.1 Information from inspection reports by Poor Law Commissioners including the date of the visit, the date of the previous visit and the answers given to question number 6 of the report form relating to frequency of visits. All files are available from The National Archives.**

In addition to these inspections, each year the Poor Law Board released its own report concerning the administration of workhouses, beginning in the first annual report of 1848 (Poor Law Board 1848). They covered such topics as annual poor law expenditure, figures on the numbers of paupers in workhouses, information about workhouse schools, and notes on any pressing concerns, such as an outbreak of cholera which was discussed in the second report (Poor Law Board 1849). These reports reveal a complex and somewhat organised system of administration, which could procure detailed figures from each workhouse in the country by direct contact with the guardians.

Clearly, official workhouse inspections were occurring, sometimes as frequently as once a month, and often several times a year, and the results of such inspections were both available and recognised by Parliament. However, it could be argued that these inspectors had a vested interest in the success of the workhouse system, being as they were part of the Poor Law Board, and tales of abuse continued to enter public consciousness despite their frequent investigations. Although some inspectors may well have had genuine concern for the poor that they were responsible for, it is not possible to know whether the reports of all assistant commissioners were accurate, or to what extent they saw only what the managers of such institutions wanted them to see. In a time before social media or any kind of representation for the average person (for instance all men over the age of 21 were only given the right to vote in 1918 and all women aged over 21 years in 1928 (UK Parliament 2017e)), many of the poor had no way of reporting the abuses they experienced, and may not have been believed if they had.

Before the Metropolitan Poor Law Act of 1867 the Poor Law Board was somewhat limited in its jurisdiction over the actions of Guardians from local Unions. The difficulties faced by Poor Law Board officials in implementing their recommendations at local workhouses is well illustrated by the reports and letters generated about Keighley Union during the 1840s and 1850s. In 1842 Assistant Commissioner Sir James Walsham attended a meeting with the Board of Guardians for Keighley and Bingley Unions and inspected the premises at both workhouses (Walsham 1842). He reported the miserable conditions that he found there in a letter to the Poor Law Board, describing Keighley workhouse as “a mere third-rate farm-house of the seventeenth century” where he had seen that a woman who had recently given birth in a crowded room, within sight of male paupers, had been forced to share a bed with her new born child and another sick woman (Walsham 1842, 2). The workhouse was clearly overcrowded, one room contained nine beds for 24 women and children, and the schooling available was highly limited, conducted in a “wretched hovel” by an “old Pauper” (Walsham 1842, 3). In addition to this, at both Keighley and Bingley the masters “were often compelled to let the corpse companion the living until it was buried” (Walsham 1842, 3). Mr. Charles Mott, a second Assistant Commissioner, also wrote a letter to the Poor Law Board in 1842, highlighting his concerns about the activities of the Board of Guardians at the Keighley and Bingley Union workhouses (Mott 1842). In it, he highlighted the practice of the Guardians to provide outdoor relief in the form of wages to paupers from the surrounding areas, which was expressly against the legislation contained in the New Poor Law, and also occasions where paupers had been refused relief in the workhouse (Mott 1842). By July 1842 a Select Committee had been appointed to inquire into the allegations made by Mr. Mott and Sir Walsham, which they found to be entirely true (Napier *et al.* 1842). The outcome of this investigation was that the Board of Guardians at Keighley and Bingley workhouses

received guidance from the Poor Law Board on the laws regarding out door payments to paupers (Napier *et al.* 1842). No attempt appears to have been made at that time to address the concerns raised in Sir Walsham's letter, particularly regarding the level of overcrowding found in Keighley workhouse. This is supported by a second inspection two years later, in 1846, by Alfred Austin, Assistant Commissioner, who reported to the Poor Law Board that both Bingley and Keighley were overcrowded, and recommended that the number of paupers there should be reduced (Austin 1846). The Poor Law Commissioners then wrote to the Guardians of Keighley and Bingley Union to fix a limit on the number of paupers allowed admission in the buildings (Austin 1846, 4). However, this still did nothing to address the central problem: that the buildings were unfit for their use as workhouses. Between 1850 and 1853, workhouse inspection reports written by Mr. Harry Bernard Farnall (Inspector to the Poor Law Board) on his visits to Keighley workhouse continuously state that the building was unfit and should be replaced (Farnall 1851; Farnall 1852; Farnall 1853a; Farnall 1853b). For more than a decade the workhouse is described as overcrowded with no separate spaces for men and women to spend days and nights (Moss 1808; Walsham 1842; Farnall 1853b). Finally, in 1858 a new workhouse was erected for Keighley, but it followed on the heels of a widely published scandal at the workhouse in 1857, after the master, John Sagar, was accused of murdering his wife with arsenic (Higginbotham 2017). Sagar was found not guilty in 1858, but due to the timeline it appears likely that national attention brought to the workhouse through media coverage of the accusation of murder prompted changes by the Guardians, and the swift erection of the new workhouse in that same year.

The clear failings by the Guardians at Keighley Union, and the inability of the Poor Law Board to order the building of a new workhouse highlights just how little jurisdiction the Poor Law Commission really had during the early years of the New

Poor Law. There are numerous other examples of failings and of reports from the institutions being ignored by the Poor Law Board. For example, at Lambeth workhouse in 1865, Thomas Rawley, who had been employed as the labour master there, reported concerns to the Poor Law Board about the actions of Mr Day, the workhouse master (Earle 1865). Rawley reported that Day rarely showed up to work on time in the mornings, that he was using money from the poor rates to furnish and repair his own quarters and provide good food for himself and his family, and that he was using the paupers in the workhouse as servants (Earle 1865). In his letter of defence, Mr Day replied to each point, claiming that he had in the past “attended to business at six o’clock in the morning, but I found that I could not continue doing so, such early rising being injurious to my health”, that claims about his use of poor rates were exaggerated, and explains that he was simply training the paupers for domestic service by employing them himself (Earle 1865, 4). Despite these excuses, the Poor Law Board concluded that they did not “think it necessary to take any further proceedings in the matter” (Earle 1865, 8).

However, only two years later, in 1867, a Poor Law Inspector Dr Markham was sent to make an unannounced inspection of Lambeth workhouse after reports were received of illegal happenings there (Fleming 1867). Dr Markham found that an aged pauper inmate, Mr. Lomax, was being voluntarily employed as a medical assistant in exchange for extra diet and a room of his own (Fleming 1867). In addition to this, Markham encountered the punishment of a girl who had been locked in confinement for three days, but who he observed would have been there for longer “except for the accident of my visit” (Fleming 1867, 2). The result of this inspection at Lambeth Union Workhouse demonstrates the change in management at that time, as the Board found that the Master acted against Poor Law policy in his unusual punishments of inmates there. Mr Day

resigned from his post, but correspondence between the Board and the Guardians at the workhouse suggest that he had little choice in the matter.

### 9.1.1.2 Attempts by Charities

While inspectors conducted their official visits to workhouses across the country, unofficial visits by philanthropists were also taking place which had an untold influence on the system and the workings of the New Poor Law. Charities dealing with poverty relief were not a concept original to the introduction of the New Poor Law (Cunningham and Innes 1998), but had played an important part in providing assistance to the poor. At the time, charity was seen as the most reliable and proper method of relieving the poor, and as such there was huge growth in charitable organisations and individual contribution (Prochaska 1980). Many middle- and upper-class families gave large sums to charity, and a survey of 42 middle-class families in the 1890s found that they consistently spent more money on charity than on clothing, rent, the wages of their own servants, and on practically any other item apart from food (Prochaska 1980). By the last decades of the 19th century, the sum donated to charity from private persons exceeded the gross government expenditure on poor relief (Prochaska 1980).

On the 1st February 1853, after visiting an elderly acquaintance who had entered into Strand Union Workhouse, 33 year old Louisa Twining wrote in her diary how “At the very first visit, I was forcibly struck by what has been my conviction ever since : the *great* want which is *the* evil of workhouses – efficient supervision” (Twining 1880: 92). After being granted permission to visit by the master and matron of Strand Union, Twining began to visit some of the 500 poor and sick inmates of the workhouse in order to read to them and provide them with some company and comfort (Twining 1880: 7). Upon making these visits, Twining wrote “It soon became evident that many more



visitors would multiply the good that might be done; and so leave was asked of the guardians that other ladies might be admitted for the purpose of reading to the inmates, and giving comfort and instruction” (1880: 7). Four years later, in 1857, following the growth in the number of women collaborating with Twining, the Workhouse Visiting Society was formed, which consisted of an organised system of voluntary workhouse visits undertaken by women (Workhouse Visiting Society 1859: 3).

Despite the clear benefits of their work, the Workhouse Visiting Society did not develop unopposed, and faced a constant battle for access and authority against the Poor Law Board and individual workhouse Guardians (Jones 2000). After only six months of permission to visit Strand Union, the Board of Guardians terminated the programme, stating that it was against practice and the law to admit strangers into the workhouse for the purpose of contributing to the duties of paid officers (Twining 1880). The following years saw what Twining described as “the power of red-tape” (1880: 10) against the aim of the society to alleviate suffering due to conditions within the workhouse. For example, although in 1857 the Poor Law Board sanctioned the voluntary visitation of workhouses, they added the clause that permission was at the discretion of individual unions, thus giving Boards of Guardians the power to deny visitation, which more frequently than not was the case (Twining 1880: 20-2). However, through the persistence and dedication of these women, the Workhouse Visiting Society continued to gain ground, campaigning for separate sick wards, properly trained nurses, the discontinuation of a system where medical doctors had to pay for medicine from their own wages, they found employment opportunities for boys and girls and worked towards separating groups of inmates with different needs, such as the old and the infirm (Twining 1880; Jones 2000). Through their active method of visiting the workhouse and experiencing conditions and circumstances first hand, these upper-class

women, who had far more influence than the inmates of the workhouse and did not suffer the same prejudices of the Poor Law Board's inspectors, systematically identified issues and worked tirelessly towards solving them. As well as identifying issues and finding practical solutions which could be achieved by individual members, the Workhouse Visiting Society's influence reached much further, and instigated changes within central government and the Poor Law Board.

The first of such changes was to the organisation and conduct of the workhouse, and was only achieved after many years of campaigning and networking, with additional weight from influential medical men (Twining 1880). In 1860, the Workhouse Visiting Society created a proposal that, due to the large numbers of serious ill people with incurable conditions entering the workhouse, they should be treated as separate from the general inmates of these institutions and placed in specialised wards (Twining 1880). The Society sent a petition, which was signed by 90 medical men from every hospital in London, to every Board of Guardians offering assistance in the form of funding to supply items for the use of the terminally ill, but the petition was only accepted by seven Boards (Twining 1880). Following this limited success, the Society presented a second petition to the President of the Poor Law Board, Mr Villiers, called "Suggestions from members of the Workhouse Visiting Society on the condition of the sick in the workhouse", which campaigned for the appointment of additional medical officers, the employment of trained nurses, and permission for individuals on sick wards to receive gifts from outside the workhouse (Twining 1880). Twining herself put these recommendations before the Select Committee of Inquiry on the Administration of the Relief of the Poor when they examined her in June 1861 (Deane 2005). She used this opportunity to ask for female inspectors, workhouse visiting to be made official, middle-class women to have responsibility for the domestic management of

workhouses, a person whose responsibility it would be for the welfare of the sick, payment for medicines to come from the Poor Rates, more medical inspectors, and the creation of specialised wards for the terminally ill (Deane 2005). In addition to this, Florence Nightingale worked towards the development of institutions for training nurses, and in 1864 the private philanthropist William Rathbone offered the Liverpool guardians a team of trained nurses to work in their workhouse infirmary for three years at his own expense (Flinn 1976). At the end of these three years the guardians of the Liverpool workhouse retained the trained nurses at their own cost, since the women had demonstrated the huge advantage to maintaining efficient wards with good hygiene (Flinn 1976).

### **9.1.1.3 Changes Occur**

In 1867 there came a sudden change in the power of inspectors and the reaction of the Poor Law Board to claims of abuse such as those at Lambeth Union. This change occurred after Gathorne Hardy was appointed as the new President of the Poor Law Board, taking over from Charles Pelham Villiers in 1866. Immediately after his appointment, Hardy introduced the Bill for the Metropolitan Poor, which was quickly pushed through Parliament (Austin 1867). In his address to the House of Commons in February 1867, Hardy explained the process by which his new Bill had been created, based as it was on several inquiries conducted into the management of workhouses in London (HC Deb 1867). After the deaths of two pauper inmates, Timothy Daly at Holborn workhouse in 1864 and Richard Gibson at St Giles in 1865, inquiries were made but no action taken by Villiers at that time (HC Deb 1867). From Hardy's speech it appears that little was done to improve conditions within the workhouse or to address issues raised by workhouse inspectors under his predecessor. However, under Hardy's role as President of the Poor Law Board reports made by inspectors began to be heeded.

The process of change began with nurse Matilda Beeton who worked at Rotherhithe and Strand workhouse infirmaries and reported them both to the Poor Law Board in 1866 for inadequate facilities and poor management (Enfield 1866a; Fleming 1866). On receiving these complaints, Poor Law Inspectors Harry Burrard Farnall and Richard Basil Cane made inquiries at Rotherhithe and Strand workhouses respectively, which resulted in media attention being drawn to the state of workhouse infirmaries when the *Lancet* conducted a series of visits to Metropolitan workhouses, publishing accounts of the inspections in their journal (*The Lancet Commission on Workhouse Infirmaries* 1865). As a consequence of this publicity, Villiers called for a full investigation into the state of sick wards, commissioning Dr Edward Smith and Mr Farnall to inspect the premises of London workhouse infirmaries (Twining 1880). Although the resulting reports were available to Villiers, it was not until Hardy was appointed as President of the Poor Law Board that action was taken (HC Deb 1867). Hardy took all of the recommendations made by Smith and Farnall, as well as information from the other reports into unions such as Rotherhithe and Strand, and created the Metropolitan Poor Law Act of 1867 (HC Deb 1867). The new Act directly incorporated the suggestions and observations made by Poor Law Inspectors, including higher salaries for doctors, the use of trained nurses, guidelines for the construction and arrangement of infirmaries, and the introduction of a Common Poor Fund from which such expenses as wages and medicine were to be drawn (Enfield 1866b; Lumley 1866; Austin 1867). It required the Poor Law Board to combine the medical services of all the metropolitan Unions (1867). As a result the Metropolitan Asylums Board became the hospital authority in Greater London for the treatment of insanity, smallpox, and typhus fever, funded by a Common Poor Fund which all member unions paid into according to their income (Austin 1867). The 1867 Act proved to be the first time in British history that the state recognised its duty to provide hospitals and treatment for the poor and took the important step of

removing hospitals from the workhouse, making treatment no longer dependent on the individuals becoming pauperised (Austin 1867). It also transferred greater powers to the Poor Law Board over local unions, allowing them to send orders to Guardians (Austin 1867).

These reforms to the Poor Law occurred as a direct response to the campaigns and pressures from women of the Workhouse Visiting Society, nurses such as Florence Nightingale, the doctors of the Poor Law, and the deference that Gathorne Hardy had for the recommendations of his Poor Law Inspectors (HC Deb 1867). The 1867 Act began the development of a new kind of medical service, which advanced gradually and eventually led to the creation of the National Health Service in the 1940s (Flinn 1976).

Far from being an immobile and unbending system, the New Poor Law underwent constant changes and developments during its existence in response to surveys and reports by both the Board and by charitable organisations and individuals. Ultimately, comprehensive investigations into the system of poverty relief improved conditions for individuals who, driven by poverty, entered the workhouse, for the elderly, for the sick, and eventually for the whole of society. However, the impact that these campaigners and inspectors had depended entirely on the willingness of individuals in power to make necessary changes to the law based on new information. The pressure from the press and charitable groups fundamentally transformed British society, although this was only possible if those in parliament acted on it.. However, the New Poor Law was not the only attempt to change the welfare of the poor, and as the 19th century progressed there were many other Acts passed attempting to improve the living and working conditions of England.

## **9.1.2 Sanitation**

Some of most frequent causes of death in the 19th century were the direct result of poor sanitary conditions both in the home, in the workplace, and in the treatment of food and water (for example, tuberculosis, dysentery, and diarrhoea, see 7.2.2). Despite the growing medical knowledge that diseases could be spread through contaminated water and food, and attempts by commissioners and doctors to provide solutions to the unsanitary conditions, once again progress was slow and took much of the century for improvements to be made.

### **9.1.2.1 Attempts by Commissioners**

Despite all of his efforts in developing the legislation for the New Poor Law, after its formation Edwin Chadwick found himself barred from sitting on the Poor Law Board, and instead continued on as secretary (Jones 2000). However, by 1838 the influence of three medical doctors in the Poor Law Commission, Kay, Arnott, and Southwood Smith, began to shape Chadwick's interest in the effect of sanitation on poverty (Jones 2000) and Chadwick persuaded the Poor Law Commissioners to allow a medical inquiry into the outbreak of fever in Whitechapel, London (Paterson 1948). Drs Arnott and Kay immediately set about working on a report about the prevalence of fever in London, while Dr Southwood Smith expressed concern with the high death rate in Bethnal Green, with both reports drawing the connection between sanitation and disease (Paterson 1948). Following an epidemic outbreak of influenza and typhoid fever in 1837-8 the House of Lords started a Select Committee to inquire into the health of urban populations, which resulted in a failed Bill for "The Drainage of Buildings" (Paterson 1948; Thomas 1960). Following this, a second committee was organised, headed by Chadwick, which worked between 1840 and 1841 to produce the "Report on

the Sanitary Condition of the Labouring Population of Great Britain and the Means of its Improvement” (Chadwick 1842; Paterson 1948; Thomas 1960). In this same year, 1842, two public health bills were introduced, both of which failed to pass through Parliament (Paterson 1948). Shortly after Sir Robert Peel’s election in 1841 another inquiry was conducted by the Health of Towns Commission but, despite the huge amount of evidence contained within the report, no bill on sanitation was even attempted (Paterson 1948).

There were three reasons for this sudden interest in sanitary inquiries. Firstly, the 1830s saw a rise in revolutionary activity, for example the first Chartist petition was delivered to Parliament and the far reaching influence of Malthus met opposition in the late 18th and early 19th century from such revolutionary figures as Thomas Paine, Karl Marx, and Thomas Spence (Sherwood 1985; Marangos 2008). As a result, the government needed to be seen to be taking an active interest in the welfare of the people (Hamlin 1998; Walls *et al.* 2012). The rise in public involvement in politics, which began through riots and public protest, became more organised and frequent as the century progressed (Tilly 2010) (Chapter 4.1.5). Parliamentary elections in particular provided opportunity for the 97% of the adult male population, who had no legal right to vote (Aidt and Franck 2013, 230), to meet and march in support of candidates running for contested seats who championed popular causes (Tilly 2010). Secondly, the widely loathed Poor Law Commission required a study which might justify its continued existence (Hamlin 1998). Thirdly, recent criticisms by William Farr, whose analysis of the causes of death in England and Wales, proved to be uncomfortable reading for Poor Law Commissioners (Hamlin 1995).

The main conclusion of Chadwick's 1842 sanitary report was that the answer to issues of health in the labouring population lay in the implementation of a regulated water supply both to clean streets and to carry waste away in an improved sewer system (Chadwick 1842). On sewers, it was noted that "there is no point on which medical men are so clearly agreed, as on the connexion of exposure of persons to the miasma from sewers and of fever as a consequence" (Chadwick 1842: 313-4), and it was concluded that proper drainage through a sewage system, street and house cleansing, and clean water supply would greatly improve public health. The sanitary inquiry report was the first time that the link between poor sanitation and disease was noted scientifically and acted upon (Mara *et al.* 2010), however this association had been observed earlier during the 18th century (Keith-Lucas 1954)

The result of this report was threefold. First, in 1844 the Health of Towns Association was founded as a cross party organisation with the purpose of lobbying for changes to public health legislation, and was active in most cities, including London, Liverpool, Manchester, and Birmingham (Hamlin and Sheard 1998; Jones 2000). Secondly, the first Medical Officer of Health was appointed following a private act of parliament in the City of Liverpool in 1847, and the same position was created in London soon after (Jones 2000). Thirdly, following years of lobbying by the Health of Towns Association to implement the suggestions made by Chadwick and his colleagues in the Sanitary Report, the Public Health Act was passed in 1848 (Walls *et al.* 2012)

This Act introduced the General Board of Health which had Inspectors who would perform public inquiries into the sanitary conditions of towns, including the state of sewerage, drainage, and water supply (The Public Health Act 1848). On the face of it, this Act appeared to be taking great strides towards improving the health of towns and



cities, thus improving both public health and the lives of individuals. However, the Act was permissive, meaning that it required formal adoption in each separate area rather than being a blanket cover order (Jones 2000). Furthermore, the General Board of health had very little power, only given a supervisory role (Walls *et al.* 2012) with permission to intervene in an area only after a public petition or a high mortality rate, and it was also underfunded (Jones 2000). Despite these setbacks, Chadwick organised and led a team of investigators who toured the country and succeeded in bringing around 200 areas under the operation of the Act (Jones 2000). The ultimate issue, however, was the staunch belief in miasma theory held by Chadwick, which identified noxious smells as the presence and transmission of disease (Halliday 2001). In 1853, a new outbreak of cholera hit London, and Dr John Snow found that there had been 89 deaths in one week from an area in Soho, and subsequently persuaded the parish council to remove the handle from a popular water pump located on Broad Street (Newsom 2006). On doing this, Snow noted that the cases of cholera in the area were reduced significantly, and in the eyes of the government this suggested that the very changes made by the 1848 Public Health Act to introduce water sources to cities had actually caused widespread damage to public health (Jones 2000). Of course, in reality this was not the fault of the Act, but of the Vauxhall waterworks company which was subsequently found to be drawing their water supply directly from the Thames (Snow 2002).. Following these revelations, Chadwick and his colleagues were dismissed and the General Board of Health was eventually abolished in 1858, replaced by the Sanitary Act of 1866 with direct responsibility of municipal authorities for dealing with public health issues (Sanitary Act 1866; Jones 2000). Additionally, the Royal Sanitary Commission of 1869-71 found that no provincial cities in Britain had built the sewer systems intended by the Public Health Act of 1848 in the 20 years since the legislation had been enacted (Szreter 2003)

Although officially disbanded and deemed a failure, the work of the Poor Law Commission by Chadwick, Kay, Arnott, and Southwood Smith was effectively the start of the public health movement in England (Jones 2000). The 1866 Sanitary Act intended to decentralise the health administration system by allowing local authorities to make decisions without referral to the central board (Sanitary Act 1866). However, in practice the Act allowed the Local Government Act Office (LGAO), the new body responsible for public health, to become involved in local sanitation issues, sending out inspectors for even the most trivial of cases (Lambert 1962). This was because the Act deemed that central government could take action if local authorities failed to successfully improve sanitation (Lambert 1962). One issue with this was that, although responsible for preventing dangers to public health, neither the LGAO nor local authorities gathered any data on mortality statistics, and as a result were in total ignorance about the most prevalent causes of death or any trends relating to disease (Szreter 1991). To surmount this issue, the General Register Office (GRO) of the British Government voluntarily began collecting information on mortality from 1837, and compiled annual statistical reports of the data (Szreter 1991). William Farr, a British statistician, used these reports to help foster a competitive atmosphere between local authorities, when in the mid-1850s he developed the concept of the 'Healthy District', which was a desirable national standard of mortality that all local authorities should aspire to meet (Szreter 1991).

### **9.1.2.2 Changes Occur**

In the high temperatures of June of 1858 the River Thames, which had been somewhat short-sightedly designated by Chadwick as the main sewage disposal method for the city, began to smell (Jackson 1971). What followed became known as 'The Great Stink' and, due to its location on the banks of the river, the houses of Parliament at

Westminster received the brunt of the smell. The Stink was debated in the Commons and within a month the government had given full authority to the Metropolitan Board of Works to proceed with a sewage disposal plan (Jackson 1971). The result was the Public Health Act 1858, which abolished the Central Board of Health and transferred powers and responsibility to local boards (Lumley 1859), and the Great Sewer Project which raised huge public alarm at the £3 million cost (Black 2008). However, an outbreak of cholera in 1866, the year after completion of the Great Sewer Project, spared much of London but killed many in the part of the East End which had remained unconnected to the new sewers, and provided epidemiological evidence of its efficiency (Jackson 1971). Another government commission in 1884 reported that sewage was found as far upstream along the Thames as Greenwich, and the Metropolitan Board of Works finally took action (Jackson 1971). By the mid-1890s London County Council introduced five boats which would transport the waste of London's sewers to the coast of Essex, where the filth would be dumped out at sea (Jackson 1971). The result of all the commissions, reports, projects, and pounds meant that by the very end of the 19th century the waters of London were mostly clean and sanitation was much improved.

Despite the great expenditure on sanitary works and the evidence from doctors and commissions, the transformation of the urban living environment with sewers and fresh water on tap for the wealthy and the poor alike took over 60 years to accomplish (Black 2008). This was largely due to the responsibility of water supply and sewerage construction on private companies, who saw no commercial benefits for providing clean water and sewage disposal to poor areas for people who could not pay (Black 2008). The successful development of sanitary cities was dependent less on the legislation enacted or the work of the government, and far more on the actions and lobbying of individuals such as Chadwick, Farr, and Drs Kay, Arnott, and Southwood Smith, and

organisations such as the Health of Towns Association and the GRO. The decades that it took for even basic sanitation to appear, particularly in the homes of the poor, highlights the strength of *lassaiz faire* attitudes in government at that time, which prevented government intervention with regards to public health because it would interfere with private water and sewerage companies. The technological and medical knowledge regarding how such sewage systems would improve public health in towns and cities was well known since the 1840s (Haines and Shlomowitz 1998), but it required decades of work to motivate the government in providing such a system (Szreter 2004b; Szreter and Woolcock 2004). Szreter and Woolcock (2004) claim that in some instances it was the effect of Victorian religious morality which finally caused the wealthy to generate provisions such as the sewage system for the greater good of the general population. Whatever the reason for the eventual improvements in sanitation during the 19th century, as Szreter and Woolcock (2004) conclude, science and technology alone are rarely persuasive enough to convince those in power to introduce costly and time-consuming policies which improve the living conditions of the population.

### **9.1.3 The Factory Acts**

Although today it is difficult to imagine children as young as five years of age working in the dangerous conditions of the industrial factory, many children in the 19th century were employed in such roles (Humphries 2013). This was a reality which did not change for much of the 19th century, despite commentary from factory inspectors that the children employed therein were noticeably unhealthy. For example, in a report to the Secretary of State for Home Department in 1836, factory inspector Leonard Horner declared himself “very much struck by the diminutive stature of many of the children”

(House of Commons Parliamentary Papers 1836, 42). Factory inspectors and commissioners worked hard to improve conditions, but it was not until the 1880s that any significant change to childhood experience was made.

### **9.1.3.1 Attempts by Commissioners**

The factory question was first raised seriously in both Parliament and the public consciousness during the 1830s, and reform was one of a number of issues and campaigns which were active at that time (Gray 1996). In particular, there was growing concern about the employment of young children in Northern mills (Golding 2004), which had continued despite earlier factory legislation introduced by Sir Robert Peel in 1802 which failed to do much to prevent the shocking abuses of children in such occupations (Grant 1866). The sudden interest in the factory question during the 1830s and 1840s was again due to the rapid growth in popular agitation, such as the Chartist movement, primarily from factory operatives employed in the cotton mills and woollen industry of Lancashire and the West Riding of Yorkshire (Marvel 1977).

The first effective Factory Act was passed in 1833 following the evidence supplied in the Report of the Select Committee on the Bill for the Regulation of Factories (House of Commons Papers 1832). This work was largely influenced by M.T. Sadler, MP for Leeds, who was a critic of factory conditions and who intended the report to be an attack on the system and a defence by the factory owner, but the defence was never supplied (Nardinelli 1980). The report consisted of recorded interviews with witnesses within the factory sector, but Sadler specifically chose those who would testify according to his own motives (Nardinelli 1980). For example, Sadler chose individual factory owners and workers who were willing to testify about child beating and other horrific aspects of working life in industry, and presented these incidents to the public

as occurrences which were universal within factories (Nardinelli 1982). This Report was designed to present life as a factory worker from the worst possible angle, and although it was clearly biased testimony it still had huge influence on the legislation. Because Sadler's committee had failed to include any form of defence from the factory owners in his report, a new Royal Commission, lead once again by Edwin Chadwick, was created to gather further evidence from manufacturers (Marvel 1977). Subsequently, the leader of the Whigs, Lord Althorpe, introduced a bill to Parliament in 1833, and Marvel states that the resulting Act went against the argument made by the Royal Commission- that placing restrictions on child labour would be damaging to the adult workforce (Marvel 1977). However, on close reading of the Act itself, it is clear that this was not the position of the Commission. Although the Commission warns against the implementation of a Ten Hour Bill, legislation which was being championed by factory workers, Chartists, and some benevolent MPs, this was not because the Commissioners wanted children to continue working these hours, but because, they argued, reducing working hours to ten *was not enough* (Tooke 1833). From their inspections and interviews in factories around the country, the Commissioners found that "the effects of the labour during such hours upon children in numerous cases are – 1. A permanent deterioration of the physical constitution, and the production of various diseases often wholly irremediable. 2. Exclusion from the means of obtaining education, elementary and moral, or of profiting by those means by reason of excessive fatigue" (Tooke 1833: 52). Due to the age of these children, who were not choosing to work but were sent out by their parents and were prevented from keeping the wages they made, the Commissioners argued that it was proper for government intervention in this case (Tooke 1833), presumably to ward off complaints from proponents of *laissez faire*. After presenting all of their evidence for the working conditions of children, the Commissioners concluded that "The restrictions we venture to propose with regard to

children are, that children under nine years of age shall not be employed in mills or factories, subject, however, to the considerations herein-after stated. That until the commencement of the fourteenth year the hours of labour during any one day shall not in any case exceed eight. That until the commencement of the fourteenth year children shall not in any case be allowed to work at night ; that is to say, between the hours of ten at night and five in the morning” (Tooke 1833: 52).

The resulting Bill was enacted, entitled ‘An Act to Regulate the Labour of Children and Young Persons in the Mills and Factories of the United Kingdom’, and revolved entirely around the working hours and conditions of children (House of Commons 1833). The Act took on many of the recommendations and observations of the Commissioner’s Report, presenting in its opening statement the need for such an Act because of the impact that current working hours were having on the health and education of children thus employed (House of Commons 1833). In essence, the Act made it illegal:

- To employ children under the age of nine years in textile factories
- To employ a child under the age of 13 years without a certificate of health from a doctor
- For children aged 9-13 to work more than 9 hours a day
- For children aged 13-18 to work more than 12 hours a day
- For children under the age of 14 years to work at night

The Act also established factory inspectors, and compulsory education at the expense of the factory owner for every child employed (House of Commons 1833).

Although the changes made by the legislation were the direct result of a wide scale inquiry into the working conditions of such factories, and although they were clearly a step in the right direction in terms of improving the lives of children, ultimately this Act fell short of the mark for several reasons. Firstly, rather than abolishing child labour

completely, the Act only regulated it in the textile industry, due to the belief (and very real possibility) that families simply could not afford to give up the wages made by their children (Nardinelli 1980). Secondly, this Act did not apply to children working within silk manufacturers, which was in the top 20 occupations of children aged between 10 and 14 years during the 1851 census (Humphries 2013), meaning that the new rules did not apply to many children affected by such working hours and conditions within factories. Thirdly, small children did not play a particularly important role in textile factories, representing only 2% of the work force in every textile industry except silk (Nardinelli 1980).

The newly established factory inspectors began to enforce the legislation within the Act, reducing the number of children employed in textile factories from 56,000 to 33,000 between 1835 and 1838 (Nardinelli 1980). Over the following decades further legislation was released according to the findings of reports into factory conditions, including the 1844 Act which introduced some of the first health and safety regulations (Bartrip and Fenn 1980), the Factory Acts of 1840s, 1860s, and 1870s introduced further restrictions on working hours and terms of employments for adults and children until the 1891 Act which raised the minimum age for employment in factories to 11 years (UK Parliament 2017d). The result was that as the century progressed fewer children were used in the workforce, particularly after the 1867 Workshop Act restricted similar work hours in jobs outside of the factories and the Education Acts of the 1870s and 1880s introduced compulsory schooling (Nardinelli 1980).

Similar to the advancement of public health during the 19th century, improving conditions for working children took around 80 years from early legislation introduced by Sir Robert Peel in 1802 (Grant 1866) to the removal of children from the workplace



to schools in 1880 (Sheldon 2007). Despite evidence from commissioners about the appalling conditions that young children faced within factories and the detrimental impact on their health, government reaction was, once again, slow in making any comprehensive changes to legislation.

#### **9.1.4 The Inspector and 19th Century Legislation**

The 19th century in Britain witnessed huge changes to political infrastructure and administration, led at first almost entirely by the determination and efforts of Benthamites like Edwin Chadwick and Nassau Senior. After the overhaul of the Poor Law administration in mid-1830s, the subsequent introduction of enforcement officers and inspectors became routine appointments for new government departments (Parris 1960). When other services and administrative bodies were created, they were modelled on departments which had gone before, such as the Poor Law Board. For example, when the Education Committee of the Privy Council was founded, it was organised by Kay-Shuttleworth who had been previously employed by the Poor Law Commission, and he used this experience in creating the new department complete with inspectors (Parris 1960). It was in this way that many new government departments and initiatives came under the influence of the Benthamite belief in central control, even after Benthamites such as Chadwick ceased to play a role in their development.

The common feature for all of the legislation discussed above is the role of inspectors and commissioners in the development of policies designed (supposedly) to improve conditions for the population in various ways. Although the reports of commissions and inspectors did play a role in the development of legislation, some have argued that inspectors in the 19th century were hopelessly ineffective. Bartip (1982) argues that due

to minimal funding and low numbers of inspectors in comparison to the factories and mines that they were responsible for, government inspectors had very little impact on policy and their importance has been exaggerated by historians. For example, after the 1842 Mines Act introduced a ban on all women and boys aged under 10 years working underground, the Home Office appointed just one inspector to visit all of the mines and collieries to report upon the conditions of the workforce and to enforce the new regulations (Bartrip 1982). Similarly, Bartip quotes that in 1844 the ratio of inspectors to factories was 1: 263 (Bartrip 1982: 613). Clearly these roles would take many hands and would have been far beyond the accomplishment of one person. However, Bartrip bases this conclusion that 19th-century parliamentary inspectors had little influence on evidence from the inspection of factories and mines. But factories and mines were industries with private ownership, and in the century of *laissez faire*, government action within economic enterprises such as these would have been seen as highly interfering. Many of the commissions which employed inspectors were responsible for government funded and centrally organised bodies, such as workhouses, public health organisations, and educational facilities. The hesitation which may have been felt in cases where the government was intervening in private enterprises is unlikely to have existed to such an extent in the case of government funded institutions.

This is not to say that inspectors always improved conditions when they found them lacking. As we have already seen, changes were only made to conditions within English workhouses after the appointment of Gathorne Hardy as President of the Poor Law Board and years of campaign by charitable organisations, and sanitary improvements took decades beyond the 19th century to see hygienic conditions for the majority of urban populations. Slums still existed in British cities as recently as the 1970s, particularly in large cities such as Birmingham and Manchester, and a recent exhibition

by photographer Nick Hedges exposed the poor living conditions of many families at that time (Hedges 2014). This collection of black and white images, although taken less than 50 years ago, is heavily reminiscent of scenes captured in the slums of 19th-century cities. However, there is a difference between the impact on regulations and the impact on real conditions. For example, although some workhouse inspectors may have failed to improve conditions for sick paupers within such institutions, other did make recommendations for improvements which were received and implemented by Guardians (Fowler 2014). From such inspection reports, it is possible to see evidence of efforts made to improve the organisation and environment of government led institutions, and this is particularly visible in school inspections from the 1880s (see chapter 7.2.4).

Inspectors were not the only source of information that the government used in the creation of new legislation. Before any Bill was drafted, the government frequently created a Royal Commission to examine the current situation in any given case, whether it be workhouse conditions or the treatment of prisoners, and to make recommendations for changes in a subsequent report. Although not defined as inspectors, this was essentially the role of such commissioners as they conducted their investigations. Much legislation, such as the Poor Law, the Sanitary Act, and the Factory Acts, began with such a report from commissioners and legislation, such as those in the Factory Act of 1833, were taken directly from these recommendations. Ultimately, conditions for workers, children, paupers, prisoners, and the population were significantly improved as the 19th century progressed, improvements which would not have been possible if the government had not been consistently lobbied by organisations and provided with irrefutable evidence from their own commissioners. Without the efforts of these individuals and organisations, the government would likely have continued to pass blind

legislation which did little to effect real change. The improvements we can see in aspects of life from sanitation to conditions within the workhouse, show the impact that inspectors, commissions, and charities had through their reports and actions. However, the resulting benefits from these tireless campaigners took far too long to come into effect, often due to the slow reaction of the government.

## **9.2 Inquiries and Surveys**

Evidence presented in the preceding chapters for current approaches to improving nutritional health in the UK suggests that many policies are developed without regard for information and recommendations provided by medical experts and by government committees. Furthermore, once modern policies are implemented, they are rarely followed by evidence-based reviews of their effectiveness or their progress. The 19th century was a period of surveys, inquiries, commissioner reports, and lobbying, much of which directly influenced legislation and led to the development of improved conditions and services for the general public. However, there were many occasions in the 19th century when recommendations were ignored by policy makers, for instance the struggles of assistant commissioners and charitable bodies to improve workhouse conditions, and the many decades of delays allowed poor conditions and poor health to continue for much of the population. The development of modern policies appears little changed, and there seems to be no incentive for government departments to take recommendations from knowledgeable parties or to monitor the impact of their own policies. The following sections will examine the role that evidence and recommendations have in modern policies, as well as the methods that the government has in place to measure outcomes.

### 9.3 The Government's Plan for Action- Brave and Bold?

A major challenge in the UK which has been highlighted in recent years is the prevalence of childhood obesity, and the 2015 Health Committee conducted an inquiry on aspects of this issue, creating recommendations for government action as a result. The Committee published their findings in a report, 'Childhood Obesity – Brave and Bold Action' (The Health Committee 2015), within which they made the following recommendations:

- Introduce mandatory controls to reduce the number of price promotions for unhealthy food and drink in all retail outlets.
- Restrict advertising and marketing aimed at children.
- Extend current restrictions on advertising to apply to all forms of media, including online, in print, on television etc.
- Tighten loopholes around the use of cartoon characters and celebrities in children's advertising.
- Reform the current nutrient profiling system (in 2015 breakfast cereal containing 22.5% sugar did not fall within definitions of high fat, salt, or sugar food and could therefore be advertised to children).
- Reformulate food with a gradual reduction of sugar in every day food and drink products, as well as calorie content and fat levels.
- Introduce a cap on portion size for food and drinks in retail and entertainment sector.
- Introduce a tax on full sugar soft drinks.
- Create a new labelling system showing the teaspoons of sugar that a product provides for a clear and useful visual representation.
- Introduce clear nutritional guidelines for school food, including standards recommended for packed lunches and for school meals. Ensure that these standards also apply to free schools and academies.
- Introduce a change in planning legislation to simplify the process for local authorities to limit the number of unhealthy food outlets in local areas.
- Protect funding for the National Child Measurement Programme.

(The Health Committee 2015: 45-48)

The government's response to the findings of the Health Committee's inquiry suggested that they already had an awareness of most of the points made, and repeatedly stated

that action was due to be implemented in the new plan 'Childhood Obesity: A Plan for Action' (Department of Health 2016).

The government's Childhood Obesity Plan did introduce several new approaches to reducing the levels of childhood obesity. By 2018 they aimed to implement a soft drinks levy on producers and importers to encourage them to reduce the amount of sugar in their products (HM Government 2016). The revenue raised from this levy would be invested in programmes to reduce obesity and encourage physical activity and healthy diets for children, by funding the Primary PE, Sport Premium, and healthy breakfast clubs in schools (HM Government 2016). As discussed in Chapter 8.3, the food and drink industry was challenged to remove at least 20% of sugar from a range of products by 2020 using a voluntary programme led by Public Health England (HM Government 2016). The progress of this programme was intended to be reviewed by Public Health England with reports every six months, and if there had not been sufficient progress by 2020 the report stated that "we will use other levers to achieve the same aims" (HM Government 2016: 5). Through Innovate UK, the government introduced a research and development competition worth £10 million to stimulate research into increasing the availability of healthier food choices (HM Government 2016). Public Health England was commissioned to develop a new nutrient profile to reflect modern dietary guidelines, food availability in public spaces such as hospitals and leisure centres would be designed to increase access to healthy choices, and the Healthy Start scheme which provides food vouchers for fresh fruit, vegetables, and milk to families on low incomes would continue (HM Government 2016). In addition to this, the government aimed to improve intervention in schools and early years by increasing the time available for physical exercise with additional funding for PE and Sport Premium, as well as new investment into the Sport England Strategy 'Towards an Active Nation' which offers

opportunities for families to be active together (HM Government 2016). A healthy rating scheme for primary schools was intended to be introduced in September 2017, with Ofsted undertaking reviews, and new school food standards would be updated in the light of new dietary recommendations (HM Government 2016). Finally, health professionals were to be encouraged to speak to families and parents about diet, and to refer people to weight management services if necessary (HM Government 2016).

Despite the inclusion of the strategies in the Childhood Obesity Plan, originally due in autumn 2015 but eventually published in August 2016, it was met with disappointment by childhood obesity campaigners, public health experts, and the Health Committee alike (The Health Committee 2017). Several of the recommendations made by the Health Committee in their report (2015) were not included in the government plan, and other recommendations were not implemented to their full extent. In their follow-up report, the Health Committee outlined each area included in the government plan and to what extent their recommendations had been implemented in each case (The Health Committee 2017). Plans to introduce a levy on the manufacturers of sugary drinks were included, as recommended by the Health Committee, but no measures were implemented to ensure that the price differential between high- and low- or no-sugar drinks was being passed on to the consumers (The Health Committee 2017). The danger of this is that companies could choose to subsidise their costs from the levy by charging more for low- or no-sugar drinks, essentially forcing the consumer to pay more for healthier products (The Health Committee 2017). Furthermore, this levy does not apply to milk based drinks, even those with added sugar (The Health Committee 2017).

The Childhood Obesity Plan also failed to set out policy proposals which the government is prepared to implement in the case that voluntary reformulation of food

and drink products is not effective in tackling childhood obesity (The Health Committee 2017). Despite talk of introducing “levers” to reduce sugar if the voluntary reform fails, the report did not clarify what these would be. The Health Committee argued that the government should be prepared to place a cap on portion sizes (based on calorie content) if the voluntary measures are not effective (The Health Committee 2017). Furthermore, there was no attempt to regulate the discount and price promotion culture surrounding unhealthy food and drink by retailers, and a key recommendation by the Health Committee to amend planning legislation so local authorities can limit unhealthy food outlets was not included at all (The Health Committee 2017).

Despite calls for “brave and bold” action, much of this plan remained vague, with little indication of how many of the aims would be met. Particularly troubling was the lack of a goal for the government, for example an aim to reduce childhood obesity by 10% by 2020. Without this, measurements taken on the progress of the plan, unless a very large reduction occurred, would exist outside of any context which could suggest success or failure. Furthermore, without assessment of the actions included in this plan, there is no way to tell which method has the most effect, and which could be cut or reduced to free up funding for more successful approaches.

Three years after the original Childhood Obesity: A Plan for Action report was published a target was finally outlined in chapter 2 of the plan released in 2018 – to halve obesity by 2030 (Department of Health and Social Care and Global Public Health Directorate 2018). However, this second report did not comment on whether any reduction in childhood obesity had occurred since the introduction of the original plan, and there is no suggestion of monitoring obesity levels in connection with the plan until the target year of 2030. The second chapter of the Childhood Obesity Plan was



produced after the original plan faced fierce criticism from many medical professionals and organisations, yet it failed to introduce any immediately actionable items. Instead the report points to further consultations and considerations of actions, many of which were already recommended by the Health Committee in 2015, but were not included in the original plan, such as the ban on advertisement and in-store promotion of junk food and more powers to local authorities to control unhealthy food outlets (The Health Committee 2015; Department of Health and Social Care and Global Public Health Directorate 2018). This second chapter of the Childhood Obesity Plan soon received further criticism from public health campaign groups, with Tam Fry, chairman of the National Obesity Forum, a charity concerned with raising public awareness of obesity management, quoted as saying “We’ve had all the consultations we need, what we need now is action” (Packham 2018).

As we have already seen, the success of childhood obesity plans are not the only aspect of public health that the government has failed to monitor. As previously mentioned in Chapter 6.3.2, the Infant Feeding Survey was discontinued after the 2010 round, and currently, the only measures of breastfeeding prevalence rates for the UK are for breastfeeding initiation and data at 6-8 weeks (Royal College of Paediatrics and Child Health 2017). Organisations such as the Royal College of Paediatrics and Child Health have called on the government to reintroduce the Infant Feeding Survey (Royal College of Paediatrics and Child Health 2017), but there has been no focus on breastfeeding by government reports from the last seven years. The one frequent measure of child health, the National Child Measurement Programme, only discerns trends in childhood obesity, meaning that information about other aspects of nutritional health – such as nutrient intake – are neglected. A child with nutrient insufficiencies will not necessarily be under or overweight, particularly considering the so called “empty calories” of many modern

food products, which provide energy but have little nutritional value. For the reasons discussed in Chapter 3, we should be more concerned about the sufficiency of childhood nutrient intake than government plans suggest.

## **9.4 The Plan for Inaction**

In the 19th century, examples of when recommendations made by Commissioners into particular topics were not followed in subsequent Bills and Acts show the huge delays that can occur as a result of ignoring evidence-based policy. Today, little appears to have changed in the prevalence of evidence uptake for policies, as the reports from the Health Committee failed to be heeded in full, similar to how reports in the past were half-implemented, such as the case of the 1838 Factory Act. Today, surveys of dietary intake are performed (NDNS, LIDNS), but much like the reports of investigators such as Edward Smith, Charles Booth, Joseph Rowntree, and the Poor Law Commissioners into dietary habits, little has been attempted or achieved by the government to introduce new policies based on such information. For example, despite the conclusive evidence that childhood obesity is associated with income, there has been little discussion of this issue, nor has there been any plan to specifically target obesity reduction within low-income families. Instead, there remains uncertainty about the future of current approaches which could combat obesity among low-income children, such as the insecurity of free school meals under the new Universal Credit system (Chapter 7.3.1). These changes to the system of free school meals and the distribution of the benefits system reflect the current climate of austerity and cuts which have been undertaken in the UK in recent years. Despite the argument that austerity is required for the good of the economy, historical evidence suggest that such cuts to welfare, such as the NHS and the benefits system, are detrimental to economic growth. Szreter *et al.* (2016) argue that

throughout British history, periods where welfare has been well supported have seen economic growth, whereas those times when welfare faced cutbacks have seen downturns in the economy. An example of this is the change from the Old Poor Law, during the period of which saw a period of large economic growth, to the deterrence system of the New Poor Law, which was followed by a drop in Britain's gross capital product (GDP) (Szreter *et al.* 2016). Szreter *et al.* (2016, 2735) conclude that "this country's [Britain's] history shows that long-term prosperity has been served best when the interests of the poor and the wealthy are not mutually opposed in a zero sum game. Investment in policies that develop human and social capital will underpin economic opportunities and security for the whole population". However, in recent years these important lessons from history have been lost to policymakers, particularly since the 1980s and 90s (Szreter 2004a).

During the 19th century, progress did occur to improve health and living standards in England, but such progress was painfully slow due to the varying levels of response and commitment from the government. In 21<sup>st</sup> century Britain, there can be no defence of this. Committees are formed of qualified and experienced members of all government parties, our data is accurate and better understood, we have a far more sophisticated understanding of both statistics, the complicated factors behind ill health, and the role of nutrients in the body, and it is far easier to implement standardised policies and to convey information across the whole country. Furthermore, the UK currently has the 25th largest nominal Gross Domestic Product per capita (International Monetary Fund 2017), a measure which indicates that we are among the wealthiest countries in the world. Unlike the government of the 19th century, who were somewhat limited by their knowledge of disease transmission and nutrients, we are now fully aware of the situation regarding public dietary health. For example, concern about the levels of

public obesity in Britain have been acknowledged for decades, with the doubling of obesity rates between 1980 and 1991 (Prentice and Jebb 1995), yet the problem continues on an unprecedented scale. Government response to low breastfeeding rates, large inequality in nutritional health between socio-economic deciles, and concerning levels of nutrient insufficiency, is at odds with our extensive knowledge of these topics and the many recommendations made by health researchers and committees. This criticism is not confined to the policies of the current Conservative government, nor even to the previous Conservative and Liberal Democrat government. All three major parties, Labour, Conservative, and Liberal Democrats, have had opportunities to influence change in public nutritional health during their most recent time in government, yet there continues to be no comprehensive, clear, evidence-based plan of action to tackle nutritional health issues.

#### **9.4.1 The Unexamined Policy**

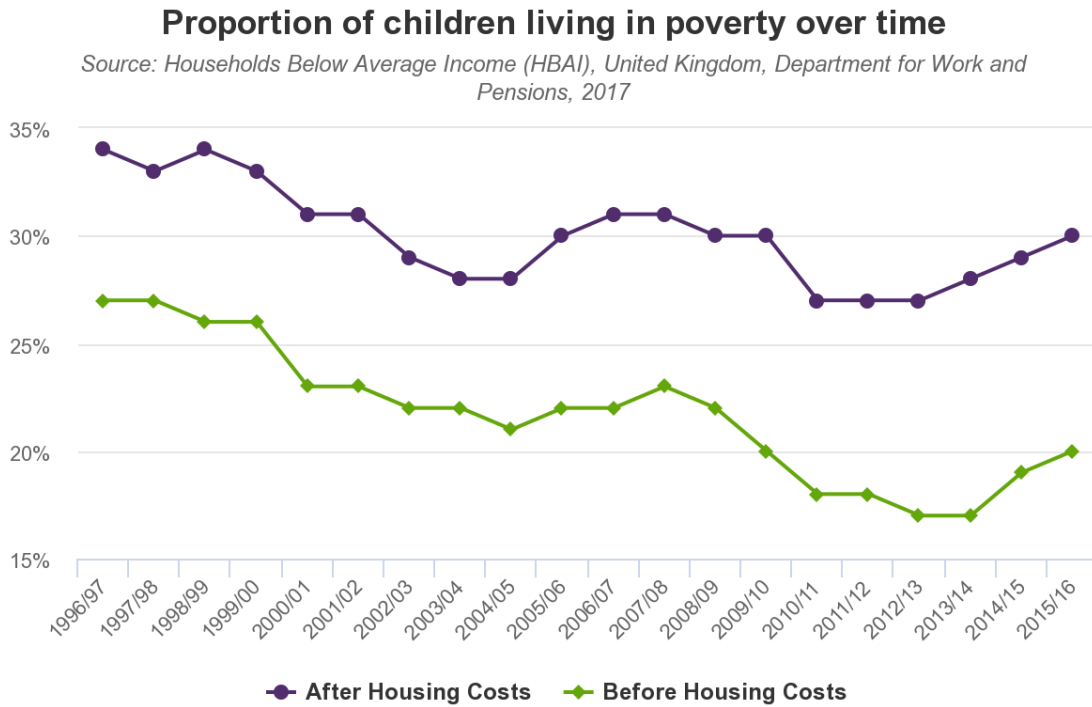
In 2008 the Public Administration Select Committee released a report detailing their examination of whether Parliament should have the power to initiate and conduct inquiries into matters which are of a significant concern to the public. In its interviews with members of the House of Lords, the report states:

Our witnesses agreed that it would be difficult to set up a Parliamentary Commission of Inquiry – whether into Iraq, or into another issue – because of party loyalism and whipped votes in the House of Commons. In all but the most extraordinary of circumstances, the governing party would be able to prevent any inquiry it did not want to see by using its majority to defeat any vote to set one up. This is particularly likely to be the case where an inquiry is politically

inconvenient or embarrassing to the Government. Lord Hurd noted that "...it is precisely the role of the party and the strength of that role which is inhibiting the House of Commons from doing what in the 19th Century it did almost as a matter of course" (The Public Administration Select Committee 2008: 6).

Lord Hurd made it clear that inquiries which are "politically inconvenient or embarrassing" to the government may be prevented by peer pressure, partly loyalism, and the possibility that "bringing down a Prime Minister might lose you your seat in an election" (The Public Administration Select Committee 2008: Ev 12, question 40). This response poses the question of whether reluctance to perform strategy reviews could in part be due to political circumstances. No individual, department, or government would wish to admit that an expensive plan to tackle public health issues had failed to provide any results, particularly in a political climate where failure is frequently used by the opposition to highlight and present damaging failings to the public.

For example, in 2011 the government developed a new strategy following the Child Poverty Act 2010 which presented a framework to *end* child poverty in the UK by 2020 (Department for Work and Pensions and Department for Education 2011). This target to reduce child poverty was then scrapped by the Conservative Government in 2015, and replaced with a reporting system which focuses on life chances (Child Poverty Action Group 2018). However, figures released by the government in 2017 show that there has been an *increase* in the number of children living in poverty since 2012 (as defined by an income below 60% of the median) (Figure 9.1). The government now has just three years to fulfil its aim to eradicate child poverty which is unlikely to be achieved.



**Figure 9.1** The trend in childhood poverty over time, according to households with incomes below 60% of the median.

A cynic might point to the absence of a goal in the original report of the government plan to tackle childhood obesity (HM Government 2016) as an attempt to reduce the possibility of failure, since not setting a target removes the potential to measure a failing policy. This position is strengthened somewhat by the discovery made by Channel 4's *Dispatches* in 2016 that the original draft of 'Childhood Obesity: A Plan for Action' stated that it was aiming for 800,000 fewer obese children by 2026, which would halve the current childhood obesity figures, a target which was later removed in its entirety from the published report (The Health Committee 2017).

In the follow-up report by the Health Committee (2017), the question of the missing target for reduction in childhood obesity was put to Nicola Blackwood, then

Parliamentary Under Secretary of State at the Department of Health, who gave the following reply:

In all our discussions and communications about that, we have been clear that our modelling on the plan expects the plan in aggregate to lead to a reduction in childhood obesity of up to 20%, but if I am honest I do not think that will be the measure of success for the plan. The measure of success for the plan will be a change in our relationship with sugar, fats, and high-calorie foods

Blackwood was then asked what, in her opinion, she would like the 2025 statistics on childhood obesity to be, to which she replied:

“I do not think about it in terms of stats.” (The Health Committee 2017: 33).

Regardless of whether the government wishes to consider statistics or not, with no plans or methods to measure success in rates of breastfeeding, childhood obesity, and school programmes encouraging healthy eating choices, and no specified targets, a position has been achieved where failure is technically and statistically an impossibility, since there is no level or method by which success can be measured.

In the 19th century whether a plan was successful or not was not such a problem for two reasons. Firstly, few citizens had the right to vote, so failures in the system which affected them had far less impact on chances of a party's political success (Szreter 2004a; Szreter and Woolcock 2004). Secondly, inquiries which were made were available only in hard copy, thus were not easily attained. This means that even when the government did fail, unless the press discovered a scandal, the public would not necessarily know how legislation had turned out. This is well illustrated by cases

discussed earlier in Chapter 9, such as the workhouse series published by the Lancet which led to a full investigation of infirmary conditions by the Poor Law Board. However, in today's world of interconnectedness and information, practically everyone in the developed world can access UK Government documents and see for themselves what the reports say. Szreter (2003, 423) argues that, much like the 19<sup>th</sup> century, vested interest acts to stunt progress in modern public health measures stating that "because so many of the innovative practices and products sanctioned by the criteria of profitability and shareholder value, can never be fully assessed in advance for the totality of their health implications, the public health movement inevitably finds itself in conflict with often-powerful commercial interests".

A potential reason for the hesitation of the current government to implement strong policies to promote public health improvements is the right to autonomy that all individuals have to care for themselves without interference. This idea of autonomy is in some ways reminiscent of the 19th-century fixation with *laissez faire*, and today the UK is frequently accused of being a "nanny" state, with claims that the government interferes too much in the lives of citizens (Calman 2009). This is not an accusation that the government takes lightly, and there have been thorough ethical investigations into the limits of state power in people's lives. In 2007, the Nuffield Council on Bioethics, an independent body which reports on ethical questions raised by advances in medical and biological research, set up a working party to examine issues of public health (Calman 2009). This working body had three main aims for their investigation:

1. To identify and consider ethical, legal and social issues arising when designing measures to improve public health.
2. To consider, by means of case studies:
  - a. The variety of aims for such measures, such as informing individual choices and protecting the wider community, and their relative priorities;
  - b. The role of autonomy, consent and solidarity;



- c. Issues raised by decisions about, and perceptions of, risk;
  - d. The special situation of children and those who are poor or socially excluded.
3. To examine the implications of the above for the development of frameworks for policy making in public health.

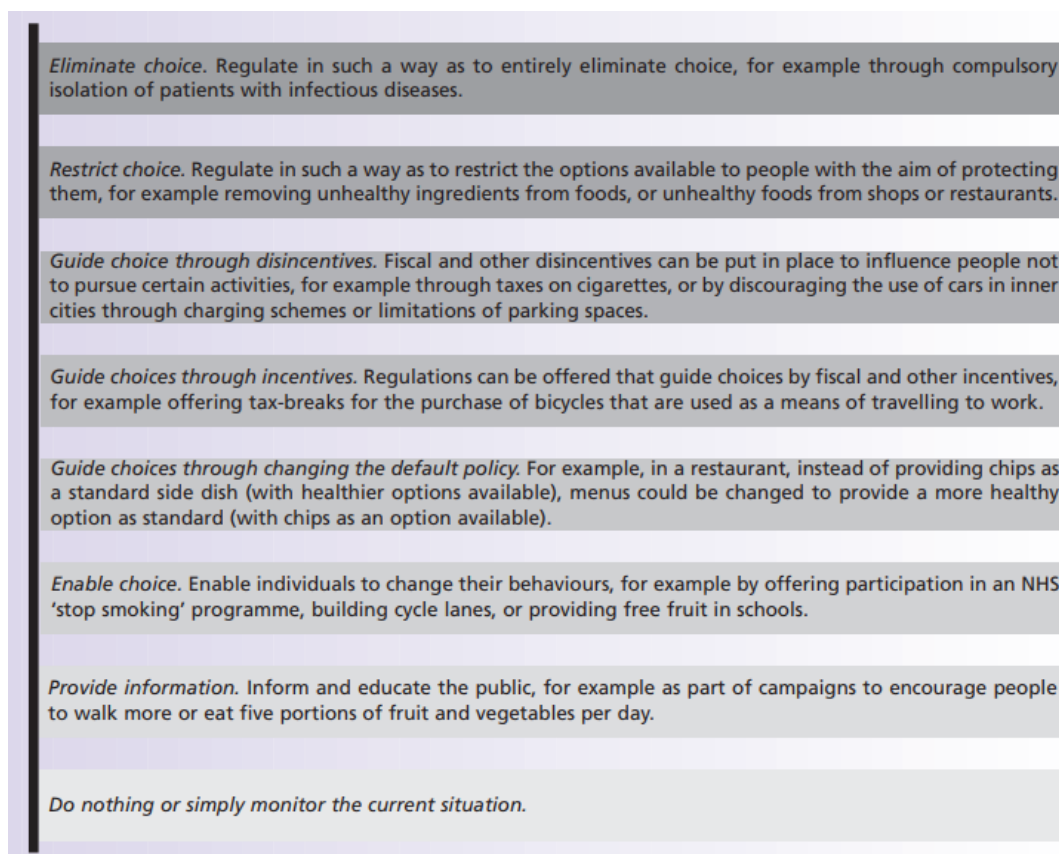
(Ali *et al.* 2007: x)

In the report the authors cite John Stuart Mill, who we have previously noted in Chapter 4.1.4, and his harm principle as one way to approach the ethical conflict which arises between public health programmes and the protection of citizen autonomy (Ali *et al.* 2007). In essence, Mill's harm principle states that the only occasion which warrants state intervention against the will of a citizen is to prevent harm to others, and that promoting moral or physical good is not a sufficient reason to permit state intervention against an individual's will (Ali *et al.* 2007). In other words, an individual cannot be forced to comply with the state in any situation other than when she or he has the potential to cause harm to others. The report itself admits that the harm principle does not provide a satisfactory answer to all the questions which arise when dealing with public health, but that the core principle does apply in ensuring the "greatest possible degree of individual liberty and the least possible degree of state interference" (Ali *et al.* 2007: 16). Instead of adhering to Mill's principle, the Nuffield Trust presents the stewardship model, which is described in the following way: "The concept of 'stewardship' is intended to convey that liberal states have a duty to look after important needs of people individually and collectively. It emphasises the obligation of states to provide conditions that allow people to be healthy and, in particular, to take measures to reduce health inequalities. The stewardship-guided state recognises that a primary asset of a nation is its health: higher levels of health are associated with greater overall well-being and productivity" (Ali *et al.* 2007: xvi-xvii).

Two points in the Nuffield Trust report which are particularly relevant for the topic presented in this thesis are the care of the vulnerable and obesity intervention. Both Mill

and other 19th-century political commentators (such as commissioners involved in the Factory Act 1833) argued that because children had no control over the choices made for them, it was the responsibility of the state to legislate on their behalf. The Nuffield Trust report defines vulnerable people as children, the elderly, the socially disadvantaged, and those without sufficient healthcare-related knowledge to act as autonomous citizens, thus suggesting that the state has a role to facilitate healthy behaviours through education, awareness, and access (Ali *et al.* 2007). In terms of obesity, the report concluded that businesses, particularly in the food industry, have an ethical duty to help individuals to make healthy choices, and where the market fails to uphold its responsibility, regulation by the government is ethical and appropriate (Ali *et al.* 2007). Furthermore, both the position of children as vulnerable individuals and the role of the government to facilitate healthy behaviours leads to the ethical justification for the state to intervene in the approach that schools take to promote healthy lifestyle behaviours (Ali *et al.* 2007).

Assessing what kind of intervention to undertake to improve public health but without excessive interference can be challenging for a government, and may prevent bold action being made. However, the Nuffield Trust report introduces a method for overcoming this issue, by using the ‘intervention ladder’ (Figure 9.2). The higher the ‘rung’ on the ladder, the more intrusive a policy is in individual freedom, and the stronger the justification has to be.



**Figure 9.2 The Intervention Ladder. Levels of intervention that the government can take in order to introduce changes or limit dangers in the population health (Ali *et al.* 2007, 42)**

Using this method of determining appropriate levels of intervention, it is clear that the government is not only acting ethically when promoting healthy eating behaviour to children, but has a duty of care to provide access, learning, knowledge, and guidance about diet to this vulnerable group.

For breastfeeding the situation is slightly different since, although it is the child's nutritional health, intervention also affects the mother who is an autonomous adult capable and entitled to make her own choices. This is where the rungs on the intervention ladder need to be reassessed as the intervention which is appropriate for improving nutritional health in children may not be suitable for promoting breastfeeding practice. However, the state does have a duty to ensure that *all of its citizens* have

knowledge about the practice so that they can make the best choice for themselves based on the evidence available. There is also a duty for the government to ensure that women are not made to feel unsafe or intimidated, and to protect citizens who would make the choice to breastfeed if it were not for factors stemming from the social stigma attached to such feeding practice.

Creating legislation which can improve adult nutrition without interfering in autonomy is possible, and hesitation by the government to introduce strong legislation may be unfounded when the issues are examined. Take, for example, the Health Committee's recommendation to introduce stronger legislation which would allow local authorities to enforce planning rules limiting the number of unhealthy food vendors in their areas (The Health Committee 2015). This suggestion made no appearance in the subsequent Childhood Obesity Plan developed by the government (HM Government 2016), which may be due to it appearing to be overly interventionist, meddling with businesses and consumer rights. But, by limiting unhealthy vendors in an area, local authorities provide greater choice in food availability to their citizens, since people could choose between healthy or non-healthy food outlets. Unhealthy vendors would still exist, but there would also be the opportunity for a growth in outlets selling healthy food options and would perhaps encourage businesses to improve the nutritional quality of their products. As discussed in 6.2.5, there is strong evidence to suggest that fast food outlets serving unhealthy food are far more prevalent in the most deprived areas of Britain, and as a result adolescents from low-income families are consuming more of such food than those from less deprived areas.

Autonomy is a critical aspect of an individual's life in a free democratic country, but it is not necessarily removed by the government facilitating healthy eating behaviour by

the methods it uses to improve public knowledge and to provide more opportunities for individuals to make healthy choices. It could even be argued that, in the case of public nutrition intervention, policies could improve autonomy as they increase people's knowledge and choices.

In their study of historical government legislation which intervened to improve public health, Walls *et al.* (2012) observe that public recognition of a crisis often occurred before legislative intervention, and this supports the arguments presented here for the role of lobbying during the 19th century. They state that “science consistent with reform policy helps, but science alone does not cause governments to act” (Walls *et al.* 2012, 100), and identified “tipping-points” where the overwhelming weight of evidence and public attention to a topic push the government into making effective legislative changes. Today the government has the means, methods, and knowledge to enforce effective changes targeting public health, and a framework also exists for discerning appropriate and ethical interventions. However, the slow responses to issues, the failure to incorporate recommendations in strategies such as the Childhood Obesity Plan, and the absence of measures for success suggest that the processes by which the government creates policies must change. Based on the examination of current and historical policies, one change which could potentially improve the effectiveness of future government plans and initiatives would be to introduce assessments of success and stated targets as compulsory components of future policies. The inclusion of measures and targets within future policies would improve transparency and introduce some accountability, which could lead to the more frequent use of evidence-based plans in policies.

Ultimately, government action has been slow to respond to reduce childhood obesity, improve children's nutrition, and increase breastfeeding prevalence rates. While there is ongoing action to deal with childhood obesity levels, this has been received critically by health organisations, and there remains little focus on issues of breastfeeding and nutrient intake. The danger of a slow response which disregards evidence provided by research groups is clearly shown through an understanding of the history of legislation in the UK to improve conditions within the workhouse, the urban environment, and in factories. However, the issues of today are perhaps more severe in terms of financial strain in the UK, since individuals who suffer from poor health are now treated by the NHS, and the growing health problems relating to diet and nutritional intake will result in huge costs in the future. To avoid the same mistakes that the 19th-century government made when dealing with widespread poor health of their time, the government in the 21st-century must strengthen their approach to the serious and extensive health issues facing us today, and accept recommendations made by evidence-based research.

## **Chapter 10 Conclusion**

This thesis explored current nutritional health policies in modern Britain by examining historical and archaeological evidence for nutritional health during the 19th century. Several different types of data were used to interpret nutritional changes and the factors that contributed to them, and because of the multitude of evidence, this research has several conclusions which are relevant to both history and modern public policy.

### **10.1 Fulfilment of Aims**

The main aim of this thesis was to explore nutritional health status in the 19th century and to use this understanding of past to analyse modern nutrition-related policies. To do this, it was necessary to engage in much historical research to determine trends in nutritional health changes over the 19th century, the factors which influenced nutritional health changes in the past, and differences in diet between 19th-century socio-economic groups. As a result, this thesis is heavily based on historical information because 19th-century nutrition is a topic which has received limited attention, and as such much of the detail presented here was reliant on original research.

This thesis presents evidence for the nutritional health and diets of 19th-century English populations, including children and those from high and low incomes. Modern policies concerning nutritional health were then examined in regards to the historical information, and several key areas were highlighted in which historical evidence would support a change in the policies currently employed.

## **10.2 Infancy**

The historical and archaeological evidence indicated that it was diet during childhood which led to equality between working- and upper-class nutritional health. Similarly, we know from modern research that breastfeeding improves the health of both the child and mother. As we have established, breastfeeding would have been common practice for many working-class women in the 19th century. The promotion of breastfeeding by male doctors with their physical examination of breasts, as well as the overcrowding and lack of privacy in working-class dwellings suggests that it is likely that this feeding practice had visual representation in the 19th century. This thesis argues that to increase breastfeeding prevalence rates it is the duty of the government to ensure that breastfeeding is accepted as a normal part of raising a child by developing visual representation of the practice and by offering information and advice to reduce anxiety over the method. This approach must be targeted at the general public at large, not just towards pregnant women, in order to reduce the hostility that many people feel towards breastfeeding. The most effective, far-reaching, and least invasive method to achieve this could be through the use of an advertising campaign. Furthermore the UK requires a new review into the advertising standards of formula feeding companies, something which is hoped will be produced by the All-Party Parliamentary Group on Infant Feeding and Inequalities.

## **10.3 Childhood**

Original data collected during research for this thesis provided insight into the changing height of working-class convicts across the 19th century. By placing this height data into its historical context, it became clear that the uptrend in stature after the 1880s was likely to be the result of legislation which introduced compulsory schooling and which



led to improved health in children. This historical evidence indicates that there is precedent for the role of schools in improving the nation's nutritional health, and the government's focus on healthy meals and education in schools is a good step towards improving public nutritional health. However, the government plan does have some flaws, in particular that the introduction of Universal Credit is likely to reduce the number of children eligible for free school meals and the recent suggestions to change the availability of free school lunches during the first three years of primary school indicate that the role of schools in promoting healthy eating behaviours may not be safe in the future. A further issue with the government's plans for schools is the unenforced and unexamined nutritional quality of food served in Early Years centres. In addition to these, the schools Healthy Rating Scheme which was intended to begin in September 2017 has yet to materialise, and there has been no indication for when this scheme may start. Government action on these issues has been slow and incomplete, and there is no sign of any action being taken in the near future.

The archaeological and historical evidence for rickets leads to another area of potential improvement, vitamin D supplements. Current eligibility for receiving free vitamin D supplements prevents many children in poverty from receiving healthy levels of this nutrient, which was found to be far lower in children from low-income backgrounds. In addition to this, the introduction of Universal Credit makes it unclear which children will still receive vitamin D in the future. Since this vitamin cannot simply be attained from a healthy diet, it may be necessary to introduce more inclusive rules regarding the entitlement that children have of receiving free vitamin D supplements.

## 10.4 Sugar and Fast Food

Another area brought to attention by the historical evidence is the low sugar levels in 19th century recipes, which suggest that it is possible to attain a healthier taste for sugar in our food. A gradual return to lower levels would see a huge reduction in the amount of sugar consumed by adults and children, but this is likely to only be possible through enforced and monitored regulation. It was not envisioned by either the author or by leaders in public health that the voluntary programme set out in *Childhood Obesity: A Plan for Action* would effectively and permanently reduce the population's sugar intake. The introduction of the April 2018 levy on sugar sweetened beverages was a good step towards reducing sugar intake. However, it does nothing to tackle the very high sugar levels in food, which has been shown to be more effective at reducing overall sugar intake than targeting drinks, and the effects of the levy on sugar consumption has yet to be determined.

Although nutritional health has improved since the 19th century, a gap in nutrient intake levels has been created between individuals from high- and low-income deciles. Whereas in the past, as our historical and archaeological evidence suggests, nutritional quality was similar during much of childhood and upper-class adults potentially experienced the detrimental impact of excessive calorie intake, today low-income families are at higher risk of poor nutritional health due to insufficient vitamin and mineral intake and increased levels of overweight and obesity. Despite this, there has been no attempts made in nutritional health policies to specifically target issues affecting low-income families, such as the higher prevalence of fast food outlets in deprived areas (see 6.2.5). The 2015 Health Committee report, *Childhood Obesity – Brave and Bold Action*, recommended that planning legislation be amended to allow

local authorities greater control over the number of fast food outlets in local areas (The Health Committee 2015). Although there is plenty of research which shows the prevalence of fast food outlets in disadvantaged areas, as well as research which suggests that low-income teenagers are consuming more fast food than teenagers from less deprived areas, there has been no action to tackle such inequality. This is perhaps due to the reluctance of the government to intervene in private businesses, which leads to the final section.

### **10.5 Political Responsibility**

The government's current approach to reducing nutritional health issues are policies and actions which are unenforced, or have no method of progress measurement, and no targets, and which do not always take on board recommendations made by public health experts. This approach is reminiscent of 19th-century legislation, which frequently took only partial notice of the reports from Commissions and Inspectors, leading to the implementation of legislation which did little to deal with the issues at hand or alternatively took many decades. However, unlike the 19th century, modern policy makers have access to evidence from a wide range of sources and are knowledgeable of the causes of such health issues. Committees are structured in such a way that political bias and personal gain is not a factor in their investigations and subsequent recommendations, and the public now have far more access to government records. As a result fundamental changes to the way that government implements policies is necessary. By introducing a requirement for the inclusion of targets and progress reviews, where possible, in all future government plans, we may start to see more comprehensive and effective legislation concerning nutritional health. Promoting such practices as breastfeeding, introducing better policies concerning food in educational

settings, and introducing a more comprehensive set of requirements for supplements and school food eligibility using approaches which are both targeted and monitored could see improvements today and a healthier tomorrow.

## **10.6 Historical Nutritional Health: Future Research**

Between the first and final draft of this thesis, a new sugar sweetened beverages levy was introduced and chapter two of the Childhood Obesity: A Plan for Action report was published. Modern actions targeting nutritional health are constantly changing, and each new policy requires a basis of evidence and needs to be followed up by research into its successes and failures. Future research into this topic is required to direct such policies towards actions which will benefit the health of the nation and reduce the waste of time and money associated with policies which are not effective.

In addition to the research required for current and future modern policies, much work is still required to explore the diet and nutrition of the 19th century, specifically that of the upper classes. Much of the focus before now has been on working-class adults within institutions but, as this research reveals, there is far greater variation in the diet of the 19th-century English population than previously assumed. One way to address this would be further osteoarchaeological work, particularly using recent advancements in isotope analysis. The use of incremental human dentine sampling has recently proved to be highly successful (Beaumont *et al.* 2013b; Beaumont *et al.* 2014). This technique uses a series of micro-samples from the same tooth of an individual to analyse the composition of dental collagen, which reflects the environmental state of the individual at the time of tooth formation (Humphrey 2014). Using this technique on skeletal remains from status-established 19th-century contexts, the pattern of infant weaning and

dietary intake could be ascertained between high- and low-status populations. This method could also be used to track changes in infant feeding practices through time.

## **10.7 Final Remarks**

Since the 19th century Britain has seen tremendous improvements to the working, living, and dietary conditions of its people. Huge advances in medical knowledge and the introduction of the NHS has seen massive reductions in death rate during childhood and in the prevalence of deadly infectious diseases which once ravaged the population. Greater security has been achieved, and the welfare state has been responsible for improving the lives of the country's poorest and most vulnerable. Gone are the overcrowded workhouses in which paupers lived alongside tuberculosis patients, today the majority of British citizens live their lives free of serious infectious disease, in comfortable homes, with employment regulated by strict laws. However, these wonderful advances which have led to the society we recognise today have also resulted in new, peculiarly modern epidemics. These are the 21st-century epidemics of non-communicable diseases- cardiovascular disease, cancer, and diabetes. The historical evidence presented here suggests several approaches which may help to combat rising rates of non-communicable disease, and strengthens some of the existing policies. In order to prevent rising death rates and the huge strain placed on the NHS, far stronger and more immediate action is required to control the detrimental results of poor dietary health in the UK.

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**Glossary:**

Childhood Obesity: A Plan for Action (referred to as the Childhood Obesity Plan)- A report released in 2016 which detailed the actions government intended to make to tackle childhood obesity levels. This report was released after consultation with the Health Committee. Chapter 2 of this plan was released in June 2018.

Department of Health & Social Care- A Ministerial department which supports ministers in developing plans for the nation's health and social care. The Department receives information from 28 health agencies and public bodies.

Early Years Settings- Any form of pre-school care, i.e. nurseries, child minders, preschools.

Healthy Child Programme (HCP)- A recommended framework of universal services to promote health and wellbeing in children and young people

Health Committee- A committee appointed by the House of Commons to examine the policy, administration, and expenditure of the Department of Health and Social Care. Many of its members are medical professionals or have experience in public health.

Healthy Lives, Healthy People- A report which sets out the government's long-term plan for the future of public health in England

Health Visitor- Registered nurses and midwives who have additional training in community public health nursing, who visit parents during the ante-natal period until children reach 5 years of age.

House of Commons- Consists of 650 democratically elected Members of Parliament who propose new laws, and scrutinise government policies.



House of Lords- The second chamber of the UK Parliament which shares the task of making laws and challenging the work of the government.

Infant Feeding Survey- A survey of infant feeding practices conducted every five years from 1975 to 2010, when it was discontinued.

Laissez faire- An economic system in which businesses are free from government intervention.

Local Authority- A government organisation which is officially responsible for all public services and facilities within a defined area or region.

Low-Income Diet and Nutrition Survey (LIDNS)- A survey which collects data on the diet and nutrition of low-income families in the UK. The survey began in 2003.

Making Every Contact Count (MECC)- An approach to healthcare wherein health professionals are trained and encouraged to support individuals in making positive changes to their physical and mental health.

National Child Measurement Programme (NCMP)- A nationally mandated public health programme which provides data on the weight of children across the country

National Diet and Nutritional Survey (NDNS)- A survey which collects data on the diet and nutrition of the UK population. The survey began in 2008.

National Health Service (NHS)- The publicly funded healthcare system for the United Kingdom

Parliament- Consisting of the House of Commons and the House of Lords, Parliament is responsible for making laws, deciding taxes, and scrutinising the government.

Public Health England- An executive agency of the Department of Health and Social care, responsible for providing evidence-based expertise to government, local government, the NHS, Parliament, industry, and the public.

Scientific Advisory Committee on Nutrition (SACN)- A committee which advises government and Public Health England on nutrition and health-related matters

The National Archives- A non-ministerial department, and official archive and publisher for the UK Government. The National Archives stores over 1000 years of national documents.

## Appendix 1: Nutrition requirements from British Nutrition Foundation (2016b)

**Nutrition Requirements****Reference Nutrient Intakes for Vitamins**

Age	Thiamin	Riboflavin	Niacin	Vitamin B6	Vitamin B12	Folate	Vitamin C	Vitamin A	Vitamin D
	mg/d	mg/d	mg/d	mg/d <sup>†</sup>	µg/d	µg/d	mg/d	µg/d	µg/d
0-3 months	0.2	0.4	3	0.2	0.3	50	25	350	8.5-10***
4-6 months	0.2	0.4	3	0.2	0.3	50	25	350	8.5-10***
7-9 months	0.2	0.4	4	0.3	0.4	50	25	350	8.5-10***
10-12 months	0.3	0.4	5	0.4	0.4	50	25	350	8.5-10***
1-3 years	0.5	0.6	8	0.7	0.5	70	30	400	10
4-6 years	0.7	0.8	11	0.9	0.8	100	30	400	10
7-10 years	0.7	1.0	12	1.0	1.0	150	30	500	10
<b>Males</b>									
11-14 years	0.9	1.2	15	1.2	1.2	200	35	600	10
15-18 years	1.1	1.3	18	1.5	1.5	200	40	700	10
19-50 years	1.0	1.3	17	1.4	1.5	200	40	700	10
50+ years	0.9	1.3	16	1.4	1.5	200	40	700	10
<b>Females</b>									
11-14 years	0.7	1.1	12	1.0	1.2	200	35	600	10
15-18 years	0.8	1.1	14	1.2	1.5	200	40	600	10
19-50 years	0.8	1.1	13	1.2	1.5	200	40	600	10
50+ years	0.8	1.1	12	1.2	1.5	200	40	600	10
Pregnancy	+ 0.1**	+ 0.3	*	*	*	+ 100	+ 10**	+ 100	10
<b>Lactation:</b>									
0-4 months	+ 0.2	+ 0.5	+ 2	*	+ 0.5	+ 60	+ 30	+ 350	10
4+ months	+ 0.2	+ 0.5	+ 2	*	+ 0.5	+ 60	+ 30	+ 350	10

## Nutrition Requirements



### Reference Nutrient Intakes for Minerals

Age	Calcium	Phosphorus <sup>1</sup>	Magnesium	Sodium	Potassium	Chloride <sup>4</sup>	Iron	Zinc	Copper	Selenium	Iodine
	mg/d	mg/d	mg/d	mg/d <sup>2</sup>	mg/d <sup>3</sup>	mg/d	mg/d	mg/d	mg/d	µg/d	µg/d
0-3 months	525	400	55	210	800	320	1.7	4.0	0.2	10	50
4-6 months	525	400	60	280	850	400	4.3	4.0	0.3	13	60
7-9 months	525	400	75	320	700	500	7.8	5.0	0.3	10	60
10-12 months	525	400	80	350	700	500	7.8	5.0	0.3	10	60
1-3 years	350	270	85	500	800	800	6.9	5.0	0.4	15	70
4-6 years	450	350	120	700	1100	1100	6.1	6.5	0.6	20	100
7-10 years	550	450	200	1200	2000	1800	8.7	7.0	0.7	30	110
Males											
11-14 years	1000	775	280	1600	3100	2500	11.3	9.0	0.8	45	130
15-18 years	1000	775	300	1600	3500	2500	11.3	9.5	1.0	70	140
19-50 years	700	550	300	1600	3500	2500	8.7	9.5	1.2	75	140
50+ years	700	550	300	1600	3500	2500	8.7	9.5	1.2	75	140
Females											
11-14 years	800	625	280	1600	3100	2500	14.8 <sup>5</sup>	9.0	0.8	45	130
15-18 years	800	625	300	1600	3500	2500	14.8 <sup>5</sup>	7.0	1.0	60	140
19-50 years	700	550	270	1600	3500	2500	14.8 <sup>5</sup>	7.0	1.2	60	140
50+ years	700	550	270	1600	3500	2500	8.7	7.0	1.2	60	140
Pregnancy	*	*	*	*	*	*	*	*	*	*	*
Lactation:											
0-4 months	+ 550	+ 440	+ 50	*	*	*	*	+ 6.0	+ 0.3	+ 15	*
4+ months	+ 550	+ 440	+ 50	*	*	*	*	+ 2.5	+ 0.3	+ 15	*

## Appendix 2: Table of key events during the 19th century

<b>Year</b>	<b>Event</b>
1601	An Act for the Relief of the Poor (the Old Poor Law)
1776	Adam Smith The Wealth of Nations
1782	An Act for the Better Relief and Employment of the Poor (Gilbert's Act)
1795	Speenhamland System
1798	Thomas Robert Malthus An Essay on the Principle of Population
1802	Health and Morals of Apprentices Act (Peel's Factory Act)
1828	The Westminster Review formed
1832	The Royal Commission into the Operation of the Poor Laws appointed Report of the Select Committee on the Bill for the Regulation of Factories
1833	An Act to Regulate the Labour of Children and Young Persons in the Mills and Factories of the United Kingdom
1834	Poor Law Commissioner's Report An Act for the Amendment and Better Administration of the Laws Relating to the Poor in England and Wales (the New Poor Law)
1837	Select Committee on Poor Law Amendment Act. First Report.
1838	Reports by Drs Kay, Arnott, and Southwood Smith into sanitation and disease.
1842	Edwin Chadwick Report on the Sanitary Conditions of the Labouring Population of Great Britain
1844	Factories Act Health of Towns Association founded
1846	Andover Workhouse Scandal
1847	Position of First Medical Officer of Health created
1848	An Act for Promoting Public Health (the Public Health Act) First Annual Report of the Poor Law Board
1853	Outbreak of cholera in London led to Dr John Snow's discovery of the Broad Street pump.
1857	Workhouse Visiting Society founded
1858	General Board of Health abolished The Great Stink Public Health Act
1860	Food and Drugs Act
1863	Edward Smith- Report by Dr. Edward Smith on the Food of the Poorer Labouring Classes in England.
1864	First team of trained nurses employed in Liverpool Workhouse Infirmary
1865	Lancet Commission on Workhouse Infirmary reports
1866	Sanitary Act
1867	Metropolitan Poor Law Act

1870s	Louis Pasteur and Robert Koch identify bacteria as infecting agent of disease
1870	Elementary Education Act
1875	The Artisans' and Labourers' Dwellings Improvement Act (Cross' Act)
1880	Elementary Education Act Report of the Committee on Education (England and Wales); with Appendix: Committee of Council on Education: Report, Appendix, 1879-80.
1888	Elementary Education Acts. Final Report of the Commissioners Appointed to Inquire into the Elementary Education Acts. England and Wales.
1891	Factories Act
1903	The Royal Commission on Physical Deterioration Report
1906	Education (Provision of Meals) Act
1908	Joseph Rowntree- Poverty: A study of Town Life
1918	All men over the age of 21 given right to vote
1928	All women over the age of 21 given right to vote
1948	National Health Service founded