Public Health Interventions in Historical Perspective: Cholera in Victorian London, 1849, 1854, and 1866

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To those who have made this journey possible:

Mom

Dad

Katelyn

Luke

Zachary

Flynn

Each of you have encouraged me during my lowest hours, have celebrated my successes, and have brought immeasurable joy to this process.

I love you all.

And this above all:

To God be the glory now and forever

ABSTRACT

Cholera visited the rapidly growing metropolis of London three times in a span of seventeen years: 1849, 1854, and 1866. Each epidemic had unique cholera experiences, with different cholera mortality patterns and public health responses. This thesis uses the *Weekly Returns of Births and Deaths in London* to collate mortality data for the thirty-year period surrounding the cholera epidemics (1840-1870). Using this data, the thesis presents contextualized mortality patterns, including deaths from all causes, zymotic deaths, and cholera deaths. The mortality patterns are examined according to geographic district, sub-district, and neighbourhoods of London, as well as specific street-level analysis. The analysis of the epidemics yielded new information to add to the existing literature. In 1849, there was a concentration of deaths in Lambeth Church 2nd, which is mapped at street-level with a level of detail rarely seen. In 1854, the mortality data reveals that it was not John Snow's removal of the pump handle which ended the Broad Street outbreak, and therefore challenges the accuracy of this famous public health success story. In 1866, there was a shift in health-seeking behaviour, as institutional cholera deaths were higher than the previous two epidemics, and this drastically changed the known cholera mortality patterns.

This thesis adds to and challenges the existing historiography. Chapter One provides a comprehensive literature review of how cholera has been used to examine social structures, medical practices, and the rise of public health within the nineteenth century world. Chapters Two, Three, and Four examine the realities of London living, including public health legislation, the medical marketplace, the contemporary understanding of disease causation and transmission, and the treatments most often prescribed against cholera. Chapters Five, Six, and Seven are heavily made up of original research, and present London's cholera mortality patterns in 1849, 1854, and 1866. These chapters also consider the public health responses to cholera and evaluate their effectiveness. This thesis presents a cohesive examination and analysis of the cholera experience in nineteenth century London and evaluates the relationship between public health infrastructure and epidemic disease in an urban environment.

RÉSUMÉ

Le choléra a visité la métropole en croissance rapide de Londres trois fois en l'espace de dix-sept ans: 1849, 1854 et 1866. Chaque épidémie a eu des expériences uniques de choléra, avec des modèles de mortalité et des réponses de santé publique différents. Cette thèse utilise les *Weekly Returns of Births and Deaths in London* pour rassembler les données de mortalité pour la période de trente ans entourant les épidémies de choléra (1840-1870). En utilisant ces données, la thèse présente des schémas de mortalité contextualisés, y compris les décès toutes causes confondues, les décès zymotiques et les décès dus au choléra. Les schémas de mortalité sont examinés en fonction du district géographique, du sous-district et des quartiers de Londres, ainsi que d'une analyse spécifique au niveau de la rue. L'analyse des épidémies a fourni de nouvelles informations à ajouter à la littérature existante. En 1849, il y avait une concentration de décès à Lambeth Church 2nd, qui est cartographiée au niveau de la rue avec un niveau de détail rarement vu. En 1854, les données sur la mortalité révèlent que ce n'est pas le retrait de la poignée de la pompe par John Snow qui a mis fin à l'épidémie de Broad Street, et remet donc en question l'exactitude de cette célèbre réussite de santé publique. En 1866, il y a eu un changement dans le comportement de recherche de soins, car les décès par choléra en établissement étaient plus élevés que les deux épidémies précédentes, ce qui a radicalement changé les schémas connus de mortalité par choléra.

Cette thèse complète et remet en question l'historiographie existante. Le premier chapitre fournit une revue complète de la littérature sur la manière dont le choléra a été utilisé pour examiner les structures sociales, les pratiques médicales et l'essor de la santé publique dans le monde du XIXe siècle. Les chapitres deux, trois et quatre examinent les réalités de la vie à Londres, y compris la législation sur la santé publique, les défis de la profession médicale, la compréhension contemporaine de la causalité et de la transmission des maladies et les traitements les plus souvent prescrits contre le choléra. Les chapitres cinq, six et sept sont largement constitués de recherches originales et présentent les schémas de mortalité du choléra à Londres en 1849, 1854 et 1866. Ces chapitres examinent également les réponses de santé publique au choléra et évaluent leur efficacité. Cette thèse présente un examen et une analyse cohérents de l'expérience du choléra à Londres au XIXe siècle et évalue la relation entre l'infrastructure de santé publique et les maladies épidémiques dans un environnement urbain.

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INTRODUCTION

Sweltering under the August heat in 1849, Margaret Conolly lay in the doorway of 21 Church Lane in St. Giles, London. Though she had been visited by a medical officer from the parish in the past few hours, her prognosis was poor when Dr. Lightfoot and Mr. Simpson arrived. There were several immediate observations made by these two medical men: Margaret should be moved to the parish workhouse for proper care; the smell from the privy across the road was overwhelming; and she was being crowded by her neighbours. However, her husband – a simple costermonger – refused and seven hours after contracting cholera, Margaret Conolly died. The Conolly family barely had time to grieve the loss of a daughter, wife, and mother before tragedy occurred again. Two days later, Margaret's two-year old child was pronounced dead after thirteen hours of suffering with the same ailment as his mother. Frightened, Margaret's husband gathered his in-laws and his newborn child, a mere three weeks old, and they moved out of Church Lane and into No. 4, Lloyd's Court. The actions were not enough; within a week, the costermonger was alone, having lost his wife, two children, and his wife's parents from cholera.

A few doors down from the Conollys lived the Johnson family. At No. 7, a shoemaker and his three children should have been joyously preparing for the upcoming marriage of the eldest daughter – twenty-three-year-old Catherine. But sadly, Catherine died on her wedding day after a two-day battle with cholera. Her fourteen-year-old sister Ellen and sixteen-year-old brother Thomas did not suffer as long – only twenty-four and eleven hours respectively – but No. 7 was shrouded with grief on what should have been a happy occasion.

There are pages upon pages of stories like those of the Conolly family and the shoemaker at No. 7 which fill the records of the *Weekly Returns of Births and Deaths in London* during the 1849 cholera epidemic. Similar accounts can be found during the 1854 and 1866 epidemics. A disease which changed the way the medical profession responded to epidemic diseases had a harrowingly personal element – no one was safe from this dreaded sickness and fear filled London's population.

Cholera visited London four times in the nineteenth century: 1831-32, 1849, 1854, and 1866, but these epidemics were part of larger pandemics which circled the globe. It is widely believed that cholera originated in the Bay of Bengal in India where it was endemic to many communities. It first began to spread to a wider geographical area in 1817, and for several years after that, cholera affected many countries throughout South, West and East Asia including Afghanistan, Mauritius, Madagascar, Zanzibar and much of the coastal region on the Gulf of Persia.[1] The second pandemic witnessed a substantially greater geographical impact, when cholera moved out of South Asia towards Europe, appearing in many European port cities in 1831, including those of the British Isles in 1831 and, by the spring of 1832, North America.[2] With each subsequent pandemic, cholera followed its traditional routes from India into Asia, before heading west and northwest to Europe and on to North America, though it extended its reach further each time, cascading down into Central and South America in the later years.[3]

Cholera was a feared disease. Its symptoms were painful, not easily hidden, and often led to a rapid death. A large part of the fear stemmed from the inability of the medical profession to

[1] Michael Durey, *The Return of the Plague: British Society and the Cholera, 1831-2* (Dublin: Gill and Macmillan, 1979), pgs. 7-8; Patrice Bourdelais and André Dodin, *Visages du cholera* (Paris: Belin, 1987), pg. 35.
[2] Geoffrey Bilson, *A Darkened House: Cholera in Nineteenth Century Canada* (Toronto: University of Toronto Press, 1980), pg. 3.
[3] There are traditionally seven cholera pandemics from the nineteenth century to present day. They are grouped as follows: 1817-1824, 1829-1851, 1852-1859, 1860-1875, 1881-1895, 1899-1923, and 1960-present. While there were not worldwide outbreaks of cholera during each year within these timeframes, cholera was almost always present somewhere on the globe – most commonly in India and Asia. The term "epidemic years" when applied to England refers to four major epidemics: 1831-32, 1849, 1854, and 1866. Christopher Hamlin, *Cholera: The Biography* (Oxford, UK: Oxford University Press, 2009), pg. 4; Richard Evans, "Cholera in Nineteenth Century Europe," *Past and Present* 120:1 (August 1988), pgs. 124-125. For a visual representation of the movement of cholera throughout the nineteenth and twentieth centuries, see Patrice Bourdelais and André Dodin, *Visages du cholera*, pgs. 35-36, 40, 48, and 50.

effectively treat the disease, as its cause was not known until the 1880s. With no sense of how to stop this disease from the East, Londoners feared the coming of the cholera and were defenceless in its wake. This thesis is the story of cholera in London during three outbreaks: 1849, 1854, and 1866.[4] It begins with a thorough discussion of the sources and methodology used, followed by a comprehensive literature review in Chapter One. Chapters Two, Three, and Four address the first research question of the thesis: what was it like to live in, be sick in, and die in London in the nineteenth century? These chapters detail the public health legislation passed, changing theories of disease causation and transmission, the medical marketplace, and the known treatments for cholera. Chapters Five, Six, and Seven address the second and third research questions: what was the cholera experience in London during these years, and what were the public health responses to cholera? These chapters use mortality records from the *Weekly Returns of Births and Deaths in London* to present never-before-seen maps of mortality at the district, sub-district, and neighbourhood levels. Further, they engage in what the public health responses were during these epidemics and evaluate their effectiveness in combatting cholera mortality. The thesis will bring together these themes to highlight the cholera experiences and the relationship between public health interventions and epidemic disease in an urban environment in nineteenth-century Victorian London.

SOURCES

The *Annual Reports of Births and Deaths in London* are a treasure trove of information about life and death in the nineteenth century. Published first in 1837, the *Annual Reports* are a

[4] England's first cholera epidemic was in 1831-1832. This epidemic is excluded from this thesis due to a lack of consistent sources regarding mortality, as the sources for the later epidemics were compiled by the General Registrar Office, which was only established in 1836.

collection of *Weekly Returns of Births and Deaths in London* that were compiled by the General Register Office [GRO] in what was the beginning of a statistical revolution which became a cornerstone of public health and sanitation reform in Victorian Britain. As a resource, the *Annual Reports* remain relatively untapped, despite the fact that they have been used by many historians in the quest to understand mortality patterns throughout the nineteenth century.[5] Part of this is due to the sheer volume of information these documents hold. Found in its pages are the weekly breakdown of all the deaths in London, delineated by cause, age, and sex. The GRO aggregated a lot of this information into tables which report the mortality trends over previous weeks and/or years. There is information pertaining to the geographic patterns of mortality, with mortality figures reported for each of the five districts of London, as well as area and population at the last census. Finally, there is a large quantity of information regarding weather and temperature patterns throughout the week. Perhaps what makes the *Annual Reports* most compelling is that it is a qualitative as well as quantitative source. Apart from publishing numeric information, there is a large degree of commentary that the GRO published from the *Weekly Returns* they received from local medical officers of health. These reports include medical details of specific cases and observations made regarding the environment and physical space. For example, in the *Weekly Returns of Births and Deaths in London* dated 14 October 1848, there is a report of a father and daughter who both died of cholera in St. John, St. Olave's. The father was 30 years old, and the daughter was two. There is a note appended from Mr. Bensted, the Registrar of St. John, Horselydown, which states:

> These two cases were those of a father and daughter, who lived at No. 13 Sard's-rents, Church-street, St. John's, Southwark; the latter died of 'diarrhoea, followed by convulsions;' the former of 'malignant cholera,' was attacked at 12 o'clock on Friday, Oct. 14th, and died at 4h. p.m. on Saturday. From enquires I have made it appears, that he was a

[5] For example, Anne Hardy's *The Epidemic Streets* is based almost entirely on this resource, as is Graham Mooney's research on infant mortality in London.

> very sober and industrious man; that he and his wife were cleanly in their habits, but that one or another of the family has been constantly ill since they lived in their present residence. There are, I believe, upwards of 20 houses within 4 or 5 feet of a filthy open sewer, and this fact has been constantly represented to me (as Registrar) by the inhabitants of those houses. The illness which is caused by so great a nuisance can hardly be wondered at, for in some places I do not think it above 3 feet from their doors. The deceased has left two children, one not out of danger and the other very ill. These circumstances have been more impressed on my attention by a visit from the medical gentlemen (Messrs. Phillips and Button) who attended the cases, and state as their opinion, that this open sewer was the principal cause of the illness.[6]

As this example shows, there is a great deal of information that can be found in the *Weekly Returns*, both quantitative and qualitative, and it becomes especially useful during epidemics, as the GRO went to great lengths to publish up-to-date information.

However, many historians hesitate to use the *Annual Reports* because they require "a high degree of caution and scepticism."[7] There are several issues that historians need to be aware of when using these records: the reliability of the number and classification of deaths, the issue of changing administrative boundaries, and the problems posed by institutional deaths. Each of these will be examined in detail below, along with a discussion about the origins of the *Annual Reports*: why the use of statistics became so prominent in the nineteenth century and how this qualitative approach perhaps does not provide the full understanding of mortality in Victorian Britain.

The GRO, Death Certificates, and the Classification of Mortality

The GRO strove for medical accuracy in their *Weekly Returns*, which meant they relied heavily on the cooperation of local medical boards and physicians who attended deaths across London. In 1845, the GRO began using a standardized certificate to report deaths; any death

[6] General Register Office, *Weekly Return of Births and Deaths in London* IX: 41 (1848), pg. 2.
[7] Bill Luckin, "Death and Survival in the City: Approaches to the History of Disease," *Urban History* 7 (1980), pg. 55.

which did not have this certificate signed by a qualified medical professional was considered as uncertified and the death not tallied in reports of mortality.[8] However, even with the GRO attempting to regulate who could submit a death certificate, there were ambiguities.

One such ambiguity was who attended the death and, by extension, where the death occurred. Medical practitioners were often called in during the final stages of illness and therefore reported only what they saw rather than having a fuller understanding of the patient's medical history. Similarly, physicians in institutions, for example, saw upwards of a hundred patients a day – especially the Poor Law Medical Officers who attended the workhouses – which severely limited the amount of time a physician spent with a patient. This workload often led to brief descriptions of a diagnosis and cause of death, with little in the way of patient history. Graham Mooney defines this phenomenon as "diagnostic depth." The relationship between the practitioner and patient was often reflected in the number of details reported on the death certificate.[9] Conversely, local practitioners who attended patients in their homes often had a greater diagnostic depth than those who saw patients in institutions – a point Mooney believes supports the loss of the patient narrative amidst the rise of institutionalized medicine in the nineteenth century.[10]

The reliance of the GRO on medical practitioners in reporting deaths speaks to the broader evolution of medical boards and administrative structure which was emerging during this period. Yet, despite the GRO's overarching authority of reporting deaths, practitioners – both local and

[8] A qualified practitioner before the 1858 Medical Act would be one who obtained or were in the processes of obtaining a licence from the Society of Apothecaries and/or membership of the Royal College of Surgeons. Anne Hardy, "'Death is the Cure of All Diseases': Using the General Register Office Cause of Death Statistics for 1837-1920," *Social History of Medicine* 7:3 (1994), pg. 475.

[9] Graham Mooney, "Diagnostic Spaces: Workhouse, Hospital, and Home in Mid-Victorian London," *Social Science History* 33:3 (Fall 2009), pgs. 374-376.

[10] Mooney, "Diagnostic Spaces," pgs. 369, 374, 379; John Eyler, "Mortality Statistics and Victorian Health Policy: Program and Criticism," *Bulletin of the History of Medicine* 50:3 (Fall 1976), pg. 352.

institutional – were the ones who truly defined how deaths were reported in the nineteenth century. They were subject not only to the limits of the patient-practitioner relationship, but also experienced social pressures from families and institutions to report deaths a certain way – for example, sexually-transmitted diseases were often underreported because of the social stigma attached to them. It is also possible that deaths were mis-diagnosed, or the cause of death was not known.[11] Historians need to be aware that even though the GRO attempted to regulate who could fill out and file death certificates, there is no guarantee that the cause of death was accurate or that the practitioner had a deep grasp of the patient's medical narrative.

Despite the GRO's attempt to regulate who filled out death certificates, practitioners were far from consistent in how they approached these forms. Even though all death certificates past 1845 were filled out and signed by qualified medical personnel, there were few guidelines in place to ensure consistency between one practitioner and another.[12] Medical practitioners were given ten words to describe the causes of death and even though they were supposed to list them in the sequence in which they occurred, many certificates were filled out with prominent (and usually the most visual) causes listed first. It was difficult for medical practitioners to have a full understanding of a patient's disease, especially within institutions, and therefore the causes of deaths on certificates were vaguely described, which could be misleading to the GRO as well as present-day historians.[13] It is also worth noting that practitioners had control over how much or

[11] It is also worth noting that medical practitioners were conditioned by their surroundings. For example, the rise of specialist hospitals led to a greater concentration of certain causes of death being reported, which is termed cause-specific mortality. Similarly, practitioners were influenced in how they filled out their death certificates by epidemiological patterns. Eyler, "Mortality Statistics and Victorian Health Policy," pg. 352; Mooney, "Diagnostic Spaces," pgs. 378-381; Hardy, "Death is the Cure of All Diseases," pg. 479.
[12] See footnote 8 for an explanation of who was considered "qualified medical personnel" before the 1858 Medical Registration Act.
[13] Hardy, "Death is the Cure of All Diseases," pgs. 476, 478; Mooney, "Diagnostic Spaces," pg. 362.

how little to include – something often influenced by external factors such as epidemics – and as a result, the ability to medically certify the causes of death is dubious at best.[14]

However, as the century progressed, the *Annual Reports* did become more consistent. Bill Luckin even goes so far as to say that "it should be possible to arrive at moderately reliable estimates of mortality and morbidity for individual infections from about mid-century onwards."[15] Similarly, Anne Hardy believes that post-1870, it is increasingly possible to guarantee the quality and accuracy of a diagnosis.[16] So what happened between 1845, with the introduction of the standard death certificate, and the 1870s to convince Luckin and Hardy that the reliability of reported causes of death became that much greater? The answer is nosology, which is the study and classification of diseases.[17]

William Farr, a statistician and epidemiologist appointed to the GRO, established the first exclusive list of diseases in 1839. The broad groups into which he broke all diseases were epidemic, endemic, and contagious diseases; constitutional diseases; diseases of different organ systems; and deaths from external causes.[18] Farr's list changed twice before 1860, though many of the changes were minor. The Royal College of Physicians published *The Nomenclature of Disease* in 1869, which was to be adopted by all of Britain, and brought the GRO's nosology practices more in line with those used within the medical profession. This trend continued when

[14] Interestingly, during 1866, diarrhoea was almost always listed first on a death certificate and the duration of the illness was usually included because it was a common understanding that the GRO was using the 1866 cholera deaths as a way to test hypothesis about the fatality of the disease. Mooney, "Diagnostic Spaces," pg. 362.
[15] Luckin, "Death and Survival in the City," pg. 56.
[16] Hardy, "Death is the Cure of All Diseases," pg. 479.
[17] Nosology not only classified diseases, it also served as a way to publish a comprehensive list of all known diseases. The use of nosology was an important step in the era of statistical medicine, which began with the GRO's *Annual Reports*; Hardy, "Death is the Cure of All Diseases," pg. 477; Eyler, "Mortality Statistics and Victorian Health Policy," pg. 339.
[18] Hardy, "Death is the Cure of All Diseases," pg. 477.

Britain adopted the International List of Causes of Death in 1911, though the GRO used both lists simultaneously until 1920.[19]

Nosology did not completely solve the issue of inconsistencies across death certificates. While the terminology may have been streamlined, diagnostic practices still varied widely between practitioners and institutions. As discussed above, the place of death played an important role in determining the accuracy of the cause of death, as it was important for practitioners to have as complete an understanding possible of the medical case to have an accurate diagnosis. Over the nineteenth century, diagnostic practices became more consistent. This, coupled with the increasingly wide-spread definitions of diseases through the nomenclature lists, led to greater degrees of accuracy as the century progressed.[20] This is not to say that the *Annual Reports* before the 1870s are worthless and unreliable; on the contrary, they offer valuable insight into mortality patterns as long as they are treated with caution and an understanding that the numbers may be misleading due to who filled out the death certificates, where the deaths took place, and how the causes of death were determined.[21]

London's Registration Districts

The changing boundaries of London's registration districts pose a second significant problem to the use of the *Annual Reports*. When the GRO began collecting mortality data, it relied on the civil registration boundaries from 1837, which were based on parish boundaries. These parish boundaries were also the basis for the Poor Law Unions that were created in the

[19] Hardy, "Death is the Cure of All Diseases," pgs. 477-478.
[20] It is worth noting, however, that in some cases, the cause of death reported had little ambiguity due to its unmistakable symptomology. Cholera is one of these diseases. Hardy, "Death is the Cure of All Diseases," pg. 478.
[21] Luckin, "Death and Survival in the City," pg. 55.

wake of the Poor Law Amendment Act (1834).[22] In the 1830s, this was not too much of a problem as London was in its infancy of local governance. As the nineteenth century progressed, however, there arose issues of who was responsible for geographic areas – the "historical parish" or the quickly evolving municipal boards, whose functions and responsibilities were mandated by Parliamentary legislation. It was not only geographic jurisdiction that caused an issue. The boundary lines themselves were subject to change as London and its surrounding areas became more urban. Between 1840 and 1911, there were anywhere between twenty-seven and thirty-six registration sub-districts which were grouped into five main districts.[23] The evolution, dissolution, and combining of sub-districts over the years makes geographic comparisons difficult. For example, a changed boundary line influences population density, which makes it impossible for an identical comparison of mortality in a region over any great span of time.[24]

The problem of mortality comparison is greatly complicated by patient mobility. The GRO reported where people died; this was not necessarily the same as where they lived, and thus mortality figures could become inflated or deflated in instances of health-seeking behaviour which required movement across boundaries.[25] As the century progressed, more and more boundary lines came into existence; the more boundary lines there were, the greater the probability that patients would cross a boundary in order to obtain healthcare.[26] Because the GRO did not reallocate deaths in their mortality records until 1910/11, historians need to be

[22] Graham Mooney, "Did London Pass the 'Sanitary Test'?: Seasonal Infant Mortality in London, 1870-1914," *Journal of Historical Geography* 20:2 (1994), pg. 159.
[23] Mooney, "Did London Pass the 'Sanitary Test'?," pg. 159.
[24] Hardy points out that outside of London, the problem was even more complex, as rural settlements were spread over wide geographic areas that were interrupted by arbitrary municipal boundaries, thus making it increasingly difficult to accurately gauge the population of rural areas. Hardy, "Death is the Cure of All Diseases," pg. 483.
[25] Hardy, "Death is the Cure of All Diseases," pgs. 480-481; Bill Luckin and Graham Mooney, "Urban History and Historical Epidemiology: The Case of London, 1860-1920," *Urban History* 24:2 (1997), pg. 47.
[26] Mooney, "Did London Pass the 'Sanitary Test'?," pg. 159.

acutely aware of the problems this could cause, and there are several different approaches that have been explored to take into account these potential discrepancies.[27]

Perhaps the simplest is by grouping the sub-districts into larger district headings. The sub-districts of London, even in the GRO records, are assigned into one of five districts: North, East, Central, West, and South. Grouping the sub-districts into larger geographical areas decreases the number of boundary lines to be crossed, though it means losing any degree of specificity when looking at local mortality patterns.[28] And, of course, these districts were not all equal in terms of geographical space, population, and governance. For example, the central district was the area immediately north of the Thames that is today known as the business district, and it measured 2.8 square miles in 1842. In stark contrast, the South district was everything south of the Thames, and covered 23.9 square miles. The population of the central district in 1841 was 374,640 people versus 439,443 people in the South.[29] Not surprisingly, this amounted to vastly different population densities. Within the districts, there were also a varying number of sub-districts, each with its own local government and approaches to municipal upkeep.

Apart from grouping sub-districts together, some historians have attempted to reallocate deaths to "correct" the GRO mortality figures.[30] This is an intensely laborious task that relies on the existence of nominal records from institutions. The time commitment required, as well as the reliance on records, "puts historians at a distinct disadvantage" because many of the records that do exist are incomplete.[31] In order for records to be usable, they need to consistently note the

[27] Hardy, "Death is the Cure of All Diseases," pgs. 480-481.
[28] Mooney, "Did London Pass the 'Sanitary Test'?," pg. 159.
[29] The reason the area and population given in this example are from different years is because the census was only taken once every ten years, and the actual population is not known during non-census years. During non-census years, the GRO either published an estimated guess based on birth and death rates of previous years, or simply used the last known census figure. General Register Office, "Summary of the Weekly Tables of the Mortality for 1842."
[30] Mooney and Luckin, "Urban History and Historical Epidemiology," pg. 47.
[31] Luckin, "Death and Survival in the City," pgs. 55-56.

home address of their patients so that the death can be reallocated. Of course, this only addresses the issue of patients who died in institutions. There is no way to know the origin of every single mortality in London, especially those that died outside of institutions.[32] Regardless of where one died, the geographic origin of a patient was an important part of their narrative and reflected their "occupation, socioeconomic status, the nature of their illness, their residential location, and the accessibility of healthcare."[33]

Reallocating deaths is possible in theory, though in practice, it is difficult to do well and there have been questions regarding the difference it makes in mortality patterns. In certain sub-districts, reallocation of deaths makes very little difference to the overall mortality. However, in other sub-districts, it makes a significant difference.[34] The sub-districts in which there were institutions were most greatly affected, as there was an influx of patients seeking medical care and/or poor relief. This leads to the final, and perhaps the most problematic, issue of the *Annual Reports*: the impact of institutions on the mortality rate.

INSTITUTIONAL DEATHS

The impact of institutions on mortality patterns in London varied depending on the period being considered, as well as the type of institution. There were two main institutions which could impact mortality patterns: hospitals and workhouses.[35] In general, these institutions tried to minimize the number of patients they took in with infectious diseases by having very specific

[32] This category is broad – it could be those who sought care at a family or relative's home, but it also includes beggars and vagrants who had no permanent address.
[33] Graham Mooney, Bill Luckin, and Andrea Tanner, "Patient Pathways: Solving the Problem of Institutional Mortality in London during the Nineteenth Century," *The Society for the Social History of Medicine* 12:2 (1999), pg. 245.
[34] Hardy, "Death is the Cure of All Diseases," pg. 476; Luckin and Mooney, "Urban History and Historical Epidemiology," pg. 47.
[35] It is also fair to say that post 1850, lunatic asylums could also be included as institutions which had the ability to impact mortality patterns.

parameters for admission.[36] Before 1867, only the London Fever Hospital (in Islington) and the Smallpox Hospital (in Pancras) accepted infectious disease patients. In 1867, the Metropolitan Asylums Board [MAB] was established, whose main purpose was to provide beds for the pauper poor, and ideally, patients did not need to travel greater than three miles to find a hospital.[37] However, many of the mortality patterns of hospitals depended heavily on who was seeking care and from where they hailed.

The nature of hospitals was changing over the nineteenth century, and they were often seen as places of "higher character and cure, a means for scientific and practical clinical study."[38] Hospital admission was heavily controlled and over time, admission became politically rather than medically based. In 1847, the Hospital Saturday Fund was established and operated by giving admission tickets in exchange for donations to the hospital. The number of tickets, as well as if they were inpatient or outpatient, reflected the generosity of the donation, though most of the tickets were outpatients. Most wealthy patrons avoided hospital admission, as hospitals were still perceived as a form of refuge for those who could not afford private care, and they took their treatments privately at home; sponsoring hospital admissions was a form of charitable giving rather than an investment in their own healthcare. Apart from wealthy donors, many employers began supporting the hospitals to be able to provide medical care for their employees.[39]

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[36] Mooney, Luckin, and Tanner, "Patient Pathways," pg. 250.
[37] This may seem like a short distance to travel, but it is important to remember that London, especially central London, was quite compact. The central district was only 2.8 square miles, so even though the MAB tried to minimize movement of patients across borders, it was likely common for it to happen anyways. Mooney, Luckin, and Tanner, "Patient Pathways," pgs. 232, 236, 253.
[38] Mooney, "Diagnostic Spaces," pg. 376.
[39] It was also possible for local administrations to subscribe to the hospitals. After 1870, all of the London unions which had donated to the London Fever Hospital gained complete access to all the MAB hospitals. This enabled these unions to send their infectious sick to the MAB hospitals, which eliminated the issue of having a limited number of admission tickets to the Fever Hospital. This was especially significant, as the Fever Hospital was one of two hospitals which accepted infectious patients. Mooney, Luckin, and Tanner, "Patient Pathways," pgs. 234-236, 253.

As the century progressed, specialist hospitals began opening in London, and this, too, had a significant impact on mortality patterns. Specialist hospitals attracted patients from all over Britain, which led to a higher degree of patient mobility, but these hospitals also contributed to disease-specific patterns which could often have sex and age-specific patterns as well.[40] The presence of specialist hospitals is something historians need to be aware of when looking at mortality data for London, especially because they often influenced mortality patterns more than general hospitals. This is mostly because of where their patients originated. Most hospitals had three "catchment areas" of patients: approximately sixty percent of all patients were from the sub-district which housed the hospital, or one of the immediately surrounding sub-districts; twenty-five to thirty-five percent resided outside of the sub-districts surrounding the hospital; and about ten percent of patients came from outside of London.[41] This suggests that while patients in general hospitals could come from other sub-districts, thus implying the need to reallocate the mortality record, most institutional deaths occurred relatively close to home. The biggest exceptions to these catchment areas were the specialist hospitals, which offered very specific, sought-after care, and infectious disease hospitals.[42]

Apart from hospitals, the workhouses contributed to the problem of deaths occurring outside the home. The New Poor Law of 1834, which will be discussed more in Chapter 2, was based on the premise of Less Eligibility, which changed the social stigmas associated with seeking refuge and care in the workhouse. The New Poor Law essentially turned the workhouse into the last resort for any pauper, and it meant that the ill-stricken poor often sought care

[40] Mooney, Luckin, and Tanner, "Patient Pathways," pg. 235; Hardy, "Death is the Cure of All Diseases," pg. 482; Anne Hardy, *The Epidemic Streets: Infectious Disease and the Rise of Preventive Medicine, 1856-1900* (Oxford, UK: Clarendon Press, 1993), pg. 298.
[41] Mooney, Luckin, and Tanner, "Patient Pathways," pgs. 247-248.
[42] Graham Mooney, Bill Luckin, and Andrea Tanner have conducted a study which highlights the sub-districts with the most influential institutions across London. Hardy, "Death is the Cure of All Diseases," pg. 481; Mooney, Luckin, and Tanner, "Patient Pathways," pgs. 239-240.

anywhere else before entering the workhouse.[43] The workhouse, like many hospitals, tried to exclude infectious diseases in their institution, though the system was adjusted in 1865, when the Poor Law Board sent its principal medical officer and sanitary inspector to investigate conditions in the workhouse infirmaries. Upon their recommendation, workhouses began having separate hospital buildings, and joint poor law hospitals with dedicated poor law medical officers followed soon after.[44] Unlike hospitals, however, the workhouses did not have paupers from other regions seeking admission. Because Poor Law Unions were the basis for the registration sub-districts, most sub-districts had access to their own workhouse which minimized movement across administrative boundaries. A case study from the 1861 *Annual Reports* shows that a minimum of fifty percent of deaths which occurred in the workhouse originated in the same sub-district, which heavily alleviates the issue of reallocation. The only time this becomes problematic is with the outlying workhouses – workhouses which were physically situated in one sub-district but administratively belonged to a different one. However, by 1861, there were only six outlying workhouses across all of London.[45]

Districts which had institutions such as hospitals, prisons, asylums, and workhouses obviously experienced different mortality patterns than those that did not have these institutions. These patterns are observable at the district level – for example, the central district had a disproportionately high number of institutions – but even more so at the sub-district level.[46] This is one reason it is very important that historians are acutely aware of the socioeconomic and

[43] Mooney, Luckin, and Tanner, "Patient Pathways," pg. 236.
[44] Mooney, "Diagnostic Spaces," pg. 376.
[45] Luckin and Mooney, "Urban History and Historical Epidemiology," pg. 48; Mooney, Luckin, and Tanner, "Patient Pathways," pg. 260.
[46] As a way to combat the problem of reallocation, some historians have omitted the sub-districts where institutions existed as a way to counter-act the high mortality of these regions. This is highly problematic, as it removes large quantities of deaths from overarching mortality patterns. Luckin and Mooney, "Urban History and Historical Epidemiology," pg. 47.

urban makeup of the sub-districts in which they conduct studies. Even lodging houses along popular travel routes had the ability to skew mortality patterns, especially because these "diagnostic spaces," as Graham Mooney termed them, attracted the most undesirable residents: the vagrants, the travelling, the poor, and the ill. These demographic factors exacerbated the mortality trends by altering the population demographics – age and sex – as well as the disease categories most likely to claim victims. These variables challenge the mortality figures published in the *Annual Reports*, suggesting that they could be misleading without intimate knowledge of the sub-district make-up.[47]

Addressing reallocation through meticulous studies of institutions' records is a pipe dream for many demographic and epidemiological historians. In many cases, the records simply do not survive; and if they do, the time it would take to positively link individual case notes with the corresponding mortality record is quite substantial. In 1912, the GRO began reallocating deaths in the *Annual Reports* but before then, there was little record of patient narrative, including their quest to seek healthcare. Further, even if records did survive, they would not address the demographic changes posed by diagnostic spaces. The GRO began to recognize the need for standardized statistics in the 1890s, and, like reallocation, was an effort made by the GRO to provide the most accurate representation of mortality patterns in London.[48]

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[47] Other "diagnostic spaces" include lunatic asylums, military barracks, and the dispensary. As an example of how institutions could skew the mortality patterns, consider the military barracks: not only was there a specific population – young, healthy men – but there were certain diseases to which they were prone. Respiratory illnesses, particularly tuberculosis, was most common in barracks until a sanitary inquiry in 1858. This knowledge gives context for the age, sex, and disease patterns which were produced in sub-districts which housed military barracks. Similarly, many workhouse deaths are attributed to "old age," meaning that the demographic of the population was likely more elderly, which affected the age-population statistics, but also the types of diseases which likely killed these inmates. Hardy, *The Epidemic Streets*, pgs. 298-299; Mooney, "Diagnostic Spaces," pg. 358; Mooney, Luckin, and Tanner, "Patient Pathways," pg. 244.

[48] The GRO, when they began publishing institution death figures, only aggregated by sex, not by age. Mooney, "Did London Pass the 'Sanitary Test'?," pg. 159; Hardy, "Death is the Cure of All Diseases," pg. 480.

THE RISE OF VITAL STATISTICS

From where did the GRO's desire for accurate vital statistics stem? In 1836, the Registration Act established a national system of vital registration that enforced registration of all births, deaths, and marriages in England and Wales.[49] The Registration Act, which included the creation of the General Register Office, reflected the growing belief the health of the population was a responsibility of the state. Free of politics, vital statistics were a way to objectively view the state of health among the population. Physical health, it was believed, was a measure of the health of the country: its workforce, its environment, and its administration.[50] Just as preserving health was a social responsibility borne by the state, ignoring the state of British health was akin to "social murder." This thinking was often associated with liberal sanitary reformers who were armed with a Continental-inspired philosophy that argued the "length of life revealed the quality of life" and that disease and death were the result of social conditions.[51] Sir Edwin Chadwick, one of the pillars of the rise of vital statistics and sanitary reform in Victorian England, led the charge on using vital statistics as a way to index the sanitary state. He began by using the mean age of death as a way to measure the impact of different social and economic demographic data and linked it the varying degrees of insanitation throughout the population. To carry this out, he and William Farr began constructing life tables which reduced vital statistics to "an ideal generation's state of health and life."[52] Apart from the fact that life tables were very complex to create, they only provided large-scale understandings of mortality patterns and failed to account for local factors such as geography and population demographics. So while the life tables did provide a crude mortality figure– which proved useful in the mid-nineteenth century as a way to

[49] Eyler, "Mortality Statistics and Victorian Health Policy," pg. 339.
[50] Eyler, "Mortality Statistics and Victorian Health Policy," pgs. 335, 337.
[51] Eyler, "Mortality Statistics and Victorian Health Policy," pgs. 337, 339, 354.
[52] Eyler, "Mortality Statistics and Victorian Health Policy," pgs. 340-341, 345-346.

benchmark a "sanitary test" for Britain and identified problem regions – they did not provide the insights into local sanitation that Chadwick had hoped. John Simon, a notable medical officer of health in London, acknowledged this, stating that the general mortality rate "provided 'a rough and ready, but fairly trustworthy comparison of degrees of health.'"[53]

Following the introduction of vital statistics in 1836, the practice of relying on numbers for insight into social and medical problems continued to grow. In accordance with Chadwick's belief that the death rate – specially the zymotic death rate – reflected the health of a place due to the relationship between the external environment and disease causation, the 1848 Public Health Act used vital statistics as a way to establish an objective measure of health for all of Britain. According to Section 8 of the Act, any crude mortality which exceeded twenty-three deaths per one thousand automatically allowed the central health authorities to intervene. This essentially eliminated local consent for investigation and reform if the mortality was deemed too high.[54] However, Farr and Simon took this measure and narrowed it even further in the mid-1850s, when they established the Healthy District Mortality Rate, which stated that any district with a mortality rate of seventeen or less deaths per one thousand was deemed healthy, and any deaths above that incurred a "degree of insalubrity," with each degree reflecting an excess death. Using this measure, they were able to rank every district in Britain according to its perceived health using the *Annual Returns*. The overall goal of this list, which was routinely published in the newspapers, was to keep constant tabs on the state of health in Britain.[55] Vital statistics were used by the GRO and reformers into the 1860s, which was when they began facing challenges from the medical profession as well as the lay public.

[53] Eyler, "Mortality Statistics and Victorian Health Policy," pgs. 341-342; Christopher Hamlin, "Simon, Sir John (1816-1904)," *Oxford Dictionary of National Biography*, last modified 21 May 2009.
[54] Eyler, "Mortality Statistics and Victorian Health Policy," pg. 340.
[55] Eyler, "Mortality Statistics and Victorian Health Policy," pgs. 342-343.

There was a wide variety of concerns about the use of vital statistics and the implications it had on medical and public health policy. Vital statistics were upheld by reforms as a "social and political barometer," which led to the creation of health policies. However, these policies were not always welcomed. For example, the Compulsory Vaccination Acts in 1867, 1871, and 1874, it was argued, took away one's bodily autonomy and left it in the state's control; public health as a tool of the state became equated with a threat to personal liberty.[56] Another concern, this one put forward more by the medical profession, argued that vital statistics did not report complete data. While the objectivity of vital statistics proved useful before the rise of laboratory science and preventative medicine, these statistics only reported the mortality of the nation, not the morbidity. Before the Infectious Disease Notification Act in 1889, there was no compulsory reporting of incidences of infectious disease which were, and are, just as important to understanding the cycles of infection and spread of any given disease.[57] However, the biggest concern with the use of vital statistics was that it approached micro disease environments from a macro-level.

While many medical professionals supported the use of vital statistics, there were concerns that the patterns they showed did not accurately represent the experiences of diseases in local communities. For example, resort towns and industrial cities did not like the use of vital statistics because of their demographic diversity. As discussed above, local institutions could greatly influence mortality patterns. Resort towns often had inflated mortality figures due to an influx of elderly visitors, whereas industrial towns had an increased number of deaths of working age

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[56] Eyler, "Mortality Statistics and Victorian Health Policy," pgs. 337, 347.

[57] The Infectious Disease Notification Act of 1889 was compulsory in London. It was not until 1911 that the reporting of infectious disease became compulsory nationwide. Hardy, "Death is the Cure of All Diseases," pg. 482; Hardy, *The Epidemic Streets*, pgs. 300-301; Luckin, "Death and Survival in the City," pg. 55; Eyler, "Mortality Statistics and Victorian Health Policy," pgs. 339, 354-355.

men. Resorts reported higher incidences of deaths due to old age and related illnesses, whereas industrial cities had a higher degree of accidental deaths. However, vital statistics did not take these factors into consideration and, as a result, these regions were often poorly ranked on the Healthy District Mortality scale.[58] Similarly, local health and sanitation practices were important considerations when assessing the health of a particular locale. This includes not only the demographic make-up and institutions in a region, but also the available medical care, whether it be private or institutional.[59] Conflicting representations of disease experiences is another of the issues historians need to be aware of when considering mortality patterns in nineteenth-century Britain. Bill Luckin has argued that the history of medicine has traditionally been about the advancement of medical theories and practice as opposed to the complex relationship between medicine, disease, and society. As a result, Luckin suggests it is important to marry the history of medicine with urban history, as little can be understood about mortality patterns without understanding the demographic, economic, medical, and institutional influences which shaped them.[60]

These critiques of vital statistics did not stop them from being widely utilized in the nineteenth century, and as the decades progressed, their uses became more complex rather than simplified, with the GRO attempting to classify deaths more precisely with a standardized list of causes of death, as well as reporting the sex and age of the deceased along with institutional deaths. While statisticians warned that vital statistics often present a fully theoretical understanding of mortality patterns rather than a fully accurate representation, vital statistics

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[58] Eyler, "Mortality Statistics and Victorian Health Policy," pgs. 348, 350.
[59] Luckin and Mooney, "Urban History and Historical Epidemiology," pg. 51.
[60] Luckin and Mooney, "Urban History and Historical Epidemiology," pgs. 49, 53-55; Luckin, "Death and Survival in the City," pg. 53; Hardy, "Death is the Cure of All Diseases," pg. 482.

helped usher in a wide range of changes in medical practices, social change, and sanitation throughout the Victorian era.[61]

METHODOLOGY

Recognizing the weaknesses and limitations of the *Annual Reports* has shaped the methodological approach used throughout this thesis. The thesis begins broadly and then narrows its focus to examine the experiences of cholera in specific sub-districts and neighbourhoods in London. There are several considerations within the thesis methodology which address the issues explained above in using mortality statistics from the *Annual Reports*: using broad disease categories; reporting the age and sex breakdowns where available; discussing the diagnostic procedures of cholera as a way to recognize the potential for mis-diagnosis; considering large mortality patterns which minimize boundary lines; and conducting in-depth examinations of specific sub-districts and neighbourhoods which allows for a fuller picture of the influence of institutional deaths in a sub-district, including using a standardized mortality ratio calculation to gauge the potential impact of institutional deaths on mortality patterns.

Chapters Three and Four lay much of the groundwork and background information necessary to more fully understanding the cholera mortality patterns discussed in Chapters Five, Six, and Seven. Chapter Three, "Sickness and Dying in London," presents on a broad overview of mortality patterns from all causes of death with sex and age-aggregated data. The only disease category which is considered independently is zymotic (contagious) deaths, which includes all deaths reported as cholera, diarrhoea, and dysentery. Chapter Three provides an important

[61] Luckin and Mooney, "Urban History and Historical Epidemiology," pg. 45; Eyler, "Mortality Statistics and Victorian Health Policy," pgs. 352-353, 355.

overview of healthcare in Victorian London, as well as an in-depth discussion of the changing medical understanding of zymotic diseases, as the concept of contagion underwent several theoretical changes over the nineteenth century. Chapter Four, "Cholera in Victorian London," begins to consider cholera-specific mortality. Again, necessary background knowledge is discussed, including the diagnostic methods for cholera as well as the standard treatments. While cholera's symptomology is fairly unique and therefore misdiagnosis was less common than for other diseases, it is important to be aware of the diagnostic risk presented by diarrhoea. The chapter addresses this by scrutinizing mortality patterns of diarrhoea and cholera to ascertain the degree to which diarrhoea deaths could inflate cholera mortality. Up until this point, the *Annual Reports* are sparsely used apart from gross mortality rates, and the figures drawn from them are for all of London, alleviating any concerns of boundary lines. However, Chapter Four addresses the question of geographic mortality patterns. One of the biggest concerns with using the *Annual Reports* were the changing boundary lines of sub-districts, and how this makes yearly comparisons difficult. One of the solutions proposed was to use broader geographic regions, which is the approach taken in Chapter Four. Rather than addressing only the sub-district mortality patterns, cholera deaths are considered for the five main registration districts: North, East, Central, West, and South. While some sub-district boundaries changed between 1849 and 1854, and again between 1854 and 1866, the five registration districts did not experience significant boundary changes, which allows for comparisons between the epidemic years.

Chapters Five, Six, and Seven, while offering the most original research, also present the most challenges methodologically. Each chapter is focused on a specific cholera epidemic. The *Annual Returns* are fairly clear about when each epidemic "began" and "ended," but this in itself is problematic, as the epidemics did not have definitive start and end dates. While the number of cholera deaths may have dropped below a certain threshold – for example, less than eight cholera deaths in a week – there was never a firm "beginning" and "end" to each epidemic. However, the dates used in these chapters correspond to the ones used in *Annual Reports*, with any additional weeks used to provide context for the increase and decline of cholera deaths. The weeks considered in greater detail reflect the overall mortality patterns, and were chosen based on the increase, peak, and decrease of cholera mortality over the course of the entire epidemic.[62]

The second challenge these chapters present is that they examine specific neighbourhoods within the sub-districts, considering their experiences with and responses to cholera. These neighbourhoods were chosen methodically: each chapter considers cholera mortality patterns broadly at first, using the five registration districts, followed by the sub-districts, and then the neighbourhoods. This approach provides the context for the neighbourhood experience, and highlights why these neighbourhoods were chosen: namely, they experienced cholera to the worst degree when compared across London. Within the discussion of cholera in each neighbourhood, there is a street-level analysis of cholera deaths during the height of each epidemic. Of course, this is where the problem of institutional deaths becomes most prevalent. To address this, there are two steps taken. First, acknowledging the institutions present heightens awareness to the potential for misleading mortality figures. Second, the chapters will conduct a standard mortality ratio calculation to evaluate the potential these specific institutions had for skewing the mortality data.

[62] For example, Week 36 is heavily studied in 1849 and 1854's epidemics because this was the peak of the epidemic in terms of crude deaths. Similarly, Week 31 was the peak of the 1866 epidemic.

Standardized Mortality Ratios

Standardized mortality ratios [SMR] are most often used to assess cause-specific mortality patterns within institutions and populations, usually as a measure to address the influence of age and sex distortions.[63] The SMR is useful for comparing mortality patterns between two populations, in this case, a neighbourhood and an institution. Normally, the SMR requires knowing the age distributions of the populations in question. Within this thesis, the SMRs are computed following the approach of Mooney et al. in "Patient Pathways: Solving the Problem of Institutional Mortality in London during the later Nineteenth Century." Mooney et al. do not know the age distributions within their case studies, and this information is also not known for the populations considered in this thesis. The lack of age distribution information does not invalidate the SMR comparisons, as it is being used to assess cause-specific mortality rather than the influence of age in mortality patterns, though it is important to note it as a limitation in the methodology.

To calculate the SMR, there are four data points needed: (1) the population of the neighbourhood, (2) the number of deaths within the neighbourhood, (3) the population of the institution, and (4) the number of deaths within the institution. The SMR is calculated by comparing the total number of observed deaths versus the number of expected deaths:

Observed deaths = the number of deaths in the institution

Expected deaths = (the number of deaths in the neighbourhood ÷ the population of neighbourhood) * the population of the institution

SMR = (Observed / Expected) * 100

[63] Mooney, Luckin, and Tanner, "Patient Pathways," pg. 242.

The ratio of observed deaths versus expected deaths, when multiplied by 100, gives a number higher or lower than 100. If it is higher, then the number of deaths experienced is higher than the expected deaths (an excess of deaths); if it is lower, the number of deaths experienced is lower than the expected deaths (a deficit of deaths).[64]

Using the SMR calculation provides insight into the number of cause-specific deaths within an institution which would, in a perfect world, reflect the mortality patterns of the neighbourhood. However, because institutions were notorious for skewing the mortality patterns because they attracted populations who were vulnerable – either due to poverty, age, or sickness – the SMR gives an indication how much the institutions impacted the mortality patterns.[65] One potential problem with using the SMR is that when neighbourhoods had a low death rate and its institution had a high death rate with a low inmate population, the excess of deaths can be in the thousands when expressed as a percentage.[66] For example, consider the neighbourhood of Tottenham Court in Pancras during the 1848 cholera epidemic. This particular neighbourhood housed University College Hospital, so one would expect a SMR rate above 100, indicating an excess of deaths due to the presence of such a large institution. For example:

[64] Mooney, Luckin, and Tanner, "Patient Pathways," pg. 242.
[65] It is also worth noting that institutional numbers had a high degree of fluctuation which reflected external events, including epidemic diseases. The presence of an epidemic disease could easily increase the total population of the institution, thus further inflating the mortality figures.
[66] All SMRs are understood as percentages due to the final step in the calculation, which is to multiply by 100.

Observed deaths = 31 deaths in University College Hospital

Expected deaths = (61 cholera deaths in the neighbourhood ÷ 26,800 people in the neighbourhood based on the 1841 census) * 110, which was the population of the institution

SMR = (Observed / Expected) * 100

= (31 / 0.250) * 100

= 12,382

The SMR for Tottenham Court works out to over 12,000 percent, indicating that the number of deaths which occurred is in extreme excess compared to what the neighbourhood experienced. Of course, this number does not tell us much about the actual cholera experience apart from the fact that University College Hospital experienced more cholera deaths than the neighbourhood did based on its population. The SMR provides a useful insight into the relationship of deaths between the neighbourhood and the institution, but the percentage of excess death is difficult to grasp when it is so big.

The other problem with relying on the SMR to indicate mortality patterns within institutions is the availability and reliability of the data points. Fortunately, the number of cholera deaths within institutions was fairly well reported during the epidemic years, as was the number of inmates or patients in each institution. This data, which is usually found in reports written by medical officers of health, is cross-checked with information provided in the *Annual Reports* when possible. The *Weekly Returns* published qualitative information about cholera deaths during each epidemic, including deaths which occurred in institutions.[67] This provides some

[67] In many cases, the origin of the patient is also noted, which would make it possible to reallocate the number of deaths to their proper place. However, given that this is a time-consuming task and one which is difficult to do without complete records, reallocation is not considered within these chapters.

insight into the number of institutional deaths, but for the purposes of reliability, the numbers used for calculations within the chapters are only those that have been verified by a qualitative source. This means that unless the institutional mortality figure *and* the institutional population were published as the same number in two different sources, the SMR is not calculable. It is possible to speculate the number of cholera deaths in institutions by counting the deaths reported in the excerpts printed by the *Weekly Returns*, but this number is by no means fully representative of the scope of cholera in an institution. By proactively being selective about which figures are used in the SMR calculations, the thesis upholds a higher degree of accuracy in its representation of cholera mortality patterns and the influence of institutions.

The Practicalities of Using the Annual Reports

This section details how the *Weekly Returns of Births and Deaths* were used to produce the mortality statistics featured in the following chapters. The *Weekly Returns* for the period under study (1840-1870) are not digitized, and the first step in gathering the data needed was to travel to London, England, where every page of the *Weekly Returns* from 1840 until 1870 was photographed. This yielded thousands of photographs, which were sorted by year. The next step was transcribing the necessary data. Using Excel spreadsheets, the necessary data from each *Weekly Return* was recorded.[68] This included deaths from all causes, zymotic deaths, diarrhoea deaths, dysentery deaths, and cholera deaths. Also transcribed were the age and sex breakdowns for deaths from all causes, zymotic deaths, and cholera deaths. There were many weeks where the number of deaths from the age categories (which were 0-15, 15-60, and 60+) or the sexes

[68] A brief note about the use of the term "Week" throughout the thesis. The *Weekly Returns* are published and sorted by week of the year. For consistency, this thesis uses the weekly association of mortality data rather than the specific dates as they corresponded to weeks. For a table showing the dates with each week for 1848, 1849, 1853, 1854, and 1866, see Appendix B.

(male and female) did not match the total number of deaths reported for that week. In this instance, the reported total was used rather than the one calculated by adding together the different age or sex categories for the week. This ensured maximum accuracy and consistency, as weekly totals were often collated into tables which reported mortality rates over several weeks. The *Weekly Returns* also included geographic breakdowns of mortality. The total number of deaths per district was reported weekly, as was the total number of deaths per sub-district. During epidemic years, more specific data was included to reflect cholera deaths in sub-districts and neighbourhoods. All of this was transcribed into Excel tables. Once the transcription process was complete, the collected data was used to calculate mortality rates according to year, week, district, sub-district, neighbourhood, age, and sex. These were standard percentage calculations, which were done in Excel and rounded to the nearest whole number. The mortality figures reported throughout the chapters reflect this methodology.

The next step in producing the mortality figures for Chapters Five, Six, and Seven specifically relied on having street-level data for the epidemic weeks. The *Weekly Returns*, during epidemic periods, included reports (or sometimes Supplements) which provided written records of cholera deaths recorded. These notes included the sex, age, address, occupation, and disease experience. These reports were transcribed, which allowed the creation of choropleth maps at the sub-district, neighbourhood, and street levels. It is important to note, however, that these reports are *not* inclusive of every cholera death, and the total number of reports transcribed for any given week does not necessarily match the total number of cholera deaths reported. For this reason, only reported data was used whenever possible, and when the qualitative reports were used to produce a figure, there is a footnote in the text highlighting this limitation.

Creating the maps required using GIS software (Geographic Information Systems). Using a historical map of London, this software enabled the creation of map layers which could be manipulated to show mortality patterns for different weeks at the district, sub-district, and neighbourhood level. The base map was the 1884 "Map of London and its Environs, shewing the Boundary of the Jurisdiction of the Metropolitan Board of Works."[69]

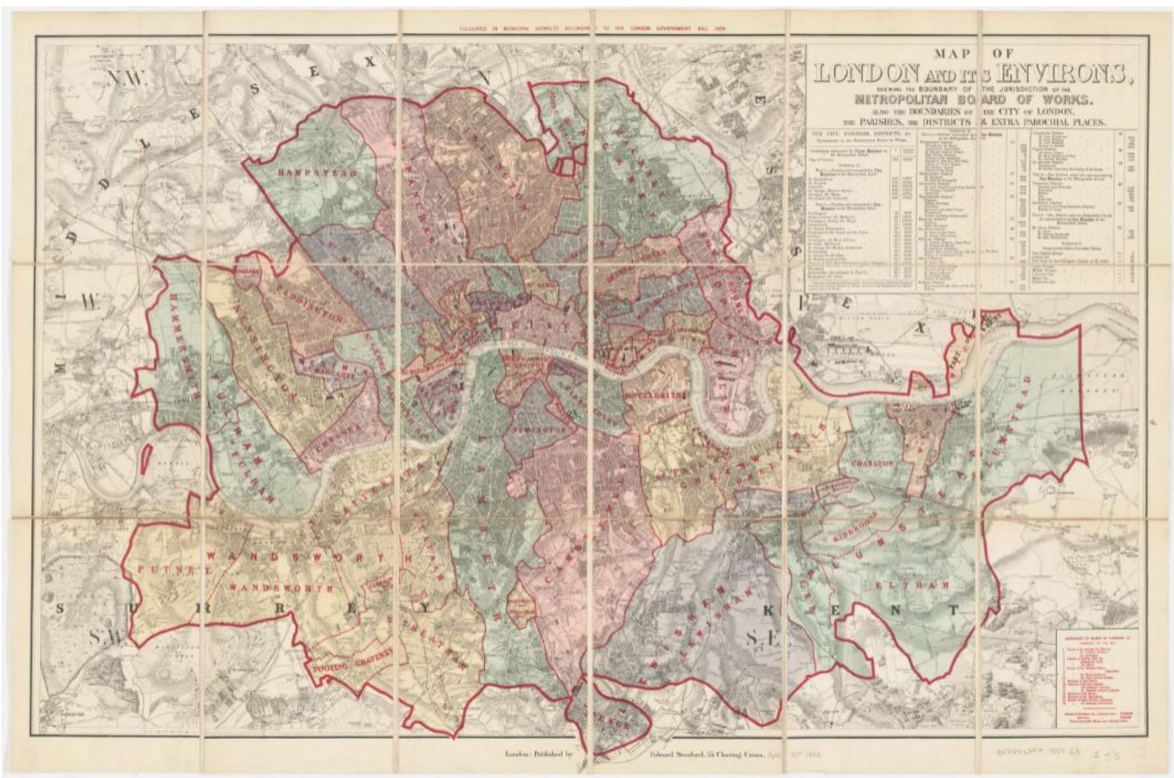

Figure I.1 – 1884 "Map of London and its Environs, shewing the Boundary of the Jurisdiction of the Metropolitan Board of Works."

[69] Other maps considered were "Map of London and its Environs – Poor Law Unions," (London: Edward Stanford, 21 April 1844), provided by Harvard University, available online at: https://iiif.lib.harvard.edu/manifests/view/ids:7066357; "Cholera Map of the Metropolis, 1849, Exhibited in the Registration Districts," *Report on the Cholera of the General Board of Health*, Wellcome Images, available online at: https://wellcomecollection.org/works/hjutkspw. For a magnified view of Figure I.1 and the other maps detailed above, see Appendix B. "Map of London and its Environs, shewing the Boundary of the Jurisdiction of the Metropolitan Board of Works," (London: Edward Stanford, 21 April 1884), provided by Harvard University, available online at: https://iiif.lib.harvard.edu/manifests/view/ids:7066353.

This map, though produced in 1884, was chosen because it clearly delineated the boundaries between all the sub-districts. Because the sub-district boundaries outlined in the Metropolitan Board of Works were based on traditional parish boundaries, it was deemed acceptable to use this map for the epidemics of 1849 and 1854, which took place before the Metropolitan Board of Works was formed.[70] Once the map was digitized and the layers were functional, the software allowed for inputting mortality data, which produced the choropleth maps featured in Chapters Four, Five, Six, and Seven. This process in itself serves as a valuable contribution to the existing cholera scholarship, as the map layers are easily shared and manipulated to demonstrate mortality rates for any mortality data taken from nineteenth century London.

The street-level maps were created by hand. The mortality per street was calculated using the street-level reports above. Once the number of deaths per street was known, a coloured legend was made to represent cholera mortality and PowerPoint wasused to carefully highlight different streets with the corresponding colours. The base map used for this portion of the project was Edward Weller's "Map of London 1868," which has been digitized at a high resolution.[71]

[70] Further, another map was produced at the same time by the same printer which was labelled "Poor Law Unions," and the two maps are identical, which further suggested that old boundaries on a newer map were still accurate.
[71] For a magnified version of Figure I.2, see Appendix B. Edward Weller, "Map of London 1868," *MAPCO (Map and Plan Collection Online*), available online at: http://london1868.com/index.htm.

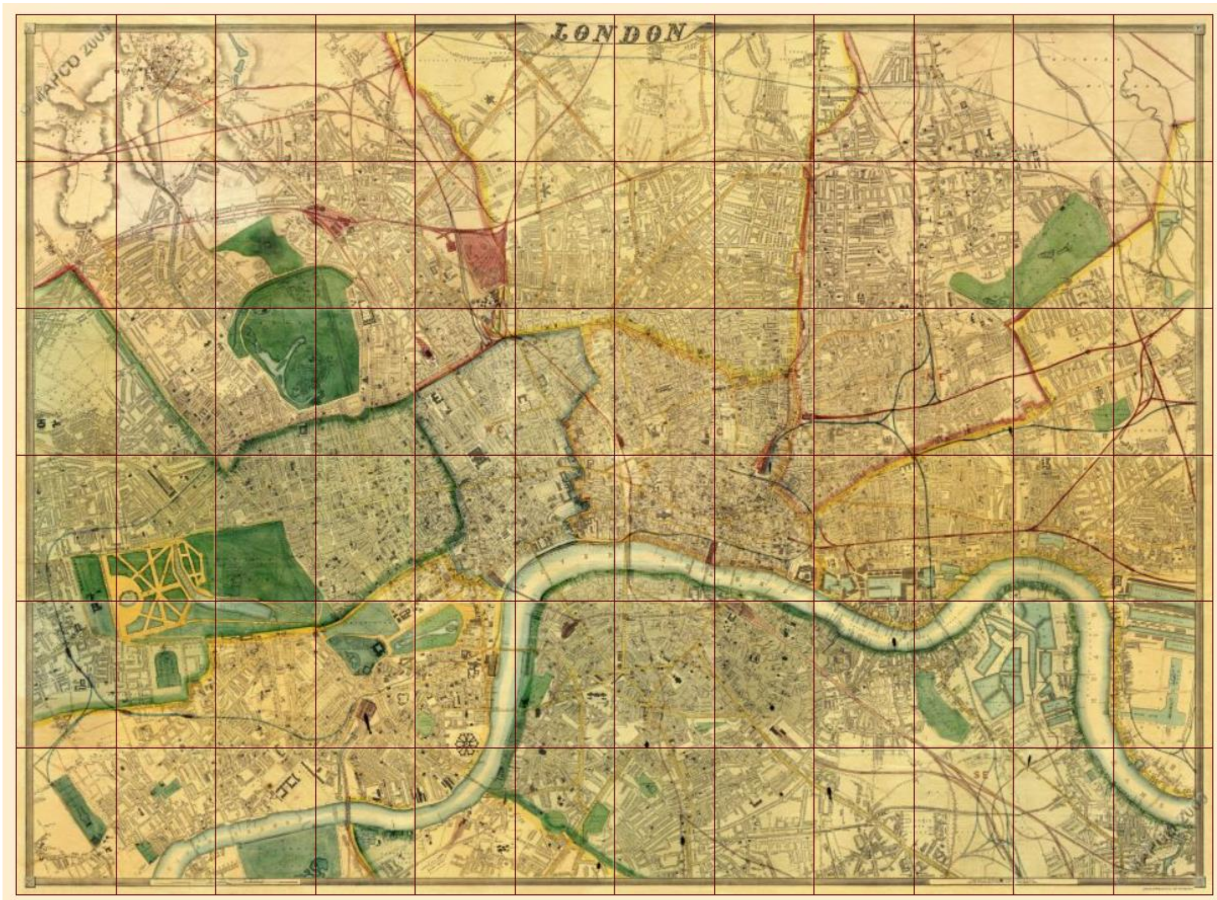

Figure I.2 - "Map of London 1868" by Edward Weller

I was able to download specific neighbourhood maps while retaining the quality needed to identify the streets. One important note: the naming of streets was not a standard practice in the nineteenth century, and there are several instances where the street names were spelled in numerous variations or included different designations (street, terrace, crescent, walk, row, and so on). The streets were grouped together when it was obvious they were the same – for example, family members dying at the same house number – but the number of deaths per street reflected original designations and were not amalgamated. This decision meant that while there may have been some streets which were under-represented, it ensured as much accuracy as possible. Finding the streets on the maps was challenging, particularly for 1849, as the base map used was nineteen years older than the street-level data. Using reference guides to London's history, I was often able to find streets which had been renamed. Further, using older maps of London and census records sometimes allowed me to find the general location of the street, which made it easier to find the corresponding street on the 1868 map.[72] Together, this research enabled me to accurately plot 1849 mortality data onto an 1869 map.

The process of collecting the data from the *Weekly Returns*, transcribing it, and creating maps was lengthy, but the data it yielded serves as the basis for the following thesis, and is an invaluable contribution to the historiography of cholera, as well as mortality patterns in nineteenth-century London. Further, the maps created – the ones made using GIS software and the ones done by hand – are never-before-seen representations of mortality in London.

Conclusion

This Introduction has highlighted the main themes of the thesis, as well as described the sources and methodology used in its creation. The use of the *Weekly Returns of Births and Deaths in London* is discussed throughout, and the sections above detail how this source is used, what its limitations are, and how to address these issues. The following chapter, which is the Literature Review, will provide the historiographical framework necessary for contextualizing the work done in subsequent chapters. The Literature Review will address more fully the research questions of the thesis, and how they relate to the existing historiography. The rest of the thesis will use these research questions to depict the cholera experience and public health

[72] Other maps consulted included "Cross's London Guide 1844," *MAPCO (Map and Plan Collection Online)*, available online at http://mapco.net/cross1844/cross1844.htm; C. &. J. Greenwood's "Map of London," (London: Josiah Neele, 31 August 1830), provided by Harvard University, available online at https://iiif.lib.harvard.edu/manifests/view/ids:8982548. To see these maps, see Appendix B. For street referencing, see "London Census 1891 Transcription Blog," available online at: http://www.census1891.com/streets-a.php.

responses to this disease in Victorian London during the 1849, 1854, and 1866 cholera epidemics.

Chapter One

Literature Review

As the most-studied disease of the nineteenth century, cholera's place in academic scholarship is well established. There are several frameworks through which cholera is studied, and this chapter discusses the following: cholera in the nineteenth-century world; cholera in the Imperial world; cholera and nineteenth-century medicine; the politics of sanitary reform, and cholera and the debate over the decline in mortality. Each section will consider notable academic works, compare differing perspectives, and highlight any theoretical debates which exist in the scholarship. The chapter concludes by outlining the research questions of this thesis and providing a brief overview of the following chapters.

Cholera in the Nineteenth-Century World

Cholera is one of the most studied diseases of the nineteenth century and has featured prominently in the scholarship of the social and medical history of Modern Britain. Asa Briggs's article in *Past and Present* (1961) provides the first concise understanding of the complexity of cholera's impact. Illustrating how cholera drew out class tensions, Briggs highlighted cholera within nineteenth-century society. He argues that cholera was a disease that "hit the poor particularly ruthlessly" and yet swept through society *en masse*, claiming rich and poor alike.[1] This disease, which paid no heed to age or sex, incited social fear which, in turn, defined society's response to cholera policies put in place by the government. This fear, coupled with strong religious beliefs that cholera was sent by God as punishment for ungodly behaviour, led to

[1] Asa Briggs, "Cholera and Society in the Nineteenth Century," *Past and Present* 19:1 (1961), pg. 76.

rapidly changing attitudes among the poor towards social control.[2] Briggs emphasizes the importance of social contexts – demographic, economic, political, administrative, and medical – when conducting studies on cholera. Following Briggs's study, historians began looking at cholera with respect to these multiple considerations, producing scholarship whose broad themes portray how cholera influenced diverse aspects of Victorian life.

The interest in cholera as a defining social event was shared by leading American scholars. Shortly after the appearance of the *Past and Present* article, Charles Rosenberg published two works on cholera in quick succession – a study of North America in 1962 and one on Europe in 1966. Both of his publications chart cholera's movement across space and time and consider the movement of the disease in and between urban centres. Building on Briggs's approach, Rosenberg uses cholera as a framework for understanding broader social and economic phenomena, including public health movements, religious beliefs, and the scientific transformation that occurred in the middle decades of the 1800s. Rosenberg also illustrates how the Indian origins of cholera created a picture of it as an "Oriental" disease, one which threatened the "advanced civilization" of Western, European countries.[3]

Following Briggs and Rosenberg's seminal works, which brought cholera to the forefront of research in medical history, there was a surge of publications which considered cholera within the British context. Published the same year as Rosenberg's study on Europe, Norman Longmate's book conducts case studies of each cholera epidemic in specific British towns. Beginning in Sunderland in 1831, Longmate works through case studies of Merthyr in 1849, and Oxford in 1854. Scattered throughout the book are anecdotes from cities including Glasgow,

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[2] Briggs, "Cholera and Society in the Nineteenth Century," pg. 84.

[3] Charles Rosenberg, *The Cholera Years: The United States in 1832, 1849, and 1866* (Chicago: University of Chicago Press, 1962); Charles Rosenberg, "Cholera in Nineteenth-Century Europe: A Tool for Social and Economic Analysis," *Comparative Studies in Society and History* 8:3 (1966), pgs. 452-463.

Manchester, London, and Exeter. Focusing on specific times and places, Longmate weaves the accounts of cholera into a narrative that tells the story of cholera in Britain.[4]

As urban history became increasingly popular in the 1970s, scholars began to examine the long-term infrastructure projects and public health initiatives that arose in response to the waves of cholera epidemics. R. J. Morris, for example, traces the actions of the Boards of Health in response to the 1831-32 epidemic. He argues that efforts to contain cholera were made but they were temporary at best; the long-term infrastructure that would be needed to effectively combat cholera in England was not apparent in 1832. Rather, it took the chaos of an unprecedented cholera outbreak in the 1840s to force public health initiatives into place. According to him, it was not until 1848 that a "partial" solution was created in the Public Health Act, which began the process of creating permanent Boards of Health in Britain.[5] Similarly, Michael Durey analyzes the social response to cholera within the framework of previous epidemic responses. Much like Morris, Durey concludes that the impact of the 1831-32 epidemic is best seen in the responses to the 1849 epidemic and how infrastructure began to form in the 1850s and 60s. However, Durey argues that "what emerges from this study is a picture of a society which, although undergoing rapid change and at times shaky on its foundations, was basically stable and able to absorb an epidemic with surprising resilience." This conclusion, he continues, "Adds a further dimension to our understanding of how British society withstood, or mediated, the pressures of urbanisation, industrialisation and population growth in the first half of the nineteenth century."[6] Whereas Morris defines the cholera epidemic of 1831-32 as a moment of weakness in British

[4] Norman Longmate, *King Cholera: The Biography of a Disease* (London: Hamish Hamilton, Ltd., 1966).
[5] R. J. Morris, *Cholera 1832: The Social Response to an Epidemic* (New York: Holmes & Meier Publishers, 1976), pgs. 197, 200, 204-210.
[6] Michael Durey, *The Return of the Plague: British Society and the Cholera, 1831-32* (New York: Humanities Press, 1979), pg. 4.

history, an event which showcased the unpreparedness of urban and rural regions to cope with the threat of epidemic disease, Durey views it as a testament of strength and resilience among the British population who overcame the disastrous and deadly disease and used the experience as a springboard for future public health policies.

While the 1831-32 epidemic gained notoriety for being the first large-scale cholera epidemic in England, and the 1866 epidemic is known as the last, the 1848-49 and 1854 epidemics hold very little attention in their own right. In 1985, Gerard Kearns published a short article as part of the Historical Geography Research Series through the University of Liverpool, which looks critically at the mortality data for London's cholera outbreak in 1848-49. Apart from focusing on a lesser-studied epidemic, the article is one of the few sources which exists that is almost entirely quantitatively based. The essay addresses more than mortality patterns, analyzing important considerations historians must have when geographically studying cholera mortality patterns. While valuable for its methodology, the conclusions it draws are difficult to use in a comparative study because they are so specific to 1848-49. By contrast, the 1854 epidemic is well known in popular history due to John Snow's apocryphal removal of the handle of the Broad Street pump but has not been the topic of any substantial academic scholarship.[7]

By contrast, 1866's epidemic has been the focus of multiple studies. Mostly showcasing the relationship between cholera and public health measures, these studies are often multi-disciplinary, as many scholars treat cholera as one aspect in an ever-expanding complex network of factors that defined the Victorian era. Bill Luckin parses the harsh reality of the fourth cholera outbreak the country experienced in just under forty years. For him, the 1866 outbreak was an

[7] Gerard Kearns, "Urban Epidemics and Historical Geography: Cholera in London, 1848-9," *Historical Geography Research Series* 15 (1985). For more on John Snow's life and medical work, see Peter Vinten-Johansen et al., *Cholera, Chloroform, and the Science of Medicine: A Life of John Snow* (Oxford, UK: Oxford University Press, 2003); Sandra Hempel, *The Medical Detective: John Snow and the Mystery of Cholera* (London: Granta, 2006).

example of “the extraordinarily diverse spectrum of attitudes towards water-transmitted disease which were in competition for intellectual and social hegemony in Britain in the mid-1860s.”[8] Luckin’s article looks specifically at the actions taken by water companies in the struggle to obtain safe drinking water, as well as the parliamentary investigations undertaken following the epidemic regarding the culpability of the East London Company, which was found to be responsible for over 4,000 deaths as a result of not moving their intake pipe when ordered to do so. Luckin fits this account into a wider picture of the changing understandings of the relationship between water and the transmission of cholera, along with the increasing attention urban reformers were devoting to ensuring adequate water supply in the city.[9]

The interest in cholera as a defining event in the social history of industrial society also found its expression in Canadian scholarship. Echoing the work of Rosenberg and Luckin, Geoffrey Bilson applied the same methods and drew many of the same conclusions. Focusing primarily on the pre-1866 outbreaks in Ontario and Quebec, Bilson draws attention to the long-term impact early cholera epidemics had on Canadian licencing practices within the medical profession, the creation of Boards of Health, and the implementation of quarantine at the local, provincial, and federal level. Bilson’s article, and later book, suggest that the medical profession failed in the face of cholera outbreaks. Unable to agree on a cause or a cure, the medical profession’s indecision instilled a sense of fear among their patients. As a result, their patients began seeking health care from lay practitioners, thus undermining the efforts of Canadian physicians trying to organize and seek professional closure. Along with looking at the role of doctors in the 1830s, Bilson argues that quarantine policies proved especially important in the Canadian context because of the movement of passenger and cargo ships down the St. Lawrence

[8] Bill Luckin, “The Final Catastrophe: Cholera in London, 1866,” *Medical History* 21:1 (1977), pg. 32.
[9] Luckin, “The Final Catastrophe,” pgs. 37, 41-42.

River and into Lower and Upper Canada. The risk of ships bringing disease-carrying immigrants into vibrant, healthy cities was one of the major catalysts in the creation of one of Canada's earliest public health policies.[10]

While Bilson's book remains the sole country-wide analysis of cholera's impact on colonial Canada, small case studies have appeared, looking at various municipal responses. Bruce Curtis, for example, views the responses to cholera in a less negative light than Bilson. For Curtis, the public health policies which emerged due to cholera, particularly those regarding ships carrying immigrants, were not unique to Canada. However, the cooperation seen between local boards of health and General Boards of Health is unlike the experiences found in the United States or England. The three-tiered response that was established in the face of the 1866 outbreak was effective and largely responsible for limiting cholera's impact in Canada. Curtis recounts this history as a success story for Canadian public health, and the transiency of cholera, along with the relationship between the disease and public health policies, became its own topic in scholarship, especially when considering cholera in the context of the imperial world.[11] His conclusions have largely been supported by case studies of Toronto and Halifax which testify to the centrality of cholera in the establishment and permanency of Boards of Health in the colonies of British North America.[12] Cholera, of course, was hardly a phenomenon of the British world,

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[10] Geoffrey Bilson, "Canadian Doctors and the Cholera," *Canadian Historical Association Historical Papers* (1977), pgs. 104-119; Geoffrey Bilson, *A Darkened House: Cholera in Nineteenth Century Canada* (Toronto: University of Toronto Press, 1980).

[11] The three-tiered response included: distribution of a memorandum from the March medical conference of the General Board of Health to all local boards of health; the creation of Central Board of Health initiatives, which created an effective hierarchical system; and firm orders that all ships arriving at Grosse Isle must be inspected. The use of forms became an objective way to gauge the risk of every incoming ship, its cargo, and passengers. Bruce Curtis, "Social Investment in Medical Forms: 1866 Cholera Scare," *The Canadian Historical Review* 81:3 (2000), pgs. 370-378.

[12] Louise Dechêne et Jean-Claude Robert, «La choléra de 1832 dans le Bas-Canada: Mesure des inégalités devant la mort» in *Santé et Société au Québec: XIXe – XXe siècle*, eds. Peter Keating and Othmar Keel (Québec: Boréal, 1995), pgs. 61-84; Heather MacDougall, "From Cholera to SARS: Communicable Disease Control Procedures in Toronto, 1832-2003," in *SARS in Context: Memory, History, Policy*, eds. Jacalyn Duffin and Arthur

even if British trade with India proved to be a major factor in the transportation of epidemics from the Indian subcontinent into the British empire.[13]

Scholarship on Germany and France focuses particularly on the political frameworks of the cholera epidemics. François Delaporte published the first book that exclusively studied cholera in Paris in 1832. The social response to cholera in Paris in 1832 was full of turmoil and class tension. Delaporte, however, does little to address these tensions from a social perspective. Instead, he works on the changing scientific understanding of cholera, arguing that "the year of cholera was a year of testing for a variety of models, hypotheses, and tactics, all of which played their part in the elaboration of a scientific medicine."[14] Cholera in 1832 transformed the health of the people into a political issue. However, this process took time as cholera was viewed by many as a positive purge to rid society of its dangerous and useless members.[15] Following Delaporte's work on cholera in Paris, Catherine Kudlick conducted a comparative study between the social context of the 1832 and 1849 epidemics in Paris. She argues – and Delaporte's work supports this – that the epidemic of 1832 received a great deal of attention but 1849 received virtually none, a phenomenon Kudlick calls "the great silence." "By contrasting the vivid reactions of 1832 with the apparent silence of 1849," she writes, "this book explores the complex process by which a disease acquired vastly different social and cultural meanings over a relatively short period of time."[16] She determines, over the course of this comparison, that in 1832, the anxieties

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Sweetman (Montreal and Kingston: McGill-Queen's University Press, 2006), pgs. 79-104; Madeline Fowler, "From Empire to Colony: The Halifax Cholera Outbreaks of 1834 and 1866," *Acadiensis* XLVII, no. 2 (Summer/Autumn 2018), pg. 51.

[13] For an unusual comparative study of two diverse locations in the British world, see Michael Zeheter, *Epidemics, Empire, and Environments: Cholera in Madras and Quebec City, 1818-1910* (Pittsburgh, University of Pittsburgh Press, 2015).

[14] François Delaporte, *Disease and Civilization: The Cholera in Paris, 1832* (Cambridge, Massachusetts: The MIT Press, 1986), pg. 197.

[15] Delaporte, *Disease and Civilization*, pgs. 198-199.

[16] Catherine Kudlick, *Cholera in Post-Revolutionary Paris: A Cultural History* (Berkeley, California: University of California Press, 1996), pg. 6.

of the bourgeoise defined the response to cholera. Still in the throes of establishing their societal dominance, cholera represented a threat to the bourgeoise because it was a disease that was rooted in ideas of the Parisian environment and the plebeian population. By 1849, however, the bourgeoise had established their sense of identity and social cohesion. Cholera, though still a medical threat, no longer held the power to topple the social order of Paris and therefore was met with a deafening silence.[17]

Richard Evans continues this interrogation of the relationship between cholera, society, and politics, in his case study of Hamburg, Germany. Evans investigates, in minute detail, the urban environment of Hamburg and the sanitation movement of the city in comparison to Berlin. Evans also spends a great deal of time examining the chronology of cholera in Germany, beginning with the 1831 outbreak. Much of his analysis includes the repercussions of emerging scientific and medical advances of the nineteenth century.[18] The experiences of cholera in Hamburg were consistent with the social responses in Britain and North America. The similarities of Hamburg to the other case studies mentioned raises the question about the emphasis historians need to give to local context. To an extent, local circumstances are relevant but is the behaviour of cholera in an urban environment predictable, even if only at a basic level? In concurrence with the North American context provided by Rosenberg and Bilson, studies of cholera in France and Germany suggests that even an ocean apart, the experiences and responses to cholera in the nineteenth century were remarkably similar. The value of city-based studies is found when looking at unique social and cultural values – for example, the social structure unique to Paris in the

[17] Kudlick, *Cholera in Post-Revolutionary Paris*, pgs. 213, 215.
[18] Richard Evans, *Death in Hamburg: Society and Politics in the Cholera Years, 1830-1910* (Oxford, UK: Oxford University Press, 1987). Mainly, Evans contextualizes this outbreak within the contagionist/anticontagionist debate but supplements this with the work of Max von Pettenkofer in the 1850s and 60, followed by Robert Koch's work in the 1880s.

Victorian era. Evans published a more succinct article which highlights the main points of his book, specifically probing the question as to whether cholera epidemics actually unleashed political revolutions.[19]

Cholera and the Imperial World

Cholera was often known as "Asiatic cholera" during the Victorian era, a recognition of its origins in the Indian subcontinent in the Bay of Bengal. With the establishment and extension of the British Raj, and the imperial networks of trade and transportation, it is unsurprising that the response to cholera in India often reflected British concerns and, correspondingly, public health policies. David Arnold and Mark Harrison have both addressed cholera in imperial India. Specifically, they examine the perception of cholera as a disease borne out of the Bay of Bengal which had become endemic in large parts of British India. As a result, the disease environment of India was viewed as a threat to British health, and the British body was perceived as superior to the Indian body – a perspective which reinforced ideas of colonialism and the need for a "civilizing" presence in the country. Due to its origin in India, and because the medical system in India was "underdeveloped" compared to British medicine, cholera was often seen as an "Oriental" disease to Britons residing in England and Scotland, a threat that had travelled from

[19] Richard Evans, "Epidemics and Revolutions: Cholera in Nineteenth Century Europe," *Past and Present* 120 (1988), pgs. 123-46.

their imperial territory to home soil.[20] As can be seen in Figure 1.1, cholera became personified as the threat India posed to the British way of life and John Bull valiantly protected English borders with their Boards of Health and public health policies.

Figure 1.1 – "John Bull Catches the Cholera: Comparing the Reform Bill to the Cholera Epidemic." Coloured lithograph, c. 1832. Courtesy of Wellcome Images, available online at: https://wellcomecollection.org/works/ebp6me9z.

The ease with which cholera crossed national boundaries inevitably led to discussions between nations about preventative sanitary measures. The most common of these was quarantine, which Britain enforced sporadically through much of the nineteenth-century.[21] Cholera, and the quarantine response, were heavily discussed at the eight International Sanitary Conferences [ISC] which occurred between 1851 and 1894 and exclusively addressed the dangers cholera posed to Europe.[22] The content of the conferences changed over the years to reflect the changing scientific understanding of cholera. The first four ISCs revolved around questions of disease transmission. The contagion/anticontagion debate was raging and politicians often let economic fallout influence their opinions on which theory of

[20] For discussions on British colonialism and cholera in India, see David Arnold, "Cholera and Colonialism in British India," *Past and Present* 113 (1986), pgs. 118-151; David Arnold, "The Indian Ocean as a Disease Zone, 1500-1950," *South Asia: Journal of South Asian Studies* 14:2 (1991), pgs. 1-21; Mark Harrison, "'A Question of Locality': The Identity of Cholera in British India, 1860-1890," in *Warm Climates and Western Medicine*, ed. David Arnold (Amsterdam: Rodopi, 1996), pgs. 133-159; Mark Harrison, "Cholera Theory and Sanitary Policy," in *Public Health in British India: Anglo-Indian Preventive Medicine, 1859-1914*, Mark Harrison (Cambridge, UK: Cambridge University Press, 1994), pgs. 99-116.
[21] For an in-depth history of quarantine, see Alex Chase-Levenson, *The Yellow Flag: Quarantine and the British Mediterranean World, 1780-1860* (Cambridge, UK: Cambridge University Press, 2020). Chase-Levenson, *The Yellow Flag*, pgs. 16-17.
[22] Conferences were held in 1851 (Paris), 1859 (Paris), 1866 (Constantinople), 1874 (Vienna), 1885 (Rome), 1892 (Vienna), 1893 (Dresden), and 1894 (Paris).

disease transmission was most accurate.[23] Those who advocated the anticontagionist perspective did so because they recognized that a contagious disease would undoubtedly mean forced quarantine. On an international scale, quarantining ships containing raw materials, manufactured goods, and passengers was an vast expense. Following Koch's discovery of the cholera bacteria in 1883, the conferences began looking at how to contain cholera to infected ships, particularly in the Suez Canal. There was also a great deal of discussion about the mobility of religious pilgrims making their way to Mecca. The control of borders – land and sea – dominated the discussion during the 1890s conferences.[24]

Arguably the most important ISC was the one held in 1866. This was the conference at which "the conflict between the 'Orient' and the West became more explicit."[25] It drew out the tensions between modernity and backwardness, civilization and stagnation – issues which lay at the heart of British colonization. These ideas were exacerbated by cholera's presence, as the disease challenged notions of sanitation, medicine, and imperial control; the British believed their presence would solve India's problems by imposing structured government and public health policies, doing away with medicine not founded in any scientific theory, while the Indians believed that cholera was the result of British soldiers, a retribution from the deities and spread by the heavy movement of British troops.[26] The 1866 Conference drew clear boundaries between the Eastern and Western ways of life, with Turkey as the country connecting the two geographically. It was also at this Conference that the high degree of transiency of Mecca-bound pilgrims was called into question because they represented the threat of cholera traversing land

[23] Chase-Levenson, *The Yellow Flag*, pg. 15.
[24] Valeska Huber, "The Unification of the Globe by Disease? The International Sanitary Conferences on Cholera, 1851-1894," *The Historical Journal* 49:2 (2006), pgs. 453-476.
[25] Huber, "The Unification of the Globe by Disease?", pg. 462.
[26] David Arnold's "Cholera and Colonialism in British India" discusses in-depth the tensions and relationships between cholera, British imperialism, and Indian medicine and society.

and sea borders – a threat identified by the British, though they underplayed the equally high degree of movement of their own troops into and around India.[27] As the understanding of cholera emerged with Koch's laboratory findings, the ISC began discussing more in-depth responses to a disease that was crossing borders and becoming international in scope. The ISC, Huber argues, was intended to unite the globe in defence against cholera but instead created strong political alliances based on medical theories of disease transmission, economic interest, and ideas about a society half a world away.[28]

Cholera and Nineteenth-Century Medicine

Cholera precipitated a passionate and diverse debate about disease causation, one that had at its centre the ongoing concern over urban sanitation. Consequently, many historians have examined the complex relationship between cholera, medical thought, and urban sanitation, probing at the competing medical theories of contagion and asking how the understanding of cholera as a disease shaped public health discourse. Margaret Pelling's pioneering work, for example, examined the pluralistic medical understanding of cholera in the nineteenth century. Pelling argues that the standard dichotomy of understanding cholera – pitting contagionist versus anticontagionist theories of disease transmission – is too simplistic for nineteenth-century medical thought. Rather, she suggests that the medical understanding of cholera was a fluid and dynamic process, with many physicians posing theories which ranged between contagion and anticontagionist rhetoric.[29] The contagionist theory posited that cholera transmitted via direct

[27] Huber, "The Unification of the Globe by Disease?," pg. 462.
[28] Chapter Nine of *The Yellow Flag* discusses in-depth the complex relationship between science, medicine, race, and quarantine in the mid-nineteenth century.
[29] This is an argument also discussed in Christopher Hamlin's "Predisposing Causes and Public Health in Early Nineteenth-Century Medical Thought," *Social History of Medicine* 15:1 (1992), pgs. 43-70.

contact between people, and this is what created country-wide epidemics, whereas the anticontagionist theory argued that cholera occurred as a result of environmental factors and did not rely on human agency to spread in any given population. Pelling spends the better part of her conclusion criticizing the work of historian Erwin Ackerknecht's paper "Anticontagionism, 1821-1867."[30] She believes this 1948 account is too focused on "the ascendancy of anticontagionism," arguing that it "coincides with the rise of liberalism, its decline with the victory of the reaction."[31] By linking anticontagionism to the political and social context, Ackerknecht is limiting his view of the breadth of the medical profession. Not only does he undermine the contagionist movement, but he overlooks the other, lesser-known theories. It is these theories to which Pelling devotes her book.

Pelling emphasizes the flexibility in the way the English people responded to disease. Her seven chapters cover the theories of Edwin Chadwick and Southwood Smith, ardent anticontagionists; William Farr, who was an anticontagionist with the belief that some zymotic diseases, including cholera, could be transmitted via direct contact; Justus Liebig's theory that cholera was caused by fermentation of the blood; Robert Hunt's electrical theory, which suggested cholera was the result of a low level of ozone due a lack of electric activity; the cholera-fungal theory upheld by the Bristol Medico-Chirurgical Society in 1849; John Snow and William Budd's contagionist perspective which endorsed water as the primary vector; Pasteur's demonstrated existence of pathological organisms in the 1860s; and finally Robert Koch's

[30] Pelling is not the only author to pen a response to Ackerknect's article. Peter Baldwin published a monography in 2009 which addresses the contagion-anticontagion debate, though his study is organized around specific diseases (including cholera) rather than the numerous schools of thought behind disease causation, which is how Pelling organized her book. See Peter Baldwin, *Contagion and the State in Europe, 1830-1930* (Cambridge, UK: Cambridge University Press, 2005).
[31] Erwin Ackerknecht, "Anticontagionism, 1821-1867," *Bulletin for the History of Medicine* 22 (September 1948), pg. 589, quoted in Margaret Pelling, *Cholera, Fever, and English Medicine, 1825-1865* (Oxford, UK: Oxford University Press, 1978), pg. 299.

discovery of the *vibrio cholerae* organism in 1883 (even though Italian Filippo Pacini discovered it first in 1854). Pelling's extensive look at the multiple players active in the nineteenth century challenges the "two sides" mentality that is found in the contagionists/anticontagionist dichotomy and indicates that Ackerknecht's "Anticontagionism" is too simple an account.[32]

The complexity of medical thought in the nineteenth century is an important consideration when trying to understand the history of public health; public health policies needed to reflect changing ideas of how diseases occurred and were transmitted. Christopher Hamlin continues the historical exploration of the theories of predisposing causes and the way the idea of predisposition influenced society's understanding of disease. While acknowledging Margaret Pelling's argument that the contagionist/anticontagionist dichotomy is too oversimplified, Hamlin offers up alternative frameworks for understanding the early public health movements by looking at how ideas of predisposing causes influenced public health and preventive medicine. He argues that predisposition-oriented medicine was quite common in Victorian England. This, in turn, created a much more accurate and flexible framework for understanding nineteenth-century public health.[33] The shift from diseases of the individual (humoural theory) to general questions about the presence of particular diseases in particular populations led to the rise of public health questions which focused on the relationship between medicine and society. Predisposition, Hamlin argues, could not be disproven and it could not be ignored. This gave birth to an era of medicine which was preoccupied with relations of class as well as economic and national efficiency.[34]

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[32] It is important to note that while Pelling focuses on theories revolving around cholera, one of the arguments she sets out to prove (and subsequently undermines) is that fevers deserve much more attention than cholera when it comes to studying theories of disease transmission. Fevers were more consistent and intermittent throughout the century, thus making their explanations more suited for understanding the nuances of disease transmission. Pelling, *Cholera, Fever and English Medicine*, pg. 301.
[33] Hamlin, "Predisposing Causes and Public Health," pg. 52.
[34] Hamlin, "Predisposing Causes and Public Health," pg. 70.

The Politics of Sanitary Reform

In an effort to link medical thought, public health, and social consciousness, Michael Sigsworth and Michael Worboys co-authored an article in 1994 which "discusses distinctive working-class views and actions on public health in the heroic period of sanitary reform between the Public Health Acts of 1848 and 1857."[35] Most historians believe, Sigsworth and Worboys argue, that urban conditions were so bad that any sanitary improvement surely must have been welcomed. However, their paper looks at overwhelming evidence that there was significant resistance to many public health policies, especially during the 1832 cholera outbreak. While the working population did notice horrid sanitary conditions, they were more focused on restoring their rights to sanitary conditions rather than narrowing in on specific and technical reforms. This meant the primary target in their unrest was not the changing sanitary landscape – though Michelle Allen, in her 2008 book, points out there was resistance to changing physical spaces – but rather the legislative bodies that they believed had infringed upon their rights.[36] In order to understand public health "from below," meaning from the perspective of the working population, it is necessary to go beyond Chadwickian rhetoric and explore the popular understandings of health and disease, the perceived responsibility of the government in creating and enforcing effective public health policies, the importance of local knowledge, and the economic implications of shelter, food, water, and fatigue.

Hamlin built off this idea in a further study published in 1998, which similarly argued that public health measures were as much political as they were medical. Hamlin points out that Edwin Chadwick, the father of the sanitary revolution and author of the 1842 *Report on the*

[35] Michael Sigsworth and Michael Worboys, "The Public's View of Public Health in Mid-Victorian Britain," *Urban History* 21:2 (1994), pg. 238.
[36] Sigsworth and Worboys, "The Public's View of Public Health," pg. 241; Michelle Allen, *Cleansing the City: Sanitary geographies in Victorian London* (Athens, Ohio: Ohio University Press, 2008).

Sanitary Conditions of the Labouring Population of Great Britain, dealt little with disease itself and rather focused on creating a sense of societal order and control. The 1842 *Report*, Hamlin argues, was a political document, not a medical one.[37] The introduction of piped water and sewers, Chadwick believed, was the most politically viable route to social stability and organization. Sanitation policies addressed both the physical conditions of the labouring poor, but sanitary reform would also alter the political mindset of the radical reformers, as there was an intrinsic relationship between moral character and the environment.[38]

The political considerations – both the explicit and implicit – and consequences of sanitary reform were framed by considerations of space and the built environment. More recent scholarship has focused on understanding the relationship between cholera and Victorian urban society, wherein society meant not only a collection of people but also the physical spaces they occupied. Pamela Gilbert emphasizes how the relationship between society and space was the foundation of the public health movement, as it linked physical health and moral behaviour with a suitable environment. Social disorder and personal vice could be justified by the environment and these factors, in turn, could explain physical illness.[39] Similarly, Jane Jenson analyzes how cholera and sanitation policy imposed a sense of social order on an otherwise chaotic industrial city. Focusing on citizenship regimes and public health policy, Jenson argues that notions of identity – what that meant in nineteenth-century Britain and to whom citizenship rights were extended – were an important consideration in the creation of effective public health policies. Despite the ongoing contagion/anticontagion debate, the sanitation focus fell on building sewers

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[37] Christopher Hamlin, *Public Health and Social Justice in the Age of Chadwick: Britain, 1800-1854* (Cambridge, UK: Cambridge University Press, 1998), pg. 157.
[38] Hamlin, *Public Health and Social Justice*, pgs. 184-187.
[39] Pamela K. Gilbert, *Mapping the Victorian Social Body* (Albany, New York: State University of New York Press), pg. 9.

and providing clean water.[40] This had a tremendous impact on the social geography of the city, as access to clean water was often an indicator of class. However, when the General Board of Health partnered with Vestry and District Boards of Works to ensure that clean water was available in all locations, the city faced a dramatic remapping, both socially and physically.

Changing physical spaces also altered the social and symbolic meanings of that space. As Michelle Allen insightfully observed, one must look beyond "the aims and accomplishments of sanitary reformers [to] the range of responses to and perceptions of what was essentially a new urban phenomenon – the concerted cultivation of cleanliness."[41] She draws on sources which reflect the people's understanding of physical spaces, such as in Charles Dickens's *Our Mutual Friend* (1865) and George Gissing's *Nether World* (1889), to illustrate how resistance to sanitary improvements were based on social and cultural understandings and uses of physical space. Gilbert's second contribution looks beyond space to people, examining cholera and the Victorian "social body" from 1832 to 1867. She states that cholera's social history is impossible to separate from political and cultural history, and uses her book to argue that the "reception and rhetorical uses of the cholera epidemics" reflect the management of the social body through public health infrastructure as well as the importance of the body for twentieth-century ideas of nationalism.[42] The rapid rise of medical statistics resulted in a society in which every sick body was a deviant body. The cholera epidemics created an urgency to understand the social body and the relationship between public health and society.

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[40] The journey of sourcing clean water in London is the topic of Anne Hardy's "Water and the Search for Public Health in London," *Medical History* 28:3 (1984), pgs. 250-282. Jane Jenson, "Getting to Sewers and Sanitation: Doing Public Health within Nineteenth-Century Britain's Citizenship Regimes," *Politics & Society* 36:4 (2008), pg. 539.
[41] Allen, *Cleansing the City,* pg. 2.
[42] Pamela K. Gilbert, *Cholera and Nation: Doctoring the Social Body in Victorian England* (Albany, New York: State University of New York Press, 2008), pg. 4.

Cholera and the Debate over the Decline in Mortality

Cholera, as one of the most consequential diseases of a rapidly growing urban environment, has become implicated in the more general debate about the decline in mortality in the nineteenth century. In the years following Abdel Omran's theory of the epidemiological transition, the historiography shows several deep-running themes about the declining mortality rate of the nineteenth century, the relationship between disease mortality and public health, and the etiology of "infectious disease." Much of this literature extends to disease mortality beyond cholera.

The epidemiologic transition model is most closely associated with Abdel Omran, whose first influential papers were published over fifty years ago.[43] Building on Kurt Mayer's 1962 article "Developments in the Study of Population," Omran states that epidemiology "is concerned with the distribution of disease and death, and with their determinants and consequences in population groups."[44] An epidemiological transition, therefore, is focused on understanding a fundamental transformation of mortality and fertility trends over a period of time. The epidemiological transition Omran describes involves the shift from a society based on high mortality and high fertility to one which was dominated by low mortality and low fertility. Within this theoretical framework, there are three well-documented eras of mortality in human history. The first is the "age of pestilence and famine," which was characterized by high mortality rates that fluctuated wildly from year to year. This, in turn, prohibited a sustained aggregate population growth, since any short-term population growth would be reversed by

[43] A professor in epidemiology rather than history, Omran's work on the epidemiological transition nonetheless influenced the direction and historiography of the history of medicine in a profound way.
[44] Abdel Omran, "The Epidemiological Transition: A Theory of Epidemiology of Population Change," *Milbank Quarterly* 83:4 (2005), pg. 731. Note that this essay was first published in the *Milbank Memorial Fund Quarterly* 49:1 (pt. 1, 1971), pgs. 509-538.

periodic epidemics, famines, and wars. The second era was the "age of receding pandemics." As epidemic peaks became less frequent, aggregate mortality began to decline gradually over time and the population began to slowly, but steadily, increase. The final era of mortality, according to this school of thought, consists of the "age of degenerative and man-made disease." These deaths – often the result of life-style and "affluence" – are accompanied by general mortality decline towards a stable and historically low level.[45] The transition from infectious to degenerative diseases is determined by three factors: ecobiological determinants (the balance between disease agents, the level of hostility in the environment, and the resistance of the host); socioeconomic and cultural determinants (for example, standards of living, health habits, hygiene, and nutrition); and medical and public health determinants (specific preventative and curative measures to combat disease).[46] At the heart of Omran's theory is the assumption that "the theory of epidemiologic transition begins with the major premise that mortality is a fundamental factor in population dynamics."[47] Acknowledging that population change is determined by subtracting the number of deaths (mortality) from the number of births (fertility) allows historians to "lend theoretical perspective to processes of population change by relating mortality patterns to more specific demographic and socioeconomic trends – both longitudinally and cross-sectionally – through the development of models."[48] Omran builds models which explain broad patterns of change over time. The mortality patterns are observed from a macro perspective which allows Omran's frameworks to exist theoretically rather than supported by numerical evidence. This methodology is a stark contrast to the work of Thomas McKeown,

[45] Most western countries are now in this phase, though many Third-World countries are still in Stage 2. Omran, "The Epidemiological Transition," pgs. 737-738.
[46] These factors occur in concurrence with the aging of the population, meaning that it is expected to see more degenerative diseases as people grow older. Omran, "The Epidemiological Transition," pgs. 739, 741.
[47] Omran, "The Epidemiological Transition," pg. 733.
[48] Omran, "The Epidemiological Transition," pg. 755.

whose renowned *The Modern Rise of the Population* critically examines the epidemiological transition.

Thomas McKeown, a British physician and statistician, argues that the sustained modern growth of the population began in the eighteenth century and has continued to the present day. The world's population, according to McKeown's calculations, had increased from 750 million in 1750, to one billion in 1830, to two billion people by 1930. In 1976, when the book was published, the world's population was approximately four billion.[49] McKeown argument is linked to the study of the changing health and life expectancy of humans – in short, what has caused the net value of births and deaths to balance in such a way to allow for such a sustained and rapid increase.[50]

McKeown's book explores the fundamental observation that an increase in the population reflects an excess of births over deaths in any given society. This simple equation proves more complicated to unpack, as both fertility and mortality can be influenced by a variety of social, political, economic, ecological, or biological factors. McKeown hypothesizes that at the time of the first agricultural revolution, which occurred approximately 10,000 years ago, fertility was constrained by the frequency of intercourse, contraception, abortion, and infanticide.[51] Given these factors, McKeown concludes that the slow population growth among early human societies was likely due to a high mortality rate rather than a low fertility rate.

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[49] For means of comparison, the world's population in 2018 was approximately 7.6 billion. "Current World Population," *Worldometers*, available online at: http://www.worldometers.info/world-population/.
[50] Thomas McKeown, *The Modern Rise of the Population* (London: Edward Arnold (Publishers) Ltd., 1976), pg. 1. It is worth noting that McKeown's book, as well as an earlier article co-authored with R.G. Record, focus on the time period following 1838 even though the modern rise of the population began as early as 1700. The reason for this is that, in Britain, statistics were not uniformly or consistently collected until the establishment of the General Register Office in 1837. McKeown, as well as other historians critiquing McKeown's work, refer to this as the "pre-registration period." McKeown, *The Modern Rise of the Population*, pg. 3.
[51] McKeown, *The Modern Rise of the Population*, pgs. 142, 23.

By comparison, the growth rate of the population in the modern era reflected a sustained excess of births over deaths, made possible by a steady decline in mortality rather than an increase in fertility. Many historians, some of whom will be discussed below, put forth arguments that the rising sanitary provisions and an increasingly scientific approach to medicine were the principal causes of a decline in mortality over the modern era. McKeown famously questions this. Rather, he posits that declining mortality from infectious diseases was the result of improved nutrition, which was itself reflective, at least in part, of a general rise in the standard of living. McKeown affirms three facts about the rise of the population in the nineteenth century: first, that mortality at the beginning of the century was very high; second, that this high mortality rate was due largely to infectious diseases; and third, the greatest risks of death from infectious disease were among infants and young children.[52]

McKeown devotes a great deal of discussion to the categorization and patterns of infectious diseases of the nineteenth century, including cholera. He sub-divides infectious disease into five main categories: airborne diseases; water and foodborne diseases; diseases due to other micro-organisms; conditions not attributed to micro-organisms; and non-infective conditions. McKeown believes that the fall of mortality before 1837 (the pre-registration period) was almost entirely associated with infectious diseases, a pattern which continued into the nineteenth century.[53] Further, he argues that the two important causes of death which could not be attributed to infectious disease were starvation and infanticide. As a result, he concludes that the decline of mortality in the nineteenth century can be attributed to a declining infectious

[52] McKeown, *The Modern Rise of the Population*, pg. 43.
[53] The pre-registration period refers to mortality patterns which occurred before 1837, the year when the General Register Office was established and began recording national statistics on causes of mortality. Before 1837, historians piece together mortality patterns based on existing quantitative records from parishes, as well as qualitative sources.

disease rate, coupled with a minor reduction in deaths from starvation and infanticide.[54] A corollary of his work strongly implied that the traditional explanation for the increase in population and life expectancy – medico-scientific discovery – had been wildly exaggerated. To prove this, he charted the decline of major infectious disease fatalities between 1850 and 1950, illustrating that mortality caused by infectious diseases declined considerably before any known, effective medical interventions.

For almost a decade, McKeown's theory of the rise of the population and the increase in life expectancy went largely unchallenged. In 1988, however, Simon Szreter offered a comprehensive rebuttal of McKeown's findings, and sets out two contestations against McKeown: first, he argues that McKeown spends too much time discussing the decline of tuberculosis during the era of the great cholera epidemics. Second, he contends that McKeown's chronology does not give proper credit to the early sanitation movement and the role of human agency. According to Szreter, McKeown focuses on the decline of respiratory tuberculosis from 1848 to 1854. Szreter argues that the mortality data from this seven-year inclusive time frame indicates the initial mortality decline resulted from the decline of five diseases: tuberculosis, typhoid, scarlet fever, cholera, and convulsions.[55] Further to this point, Szreter argues that McKeown groups all airborne diseases as a unitary group and yet omits influenza. As a result, Szreter believes it became easier for McKeown to prove his theory of nutritional improvement. Because most airborne diseases rely on the environment, tuberculosis proves an exception because it is transmitted both by air but also by contaminated food and drink. By grouping

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[54] McKeown, *The Modern Rise of the Population*, pg. 71-72.
[55] Simon Szreter, "The Importance of Social Intervention in Britain's Mortality Decline *c*. 1850-1914: a Re-interpretation of the Role of Public Health," *Social History of Medicine* 1:1 (April 1988), pgs. 11-12.

airborne diseases together, and focusing solely on tuberculosis, McKeown undermined the importance of environmental considerations that contributed to their decline.[56]

Szreter also challenges McKeown's timeline of medical and public health advancements. In what he calls the "heroic age of public health activism and legislation," Szreter discusses the multiple public health acts and bills that were passed in England during the period discussed by this thesis – that is, between 1830 and 1875.[57] Szreter acknowledges that there is no direct relationship between public health activism and mortality decline on a grand scale, but Szreter points to the importance of local public health movements, particularly in the 1860s.[58] In this way, Szreter argues, the decline of mortality can be viewed as a direct result of the public health movement – a grass-roots network of preventative measures that led to the eventual eradication of several key diseases, including typhoid, smallpox, and cholera.[59] Szreter concludes his paper by stating that the McKeown Thesis undermines human agency in mortality decline. A self-declared revisionist historian, Szreter argues that mortality decline stemmed from the implementation of public health measures, which were the result of actions taken by sanitary reformers and activists. These actions, in turn, can be situated within a broader context of urban and rural environments, as well as placed within longue durée historical movements. At the heart of this revisionist study is local history, which links local public health efforts to the decline of infectious disease mortality across the nineteenth century.

Less than a decade later, Sumit Guha penned an article in response to Szreter's theory of mortality decline. Examining the first phase of England mortality decline (the mid-eighteenth to

[56] Szreter, "The Importance of Social Intervention," pg. 13.
[57] Szreter, "The Importance of Social Intervention," pg. 21.
[58] This was something discussed in-depth by Worboys and Condrau in Flurin Condrau and Michael Worboys, "Second Opinions: Epidemics and Infections in Nineteenth-Century Britain," *Social History of Medicine* 20:1 (2007), 147-158.
[59] Of course, only smallpox was officially eradicated worldwide but the local public health efforts removed the immediate threat of epidemic disease to the locale. Szreter, "The Importance of Social Intervention," pg. 26.

the end of the nineteenth century), he argues that Szreter's alternative to the McKeown Thesis does not stand up to evidence for London in the eighteenth century, or England in the nineteenth century. Specifically, he concludes that diarrhoeal diseases continued despite Victorian public health measures, and this had a notable impact on infant morbidity and mortality.[60]

While McKeown, Szreter, and Guha all agree that food and waterborne illness mortality improved as sanitation and hygiene improved, Guha accuses Szreter of inflating the importance of these factors by grouping the mortality reduction from "convulsions" under gastrointestinal diseases. Guha takes interest in this due to the unstable diagnostic category of diarrhoea, a condition which was treated as a symptom of multiple diseases but also as a disease itself during the nineteenth century.[61] Guha rightly points out that it is important for historians to recognize that the mortality rates of diarrhoeal diseases "were merely the tip of an iceberg of morbidity than has largely escaped record."[62] As these diseases transmit via a fecal-oral route, the continued high fatality rates in a specific population indicate that "improvement cannot be explained by sanitary measures which prevented the encounter of human and micro-organism but rather a change in the outcome of that encounter."[63] Guha writes that while McKeown oversimplified the declining case-fatality rate, he also acknowledges that if these questions are ever answered, "it is unlikely that the role of changes in real income, living standards, and nutritional status will be found to be a minor one."[64] As the closing lines of his paper suggest,

[60] Sumit Guha, "The Importance of Social Intervention in England's Mortality Decline: The Evidence Reviewed," *Social History of Medicine* 7:1 (1994), pg. 89.
[61] Guha, "The Importance of Social Intervention: The Evidence Reviewed," pgs. 107-108.
[62] Guha, "The Importance of Social Intervention: The Evidence Reviewed," pg. 111.
[63] Guha, "The Importance of Social Intervention: The Evidence Reviewed," pg. 112.
[64] Guha, "The Importance of Social Intervention: The Evidence Reviewed," pg. 113.

Guha firmly aligns himself more with McKeown's reading of the mortality statistics than with those of Simon Szreter.[65]

Though Omran's epidemiological transition faced broad challenges from McKeown and Szreter's work, it did not face any specific criticism until 2007, when Flurin Condrau and Michael Worboys penned an article which questions Omran's lack of quantitative evidence. They begin with the premise that it was still common to die of endemic diseases such as tuberculosis, typhoid, puerperal fever, and childhood infections between 1840 and 1900.[66] If the epidemiological transition is defined as the decline of infectious disease, they "argue that this dominant picture of the Victorian experience of disease and death is mistaken, and it follows that the accepted notion of a modern epidemiological transition will need to be rethought."[67] Condrau and Worboys argue that the Victorian era did not see the decline of infectious diseases. Rather, they suggest that Victorian England did not experience infectious disease to the extent many historians claim, thus making an epidemiological shift impossible. They encourage a more complex understanding of the disease transitions – querying the importance of local disease patterns rather than country-wide ones, the need to aggregate data by age and sex, and careful consideration of the term "infectious disease." [68] Graham Mooney also discusses these points, though often contesting Condrau and Worboy's methodology and conclusions. Mooney argues that infectious diseases *were* the main cause of death in Victorian England and that an epidemiological transition occurred in which the reduction of infectious diseases contributed

[65] Szreter published a response to Guha's article, addressing each of the critiques. Simon Szreter, "Mortality in England in the Eighteenth and the Nineteenth Centuries: A Reply to Sumit Guha," *Social History of Medicine* 7:2 (1994), pg. 271-272.
[66] Condrau and Worboys, "Second Opinions: Epidemics and Infections in Nineteenth-Century Britain," pg. 147.
[67] Condrau and Worboys, "Second Opinions," pg. 148.
[68] Condrau and Worboys, "Second Opinions," pg. 148-149, 151, 155-156.

greatly, conclusions Condrau and Worboy's missed as a result of selective evidence and limited definitions.[69]

Abdel Omran's epidemiological transition has altered the way historical epidemiologists study the nineteenth-century history of disease. The theory frames the nineteenth century as part of a larger, world-wide movement of transitions between infectious diseases and degenerative, man-made ones. However, it is obvious that not all historians agree with the idea of an epidemiological transition, and that it is filled with complex and highly nuanced factors. While some of the back-and-forth arguments between the authors such as Szreter and Guha, and Condrau, Worboys, and Mooney may be on some level obscure debates in methodology, their discussions reflect the importance of understanding source material, recognizing the etiology of disease classification, and the importance of context.

Conclusion

Cholera's extensive historiography showcases that there are several different frameworks through which this disease is explored. Asa Briggs's 1961 study gave way to numerous studies on the impact of cholera in the nineteenth century world, particularly the relationship between

[69] Graham Mooney, "Response: Infectious Diseases and Epidemiologic Transition in Victorian Britain? Definitely," *Social History of Medicine* 20:3 (2007), pg. 596. It is interesting to note that Szreter, Guha, Condrau and Worboys, and Mooney's critiques were all published by the *Social History of Medicine*, the journal for the Society for the Social History of Medicine. The Society, founded in 1965, focuses on the relationships between health, medicine, and the social system, a direction heavily influenced by Thomas McKeown, who called for the sociological study of medicine, recognizing that social context has the ability to influence health. McKeown was Chair for the first meeting of the SSHOM, held at Birmingham University on May 8, 1970. The SSHOM's journal, *Social History of Medicine*, began in 1988. The first article published was Szreter's critique of McKeown. SSHOM subsequently published Guha, Condrau and Worboys, as well as Mooney, suggesting that the epidemiological transition and McKeown's theories are still highly contested in the historiography. For more about the founding of the Society, see Dorothy Porter, "The Mission of Social History of Medicine: An Historical View," *Social History of Medicine* 8:3 (1995), pgs. 345-359, and J. Pemberton, "Origins and Early History for the Society for Social Medicine in the UK and Ireland," *Journal of Epidemiology & Community Health* (2002), pgs. 342-346. McKeown's inaugural address for the SSHOM was published as Thomas McKeown, "A Sociological Approach to the History of Medicine," *Medical History* 14:4 (October 1970), pgs. 342-351.

medicine and society. This relationship was examined in numerous contexts, including British, North American, and Imperial scholarship. The unique contexts of different case studies highlighted how understanding the locality is an important part in understanding how societies responded to cholera: economic concerns, social structure, and competing medical theories were all important factors which are addressed in the scholarship.

Cholera was also at the forefront of nineteenth-century medical thought. The contagion/anticontagionist debates continued for decades and multiple theories of disease transmission were offered up by medical practitioners around the globe. There was an intrinsic relationship between medical theories of cholera's cause and transmission and the politics of sanitary reform, as different transmission theories necessitated unique public health responses. The rise of urban sanitation is closely related to the nineteenth-century cholera epidemics, which is heavily apparent in the scholarship.

Nineteenth century diseases, including cholera, are considered part of an epidemiological transition which spanned centuries, and why the mortality rates began to decline in the nineteenth century has been heavily debated, notably by McKeown and Szreter. Cholera's place in these debates is highlighted by its relationship with the rise of public health infrastructure and the sanitation revolution. The disease is unique because it suggests a clear correlation between public health infrastructure and declining mortality. This assumed relationship is the basis of this thesis, which will add to the body of literature that examines cholera during the nineteenth century. It will do so using a novel methodology which ultimately allows for the evaluation of the impact of public health infrastructure on what appeared to be declining cholera mortality. This thesis addresses three research questions:

Question 1: What was it like to live in, be sick in, and die in London in the nineteenth century?

Chapters Two, Three, and Four paint a picture of what it was like to live, be sick in, and die in London in the nineteenth century. They explore the rise of public health legislation; the emergence of vital statistics; theories of disease; the available medical care; the pathological explanations of cholera; the most popular treatment for cholera; broad mortality patterns; and a broad view of emerging public health legislation during the mid-nineteenth century.

Question 2: What was the cholera experience in London during 1849, 1854, and 1866?

Chapters Five, Six, and Seven address cholera epidemics specifically, and use street-level data to answer the above question. These chapters give names and addresses to cholera's victims rather than simply viewing them as a figure in a death register. These chapters also provide studies into the public health responses to these epidemics, highlighting the relationships between the General Board of Health and the Vestry and Parish District Boards of Works, which were also called "local boards." The frustration of a lack of action is described, and observations made about the state of cholera in hot-spot locales throughout London. These chapters will also address the final research question:

Question 3: What were the public health responses to cholera, and were they successful in lowering cholera mortality?

This is the real crux of the thesis, as it examines if the public health initiatives described in Chapters Five, Six, and Seven were ultimately successful in lowering cholera mortality throughout the century. After discussing the cholera experiences of 1849, 1854, and 1866, Chapters Five, Six, and Seven will engage in detailed analysis of the public health responses to each epidemic. These discussions will return to the historiographical frameworks discussed in the literature review above, integrating contemporary evidence about the effectiveness of public health interventions with modern-day scholarship.

This thesis provides the necessary context to understand cholera in nineteenth-century London: the competing disease theories, medical care and practices, and public health legislation. Armed with this context, the thesis will then provide an in-depth study of the cholera experience in London in 1848-49, 1854, and 1866. Detailed maps will display mortality patterns in new light, and the use of vital statistics will show the true extent of cholera mortality in the city's districts, sub-districts, and specific neighbourhoods. Finally, the thesis will investigate the different public health responses to each of the cholera epidemics to evaluate the changing nature of the relationship between public health interventions and cholera mortality in nineteenth-century London.

Chapter Two

Living in London: The Rise of an Urban Metropolis

The evolution of London's infrastructure during this time was swift and complex, happening in the pages of legislation and offices of public civil servants, something rarely expounded upon by these notable authors. The realities of *living* in London in the nineteenth century were defined by changing notions of sanitation, and with it, the infrastructure and legislation needed to obtain a healthy city. This chapter will discuss the lesser-known realities of the rise of this urban metropolis: the housing and state of sanitation which led to Edwin Chadwick's 1842 *Report on the Labouring Population of Great Britain*; the public health infrastructure which existed before the landmark 1848 *Public Health Act*; the way the *Public Health Act* changed the nature of sanitation throughout England; the uniqueness of London's journey to public health infrastructure, which trailed almost a decade after the rest of the country; the challenges presented by water supply, drainage, and sewers; and the rise of vital statistics. At the end of this chapter, the reader will have a firm grasp on London's public health history, which demonstrates how cholera epidemics were instrumental in prompting changes within London's public health infrastructure that transformed the Victorian metropolis.

Housing and Sanitation in London

London was the center of the Victorian world, a city Roy Porter names the "super-city *de luxe*" that continued to grow "without central command."[1] In 1841, London's population was approximately 1.9 million people; by 1851, it was 2.3 million; by 1861, 2.8 million, and in 1871,

[1] Roy Porter, *London: A Social History* (Cambridge, Mass.: Harvard University Press, 1995), pg. 186.

the population was tallied at over 3.2 million residents.[2] Life in London was driven by the economy; multiple types of commerce existed, making London a robust city which offered a wide array of commodities and employment. The Industrial Revolution fed these "spirals of demand," with competitors emerging and technology rapidly advancing. Even though cities such as Manchester, Birmingham, Leeds, and Glasgow were renowned for their industries and use of factory machinery, London kept pace with the technological advancements, often using machinery in new and unique enterprises which set the city apart from its industrial neighbours.[3] L.D. Schwarz goes as far as to suggest that "under the apparent stable surface, change was constant" in early nineteenth-century London.[4] In response to this demographic and economic expansion, London's boundaries constantly expanded, with ad hoc, patchwork governments and hastily constructed roads and houses.[5]

London, Porter argues, "lived by its river."[6] The economy was intrinsically tied to the ebbs and flows of this tidal body, and not just the dock workers. Fishing, iron-founding, gasworks, and coal industries relied on the Thames, as did food importers, building trades, clothing and footwear manufacturers, wood and furniture makers, metal and engineering workers, printing

[2] General Register Office, *Weekly Returns of Births and Deaths in London* XIIL:1 (1852), pg. 6; General Register Office, *Weekly Returns of Births and Deaths in London* XXIII:1 (1862), pg. 6; General Register Office, *Thirty-Sixth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England: Abstracts of 1873* (London, 1875), pg. 2.

[3] Interestingly, Asa Briggs argues that London, over the late nineteenth century, eventually fell behind other industrial cities who often became specialists in a certain export. Asa Briggs, *Victorian Cities* (Harmondsworth, UK: Penguin Books, 1968), pgs. 311-312; Porter, *London: A Social History*, pgs. 186-187.

[4] L.D. Schwarz, *London in the Age of Industrialisation: Entrepreneurs, Labour Force and Living Conditions, 1700-1850* (Cambridge, UK: Cambridge University Press, 1992), pg. 4. Schwarz's book is a detailed study of the changes in London, and provides useful insight into the reality of London living slightly before, and during the era considered by this thesis.

[5] Richard Rodger points out that the massive population boom contributed to the issue of needing more housing in London and argues that it was not a simple matter of just constructing more houses for the growing population. The mid-nineteenth-century housing crisis reflected current events, including cholera outbreaks, that prompted investigations into the relationship between housing, sanitation, and disease. Housing became an important social issue, one which drew in the sanitary reformers, as well as being a practical issue of needing more space to house a growing population. Richard Rodger, *Housing in Urban Britain, 1780-1914: Class, Capitalism, and Construction* (Hampshire, UK: Macmillan Education, 1989), pgs. 1-3; Porter, *London: A Social History*, pgs. 186, 207-208.

[6] Porter, *London: A Social History*, pg. 188.

and stationary businesses, and precision manufactures. These trades, which made up the heart of London's industry, represented the vast scope of employment in London – everything from physical labour to high-precision skill-based work.[7]

Housing in nineteenth-century England varied depending on locality, occupation, and social status. The rural poor lived in thatched or slate roof cottages, whereas the urban poor occupied tenement housing, usually a couple of rooms and a kitchen space. Those too poor for a cottage or tenement sought refuge in stairwells and doorways. Because of the rapid urbanization of London, housing was organized vertically rather than horizontally. Tenements were built on-top of each other, much like modern-day apartment buildings, and individual homes stacked rooms on top of one another.[8] Houses relied on coal fires for heat, and water to be carried in from a central pump. The quality of homes was not the only distinguishing factor between poor and middle-class London residents; the location of the homes often reflected the changing social boundaries of industrial London. The middle-class workers flocked to the suburbs of outer London and their downtown homes were often sub-divided in tenements for poorer, working classes.[9]

It was around this time that the "East End" also became a haven for dock workers and vagrants. London had, in the eighteenth century, already had a dichotomous relationship between the "City," referring to the City of London proper and its docks in the east, and its "Court," which was the quickly rising centre of government in Westminster. As the eighteenth century gave way to the nineteenth, another dichotomous relationship emerged which loosely reflected this: the West and the East emerged as two cities in one – Westminster and surrounding

[7] Porter, *London: A Social History*, pgs.189-204.
[8] Daniel Pool, *What Jane Austen Ate and Charles Dickens Knew: From Fox Hunting to Whist – the Facts of Daily Life in Nineteenth-Century England* (New York: Simon & Schuster, 1993), pgs. 190-192.
[9] Rodger, *Housing in Urban Britain*, pg. 3.

neighbourhoods in the West (the "Court") and East (the "City.")[10] The differences between them were stark: the *Quarterly Review* called it "the complete separation of the residences of different classes of the community."[11] The division of London into West and East was palpable, and it was not uncommon for residents of the East End to never experience life outside the regions in which they lived and worked. Simultaneously, those from the more affluent parts of London began to conceive of the East End as a separate entity, using colonial and racialized imagery. Those who ventured into this area – usually missionaries, parish officials, and medical officers of health – used startling terms to describe the East End, stating that the way of life there is "as much unknown as the condition of a district in Otaheite [Tahiti]," was "as unexplored as Timbuctoo," and was "an evil plexus of slums" comparable with "darkest Africa."[12] Indeed, housing in London during the mid nineteenth-century came to represent not only the booming population but also began to define and delineate London's different social characteristics, which highlighted the strained relationships between economics, industrialization, and sanitation.

London's vast expanse led to many social problems apart from housing. Because housing was often tied to socio-economic status, the government, in the early 1800s, paid little attention to the actual conditions in which people lived and focused mainly on the age-old problem of vagrancy.[13] Meanwhile, the supply of fresh water and the disposal of sewage became public health threats and the subject of years of legislative debates, bills, and acts. Eventually, London's water and sewer systems were brought into a centralized network overseen by government-appointed bodies. The connection between water, sanitation, and public health was spearheaded

[10] Schwarz, *London in the Age of Industrialisation*, pgs. 7-8.
[11] Quoted in Briggs, *Victorian Cities*, pg. 325.
[12] Quoted in Briggs, *Victorian Cities*, pg. 326.
[13] For example, the *Vagrancy Act* of 1824 made it illegal to sleep rough or beg, which pushed the poor into the workhouse system discussed below.

by Sir Edwin Chadwick in the mid-nineteenth century, a social reformer who dedicated his life to understanding the social implications of sanitation in London.

A civil servant, Chadwick's political career was defined by committee involvements which investigated social issues. After six years working on the Poor Law Commission, Chadwick turned his focus to public health concerns and sanitary measures. His most famous publication, *Report on the Sanitary Conditions of the Labouring Population of Great Britain* (London: 1842), was instrumental in raising awareness about the public health risks faced by England's working class. Despite being one of the most widely read and published pamphlets in Victorian England, it was not until 1847 that Chadwick garnered a public health position in the government.

Chadwick's 1842 report, as well as the subsequent Public Health Acts in 1848, 1849, and 1858, devoted considerable time addressing the issue of "nuisances." Chadwick's definition was succinct: anything which was "injurious to health" or a "cause of disease."[14] Though he did not expand on what fell under these broad categories, the 1855 *Nuisances Removal and Disease Prevention Acts Consolidation and Amendments* laid out a broader definition:

> The Word "Nuisances" under this Act shall include – Any Premises in such a State as to be injurious to Health: Any Pool, Ditch, Gutter, Watercourse, Privy, Urinal, Cesspool, Drain, or Ashpit so foul as to be injurious to the Health: Any Animal so kept as to be injurious to Health: Any Accumulation or Deposit injurious to Health.[15]

In practice, what was considered a nuisance was even more broad than this list and was able to be so due to the imprecise definitions which existed. For example, street paving and lighting were considered nuisances because they could prove dangerous – and, as such, fell under the

[14] Great Britain, House of the Lords, *Report to her Majesty's Principal Secretary of State for the Home Department, from the Poor Law Commissioners, on an Inquiry into the Sanitary Conditions of the Labouring Population of Great Britain; with Appendices*, House of Lords Papers, volume 24, page XXVI (London, 1842), pg. xvi.
[15] Great Britain, House of Lords, *Nuisances Removal and Diseases Prevention Acts Consolidation and Amendment. A Bill Intituled An Act to consolidate and amend the Nuisances Removal and Diseases Prevention Acts, 1848 and 1849*, Bills and Acts, volume 6, page VI. [i], paper number 263 (London: Parliament 1854-55), pg. 7.

purview of the local boards of health. Similarly, sewage removal and garbage disposal were problems that needed to be addressed under this heading. The structural integrity of buildings, the specifications of animal husbandry, and the regulation of butchers and tanners were all issues which fell under nuisance prevention.

Perhaps the most important nuisance which garnered much attention by both Chadwick and other social reformers was inadequate water supply and drainage. Chadwick argued that “it is indispensable that proper supplies of pure water should be provided,” and he devoted an entire section of his report to the status of water provision across the country, proving with undoubtable clarity that the working classes in all parts of England were not adequately supplied with fresh water.[16] Similarly, the 1855 definition of nuisances included an entire clause dedicated to the pooling and collection of water. While this was a separate issue than that of freshwater provisions, it proved just as important, particularly when discussing causes of disease. Standing collections of water, often fouled with animal and human waste, let off terrible odours, particularly in the summer months. While the bacteriological connection between contaminated water and disease causation was a few decades away, there was a belief amongst many that these ditches and cesspools were the cause of diseases such as cholera. Given the lack of fresh water, and the ever-present danger of standing water, it comes as no surprise that water provision and drainage were one of the most important nuisances addressed in the early days of public health initiatives.

Public Health Legislation

Cholera proved to be a determining factor in establishing the formal administration of public health in England. The first epidemic in 1832 was catastrophic, and the threat of the

[16] Great Britain, *Inquiry into the Sanitary Conditions of the Labouring Population of Great Britain*, pg. 63.

disease was constant well into the 1840s, prompting action from the government about what to do in the event of another deadly outbreak. The solution was the creation of local boards of health, which emerged under the 1848 *Public Health Act*. Overseen by the General Board of Health, local boards of health were responsible for specific regions and oversaw sanitary matters, including the paving of streets, the removal of sewage, the trading of food products, and the provision of water.[17]

Before the *Public Health Act* of 1848, the sanitation of towns and cities was largely a local concern. The four positions of the traditional English parish – the churchwarden, the constable, the overseer of the poor, and the surveyor of highways – had the responsibility of dealing with any sanitary concerns as they arose.[18] There was no appealing to a local council or government agency for support. This approach, which reflected the overarching Common Law system in England, worked so long as the towns and cities remained relatively small and stable. However, as W.G. Lumley and Edmund Lumley, who published a collection of public health legislation, noted, "as civilization advanced, and the population increased, it became necessary that special legislation should be resorted to for the supply of greater powers for extending the means of improving the external conditions of towns."[19] This was true most of all in London, a booming

[17] While it is true this was the first major piece of legislation which consolidated numerous public health concerns under one overseeing board, there had peen previous instances of piecemeal consolidation in the years prior – for example, the 1834 *New Poor Law* brought together local parishes into Poor Law Unions, creating a more centralized administration for poor relief and medical care within the workhouse. Christopher Hamlin and Sally Sheard, "Revolutions in Public Health: 1848 and 1988?", *British Medical Journal* 317 (August 1998), pgs. 589-591; Kenneth Calman, "The 1848 Public Health Act and its Relevance to Improving Public Health in England Now," *British Medical Journal* 317 (August 1998), pg. 596.

[18] It is important to note that "sanitary concerns" is a modern label applied to problems such as sewage disposal, garbage removal, and the maintenance of roads. The people of the parishes likely recognized these as nuisances but would not view them as a "sanitary threat" the way modern-day historians and epidemiologists do today. Poole, *What Jane Austin Ate and Charles Dickens Knew*, pg. 167.

[19] W.G. Lumley and Edmund Lumley, *New Sanitary Laws: Namely, the Public Health Acts, 1848 & 1858, and The Local Government Act, 1858, with Introduction, Notes, and Index: And an Appendix, Containing Various Statutes Referred to Therein and Incorporated Therewith, As Well as Those Which have Seen Been Enacted*, 2nd edition (London: Shaw and Sons, Fetter Lane, 1871), pg. 2.

metropolis facing multiple public health concerns linked to a rising population and increasing industrialization.

One of the first pieces of legislation to address public health concerns in the Victorian era was the 1846 *Bill for more speedy Removal of Nuisances, and to enable Privy Council to make Regulations for Prevention of Contagious and Epidemic Diseases*. Any complaints about public health matters were made by the local Guardians of the Poor to the Justice of the Peace of the region. The Guardians of the Poor needed to have a certificate signed by a medical practitioner, attesting to the validity of the present threat. The Justice of the Peace, upon receiving these documents, had the authority to issue any order for the "cleansing, whitewashing, or purifying of any such dwelling-house or other building, or for the removal of the nuisance in the said certificate described within the period in the said order to be prescribed."[20] To properly address the nuisance, the owner or occupier, or the Guardians of the Poor if the order was not followed within a set timeframe, had to "remove, take and carry away the said accumulation of offensive or noxious matter, refuse, dung and offal from the piece of land, or, to cleanse the said foul and offensive drain, privy, or cesspool."[21] The 1846 act was one of the first pieces of legislation which addressed the issue of authority to act in the face of epidemic disease and nuisance. By Parliamentary order, the Justices of the Peace as well as the Privy Council had the prerogative to set rules and procedures in case of epidemic disease threat, though it is important to recognize that even with the administrative structures implemented in 1846, much of the work undertaken was at a local level.[22]

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[20] See Appendix A to view the forms used by the medical practitioners and Justices of the Peace. Great Britain, House of Commons, *Bill for more speedy Removal of Nuisances, and to enable Privy Council to make Regulations for Prevention of Contagious and Epidemic Diseases*, Bills and Acts, volume 1, page I.393, paper number 580 (London: Parliament 1846), pgs. 1-2.
[21] Great Britain, *Bill for more speedy Removal of Nuisances*, pg. 8.
[22] The involvement of the Parliament in addressing public health concerns grew substantially in the nineteenth century, as all legislation was passed through the House of Commons and House of Lords. John Prest's book *Liberty*

Unlike the 1846 act, the *Public Health Act* of 1848 created a hierarchical structure through which all threats of epidemic disease and nuisances were addressed rather than solely relying on local measures. The 1848 Public Health Act established two working bodies: the General Board of Health and local boards of health. The General Board of Health was made up of an appointed commissioner – Edwin Chadwick was the first – as well as secretaries and clerks as the need arose.[23] The local boards of health were created only in specific circumstances: : "upon the petition of not less than one-tenth of the inhabitants rated to the relief of the poor of any city, town, borough, parish, or place having a known or defined boundary," or "where it shall appear or can be ascertained from the last return for the time being made up by the registrar general … that the number of deaths annually in any city, town, borough, parish, or place during the period in respect thereof such return shall have been made have on an average exceeded the proportion of twenty-three to a thousand of the population."[24] Unlike the General Board of Health, the local boards of health were made up of councilmen already appointed in that region as well as positions which were filled through a voting process by owners and ratepayers of the area.[25]

The 1848 *Public Health Act* laid out comprehensive guidelines for the local boards of health. Local boards of health had a great deal of authority over public health concerns,

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and Locality: Parliament, Permissive Legislation, and Ratepayers' Democracies in the Nineteenth Century provides an in-depth examination of how the relationship between localities and Parliament formed, and the process through which legislation was introduced, amended, and passed into law.

[23] Born in 1800 near Manchester, Chadwick's early life experiences made him aware of the social problems which existed in prisons, hospitals, and slums. He was well-acquainted with like-minded thinkers including Jeremy Bentham, Neil Arnott, and Thomas Southwood Smith. The 1848 *Public Health Act*, which established the General Board of Health, was created while Chadwick had a royal commission from 1847 to reform London's sanitation. At its beginning, Chadwick was the only paid member of the General Board of Health. His post lasted until 1854, which was when the General Board of Health structure was not renewed by Parliament. Peter Mandler, "Chadwick, Sir Edwin (1800-1890)," *Oxford Dictionary of National Biography*, last modified 3 January 2008; Lumley, *New Sanitary Laws*, pg. 50.

[24] Lumley, *New Sanitary Laws*, pgs. 52-53.

[25] If a local board of health was created across district lines (thus making a new administrative district approved by Parliament), the local board of health was made up of a mix of councilmen from all the borough represented. Lumley, *New Sanitary Laws*, pgs. 59-60.

including: the creation of committees to investigate concerns; the appointment of slaughter-houses; appointment of an officer of health; the creation of surveys and maps of water and sewer systems; the purchasing of sewers; the cleansing of sewers; setting up communal water-pumps; control over building regulations of new dwellings (particularly in regards to water supply and drainage); cleaning the streets; waste removal; inspection and forced cleaning of a building declared unsafe by an appointed medical inspector; the registration of slaughter-houses; setting standards for public houses; the upkeep of public roadways; and the creation of regulations for the disposal and proper burial of the deceased. The local boards of health had access to government funding to procure work loans, as well as the ability to regulate the payment and mortgaging of nearly all the buildings in their district. The local boards of health were held accountable through frequent financial audits and reviews to ensure efficiency from the General Board of Health.[26] Despite the new system of administration under the General Board of Health, the 1846 *Nuisance Removal and Disease Prevention Act* was renewed by Parliament in 1848.[27] It was published on August 17, 1848, a mere fourteen days after the signing of the *Public Health Act*.

The two acts, which passed almost simultaneously, were complementary. The *Public Health Act* addressed more urban environments – though it allowed for the creation of a local board of health anywhere, it must be recognized that these boards were almost entirely based in urban centres which yielded the required 23 deaths per 1000 residents – while the 1848 *Nuisance Removal and Disease Prevention Act* addressed the remaining parts of England, Ireland, and

[26] Lumley, *New Sanitary Law*, pgs. 17-31; John Prest, *Liberty and Locality: Parliament, Permissive Legislation, and Ratepayers' Democracies in the Nineteenth Century* (Oxford, UK: Oxford University Press, 1990), pgs. 33-34.
[27] Great Britain, House of Lords, *Nuisances and contagious Diseases. A Bill Intituled An Act to renew and amend an Act of the Tenth Year of Her present Majesty, for the more speedy Removal of certain Nuisances and the Prevention of contagious and epidemic Diseases*, Bills and Acts, volume 5, page V. [i], paper number 355 (London: Parliament 1847-48), pg. 1.

Scotland. The 1848 renewal act was very explicit: "provided always, and be it Enacted, That nothing hereinbefore contained shall apply to any district, parish or place in which the *Public Health Act*, 1848, or any part thereof, shall be in force." The act continued, stipulating that exceptions were allowed "in so far as the General Board of Health, by order in writing, sealed with the seal of such Board, and signed by Two or more members thereof, of (in case there be no such Board in existence) as one of Her Majesty's Principal Secretaries of State, by order in writing under his hand, shall otherwise direct."[28] The phrasing of the 1848 *Nuisance Removal and Disease Prevention Act* made the relationship between local authorities and the General Board of Health clear. The 1848 *Nuisance Removal and Disease Prevention Act* was amended to further clarify this relationship by the 1849 *Bill to amend the Nuisance Removal and Disease Prevention Act, 1848* and the 1855 *Act to consolidate and amend the Nuisances Removal and Disease Prevention Acts, 1848 and 1849*. The latter expanded the roles of local authorities in regions outside of London by laying out protocols for the numerous situations of governments that may be found across England, and then stipulated who shall make up the "local authorities."[29] One important inclusion was the appointment of a sanitary inspector.[30] The 1855 act thereby went a long way towards the creation of a uniform approach to any threat of nuisances or epidemic disease across all of England.

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[28] Great Britain, *An Act to renew and amend an Act of the Tenth Year of Her present Majesty, for the more speedy Removal of certain Nuisances and the Prevention of contagious and epidemic Diseases*, pgs. 8-9.
[29] Great Britain, House of Commons, *Nuisances Removal and Diseases Prevention Acts consolidation and amendment. A bill to consolidate and amend the Nuisances Removal and Diseases Prevention Acts, 1848 and 1849*, Bills and Acts, volume 4, page IX.621, paper number 13 (London: Parliament 1854-55), pgs. 2-3.
[30] The act mandated that the local authorities shall "for the Purposes of this Act, appoint or employ, or join with other Local Authorities in appointing or employing, a Sanitary Inspector or Inspectors, and may appoint a convenient Place for his or their Office, and may allow to every such Person on account of his Employment a proper Salary or Allowance." Great Britain, *Nuisances Removal and Disease Prevention Acts Consolidation and Amendment*, pg. 5.

As early as 1855, amendments were proposed to both the *Public Health Act* as well as the *Nuisance Removal and Disease Prevention Act* to improve and extend their uses, though only the latter of the two was passed into law in 1855. The amendments proposed to the *Public Health Act* were brought to Parliament in both 1856 and 1857, finally passing in two separate pieces of legislation on August 2, 1858, as the *Public Health Act* and the *Local Government Act*.[31]

The 1858 *Public Health Act* and the *Local Government Act* brought significant changes to the hierarchical structure that had been so carefully arranged over the previous decade. Under the 1858 *Public Health Act*, the General Board of Health was not renewed and matters of public health and sanitation were to be handled by the Privy Council and the Secretary of State.[32] This brought all matters of public health under the Sovereign and Parliament, removing the appointed committee – the General Board of Health – which had acted as an intermediary. Ironically, returning control of public health concerns to the Privy Council was closer to the original 1846 *Nuisance Removal and Disease Prevention Act* than any legislation that followed.

Removing the General Board of Health did not eliminate the local boards of health, which were renamed simply "local boards." Despite the change in nomenclature, the local boards continued all the functions of the old local boards of health, as dictated by the 1848 *Public Health Act*.[33] The functioning of the local boards did not weaken despite the change of structure; in fact, the local boards gained more authority through the incorporation of earlier pieces of legislature. Specifically, *The Towns Police Clauses Act, 1847* have given the local boards' authority "(1) with respect to obstructions and nuisances in the streets, (2) with respect to fires,

[31] Lumley, *New Sanitary Law*, pg. 9.
[32] Lumley, *New Sanitary Law*, pgs. 223, 8.
[33] Lumley, *New Sanitary Law*, pg. 229.

(3) with respect to places of public resort, (4) with respect to hackney carriages (5) with respect to bathing" whereas *The Towns Improvement Clauses Act, 1847* addressed the following matters:

> (1) with respect to naming the streets and numbering the houses, (2) with respect to improving the line of the streets and removing obstructions, (3) with respect to ruinous or dangerous buildings, (4) with respect to precautions during the construction and repair of the sewers, streets, and houses, (5) with respect to the supply of water, except the proviso thereto, (6) with respect to the prevention of smoke, (7) with respect to slaughter-houses, (8) with respect to clocks.[34]

By incorporating previous legislation into the *Local Government Act* of 1858, the new legislation effectively began the process which streamlined all municipal concerns – those related to sanitary concerns but also some, like control over the clocks, which were outside the realm of public health – into local boards. This process continued into the late nineteenth century, culminating in 1871 when the *Local Government Board Act* was passed. While the local governments remained powerful, the 1871 act transferred responsibility for local boards from the Privy Council and Secretary of State to the newly created Local Government Board.[35]

PUBLIC HEALTH LEGISLATION IN LONDON

While these pieces of legislation were intended for England as a whole, most excluded the "city of London and the liberties thereof."[36] Most legislation, apart from the the1846 *Nuisance Removal and Disease Prevention Act* had clauses which excluded the historic City of London.[37]

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[34] Lumley, *New Sanitary Law*, pgs. 284-285.
[35] Great Britain, House of Lords, *Local Government Board. A Bill Intituled An Act for constituting a Local Government Board, and vesting therein certain functions of the Secretary of State and Privy Council concerning the Public Health and Local Government, together with the Powers and duties of the Poor Law Board*, Bills and Acts, volume 5, page 5, paper number 291 (London: Parliament 1871), pgs. 1-4.
[36] Lumley, *New Sanitary Law*, pg. 42; The inclusion of Ireland, Wales, and Scotland varied according to the legislation.
[37] Keeping in mind that the City of London refers to the current-day financial district. The historic city of London was founded by the Romans as early as 43 A.D. Following the Industrial Revolution, as London became a prominent merchant and trading city, the metropolis grew to include neighbouring parishes. For a detailed analysis of the differences in public health legislation in London, see James G. Hanley, "The Benefits of Health: London, 1848-65," in Hanley, *Healthy Boundaries: Property, Law, and Public Health in England and Wales, 1815-1872* (Rochester, NY: University of Rochester Press, 2016), pgs. 89-110.

For example, the 1848 *Public Health Act* was written to, "from time to time be applied, in manner herein-after provided, to any part of England and Wales", though there were stipulated exceptions:

> The city of London and the liberties thereof, the parts within the limits of certain commissions of sewers bearing date at Westminster the 30th day of November in the year of our Lord 1847, also the parts within the limits of a certain other commission of sewers bearing date at Westminster the 4th day of December in the year last aforesaid, and the parts subject to the jurisdiction of the commissioners acting in the execution of an Act of the fifth year of the reign of King George the Fourth, for (amongst other things) more effectually paving, lighting, watching, cleansing, and regulating the Regent's Park, and in the execution of the several Acts for extending the jurisdiction of such commissioners.[38]

The exceptions listed in the 1848 *Public Health Act* indicate that the government was not trying to create a new blanket piece of legislation; rather, they were trying to pass an act which would effectively address regions in England not already covered by other, more specific, legislation. Under the *Public Health Act*, the City of London was excluded but its surrounding parishes – the ones outside the boundaries of the City of London – were not. The same was true for the 1855 *Nuisance Removal and Disease Prevention Act*. The City of London historically was governed independently and the parishes which were subsumed into the metropolis would have been governed by their own local parish authorities and Vestry and District Boards of Works. The City of London's public health concerns continued to be overseen by the Commissioners of Sewers.[39]

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[38] Lumley, *New Sanitary Law*, pg. 42.

[39] There was an effort made to consolidate governance over aspects of London's sanitation in 1847, when the Commissioners of the Sewers was suggested after an investigation into what could be done to improve London's health and sanitation. The report recommended consolidating those responsible for London's sewage disposal under one body, arguing that adequately dealing with this massive issue could not happen until it was overseen by one central board. The 1848 *Metropolitan Sewers Act* brought together seven districts and created the Commissioners of the Sewers to oversee all the sewage drainage in London. In 1855, the Commissioners of the Sewers was subsumed under the Metropolitan Board of Works. "Metropolitan Commissioners of the Sewers," *The National Archives*, available online at: https://discovery.nationalarchives.gov.uk/details/r/6cd47612-3a72-465c-a68b-eab8e927362f; "Westminster and Middlesex Commission of Sewers," *The National Archives*, available online at: https://discovery.nationalarchives.gov.uk/details/r/609e17c5-1bd1-4ada-8509-c11592d70428; Great Britain, House of Commons, *Nuisances and contagious diseases. A bill to renew and amend an act of the ninth and tenth years of*

London grew as the Industrial Revolution progressed, and the surrounding parishes were subsumed into the metropolis.[40] In 1855, the *Metropolis Local Management Act* was passed. This piece of legislation formally brought the metropolis together under the Metropolitan Board of Works, effectively defining the boundaries of the metropolis as well as unifying its response to nuisance removal, epidemic disease threats, and sanitary reform. The metropolis, as defined by the act "shall be deemed to include the City of London, and the Parishes and Places mentioned in the Schedules (A.), (B.), and (C.) to this Act", and the City of London "shall be deemed to include all Parts now within the Jurisdiction of the Commissioners of Sewers for the City of London."[41] Apart from shifting control of the parishes to the Metropolitan Board of Works, the *Metropolis Local Management Act* also divided the parishes into districts. This structure was the backbone of the organization of the metropolis. Each parish had one member elected to the new Metropolitan Board of Works; districts, which were comprised of multiple parishes, also had one member who sat on the Metropolitan Board of Works, but they also had Vestry and District Boards of Works, which were made up of a set number of members per parish.[42]

The Vestry and District Boards of Works, as well as local governance within the parish, had authorities and responsibilities ranging from local drainage, to paving, to street names, to lighting.[43] The one responsibility removed from the power of the local authorities was that of

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Her Present Majesty, for the removal of nuisances and the prevention of contagious diseases, Bills and Acts, volume 4, page IV.511, paper number 604 (London: Parliament 1847-48) pgs. 7-8; Great Britain, *Nuisances Removal and Diseases Prevention Acts Consolidation and Amendment*, pg. 3.

[40] The list of sub-districts in the *Annual Reports* reflect the parishes which became part of the metropolis. In later chapters, these parishes are referred to as "sub-districts."

[41] See Appendix A to see the Schedules. Great Britain, House of Lords, *Metropolis Local Management. A Bill Intituled An Act for the better Local Management of the Metropolis*, Bills and Acts, volume 5, page V. [i], paper number 258 (London: Parliament 1854-55), pg. 92.

[42] The Vestry and District Boards were essentially local bords of health, and the terminology for these boards varied in publications. It was not until 1858, with the *Public Health Act* and *Local Management Act* did the Vestry and District Boards of Works in London become known as "local boards." As such, Chapters Five and Six refer to Vestry and District Boards of Works whereas Chapter Seven uses the term local boards.

[43] Great Britain, *Metropolis Local Management Act*, pgs. 1, 28-51.

sewage. The *Local Management Act* identified the "Main Sewers" of London and placed their upkeep and improvement under "the Commissioners of Sewers of the City of London and in the Metropolitan Commissioners of Sewers"; such work was "vested in the Metropolitan Board of Works."[44] This brought all control of the sewers under the Metropolitan Board of Works. Along with supervising the sewers of all of London, the Board of Works was made up of representatives from each District Board and parish. This hierarchical structure enabled a unified goal carried out by local Vestry and District Boards of Works.

MANAGING LONDON'S WATER SUPPLY

Arguably the most important issue the public health legislation addressed was that of the supply, quality, and drainage of water. Water management in London has a checkered history, one which reveals why it was such an important issue to address through legislation in the nineteenth century. Though nearly all the urban centres in Britain had placed water supply under local governments by the 1830s, London had not.[45] Part of the reason for this was the vast urbanization and massive population boom London experienced in the early nineteenth century. The Industrial Revolution and the rise of large-scale manufacturing pushed workers into cities. As the biggest city in Britain, London was a popular destination, especially because the banks of the Thames boasted large-scale and diverse commercial enterprises providing ample employment opportunities for mobile workers. Between 1841 and 1851, more than 330,000 immigrants came

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[44] This included upkeep of the "Walls, Defences, Banks, Outlets, Sluices, Flaps, Penstocks, Gullies, Grates, Works, and Things thereunto belonging, and the Materials thereof, with all the Rights of Way and Passage used and enjoyed by such Commissioners respectively over and to such Sewers, Works, and Things, and all of the Rights concerning or incident to such Sewers, Works, and Things." The main sewers are listed in Schedule D, found on pages 97-104 of the *Metropolis Local Management Act*; *A Bill [as Amended by the Lords] intituled An Act for the Better Local Management of the Metropolis*, 1854-1855, pg. 23.

[45] The reason for this is the driving question in John Brioch's book *London: Water and the Making of a Modern City* (Pittsburgh, PA: University of Pittsburgh Press, 2013).

to London, some from the English countryside, others fleeing famine in Ireland. In the 1850s, another 286,000 immigrants arrived.[46]

Before the nineteenth century, water in London was obtained locally: a pond or river, a local well, or directly from the Thames itself. With the surge of population, local boards of government struggled to address the need for ever-increasing demand for potable water. However, many local governments were unable to do so for a few reasons: the upgrading of infrastructure required was far greater than any local government structure could manage, which before the 1830s was usually communally run rather than appointed by central governing boards.[47] The lack of a central administration, as well as the lack of capital needed for the physical infrastructure, left local governments with few options. As a result, many local communities continued to rely on communal water sources such as pumps, as well as sewage disposal sites, including cesspools.[48]

In 1828, when the government commissioned an investigation of the water in London, there were eight joint-stock companies serving London's population: North of the Thames were the New River (est. 1602), the East London (est. 1807), the West Middlesex (est. 1806), the Chelsea (est. 1722), and the Grand Junction Companies (est. 1811). To the south: the Lambeth (est. 1785), the South London (est. 1805), and the Southwark Water-works (est. 1822).[49] The

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[46] Brioch, "Water and the Making of the Modern British City," in Brioch, *London: Water and the Making of a Modern City*, pgs. 17-46; Roy Porter, *London: A Social History*, pg. 205.
[47] Broich, *London: Water and the Making of a Modern City*, pgs. 3-4; Pool, *What Jane Austen Ate and Charles Dickens Knew*, pgs. 166-170.
[48] Interestingly, when investigations were being done prior to the 1848 Public Health Act, the commissioners found that towns usually prioritized the supply of fresh water and sewage but it was a lack of funds and expertise that limited their ability to fully address the issues rather than a lack of interest. Hamlin and Sheard, "Revolutions in Public Health: 1848 and 1988?", pgs. 588-589.
[49] Great Britain, House of Lords, *Report of the Commissioners Appointed by His Majesty to Inquire into the State of the Supply of Water in the Metropolis*, House of Lords Papers, volume 233, page 233. [1], paper number 94 (London: Parliament, 1828), pg. 4-6; while the dates of incorporation are fairly straightforward for most of the water companies, the one exception is the Southwark Water-works, which originated as the London Bridge Water Works; once the London Bridge Water Works was dissolved by Parliament in 1822, its licence was bought by New River and resold to the owner of Borough Waterworks Company. The Southwark Waterworks was formed by merging the

biggest and most influential of these joint-stock companies was New River, which was characterized not only by its vast network of pipes, but also by its unique relationship with the Crown: James I, the monarch at the time when the company was first founded, held direct shares in the company, which not only provided continued momentum for the company's progress, but also ensured enough revenue to see the project to completion.[50]

The 1828 *Royal Commission on the Water of Metropolitan London* was initiated because of complaints about the water supply around the city. The report, which was published on 21 April, had three purposes: "To ascertain the *sources and means* by which the Metropolis is supplied with water, and their efficiency as to the *quantity* supplied," followed by a mission to "determine the *quality* of the water," and finally, "to obtain such information as might enable us, if necessary, to suggest *new methods*, or *sources of supply*, or to point out the means of ameliorating those now in existence [original emphasis]."[51] While the report found the quantity of the water more than sufficient for the demands of London, the quality was found lacking. Pollutants were commonly found in the water which was pulled up from the Thames or

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old London Bridge Water Works and Borough Waterworks. As is evident from these dates, the evolution of water supply in London experienced an industrial boom in the early nineteenth century. Tomory argues, building off the work of Ron Harris, that the evolution of water supply in London closely followed the evolution of the joint-stock business model, and that the two processes were intrinsically connected. Tomory, *The History of the London Water Industry, 1580-1820* (Baltimore, MD: Johns Hopkins University Press, 2017), pgs. 46-50, 49, 177, 236-237; "Brief History during the Snow Era (1813-58): Southwark and Vauxhall Water Companies," *UCLA Epidemiology, Fielding School of Public Health*, last modified 14 January 2008, available online at: https://www.ph.ucla.edu/epi/snow/1859map/southwarkvauxhall.html.

[50] The early solution to the lack of administration in London was the joint-stock company model. Joint-stock companies raised funds through transferable shares. The governing bodies consisted of boards of directors/governors, elected by and responsible to the share holders. The benefits of the joint-stock model allowed flexibility in financing but ensured legal resources in Parliament, as Parliamentary endorsement ensured that these companies held incorporation status. Incorporation from Parliament meant that the company was legally recognized by the Crown, thus making the business a legitimate enterprise with legal rights. However, it is important to note that not all joint-stock companies were corporations – these joint-stock companies operated under Common Law rather than Parliamentary Law, even though they technically had no legal status. Tomory, *The History of the London Water Industry*, pgs. 44-49.

[51] Great Britain, House of Commons, *Supply of water in the metropolis. Report of the Commissioners appointed by His Majesty to inquire into the state of the supply of water in the metropolis*, House of Commons Papers, volume 9, page IX.53, paper number 267 (London: Parliament 1828), pg. 3.

uncovered reservoirs. The report suggested new filtration systems which would allow the water to settle before distribution, but also advocated greater awareness and regulation of the pollution of the Thames River itself.[52]

One of the authors of the 1828 report was Thomas Telford (1747-1834), a civil engineer born in Dumfriesshire, a rural Scottish county bordering England. Over his lifetime, Telford was involved in many public service projects, including water infrastructure, canals, bridges, and roadmaking.[53] Having co-authored the 1828 report, a Select Committee of the Commons encouraged Telford to draft a plan for London to revitalize its water supply.[54] Though wary of the job due to a lack of self-confidence, Telford published another report in 1834: *The Report of T. Telford on the Supply of Pure Water to the Metropolis*. Telford's plan for improving the water supply in London laid in miles of new piping, which would bring clean water into London from as far as sixteen miles away. Telford recommended that the water companies remain functional but that they each have their own piping networks to ensure a clean water supply, as opposed to multiple companies sharing pipes, which, while cost-effective, made tracing contaminants much more difficult. His plan, which never came to fruition, was estimated to cost nearly 1.2 million pounds sterling.[55]

Telford's plan was never undertaken, and London's water supply did not see any significant change until the late 1840s – that is, after the 1848 cholera epidemic discussed in

[52] Great Britain, *Waterworks clauses*, pgs. 6-10.
[53] Roland Paxton, "Telford, Thomas (1757-1834)," *Oxford Dictionary of National Biography*, last modified 23 September 2004.
[54] Daniel Lipschutz, "The Water Question in London, 1827-1831," *Bulletin of the History of Medicine* 42:6 (November-December 1968), pg. 523; William Robson, *The Government and Misgovernment of London* (Oxford, UK: Routledge, 1939), pg. 101.
[55]Thomas Telford, "Report of Thomas Telford, Civil Engineer, February 1834, on the Means of supplying the Metropolis of pure Water," in *Life of Thomas Telford, Civil Engineer, written by himself, Containing a Descriptive Narrative of his professional Labours: with a Folio Atlas of Copper Plates*, edited by John Rickman (London, 1838), pgs. 633-636.

Chapter Five.[56] Prior to that, the one improvement seen in the 1830s and early 1840s was the rise of piped water. At the time, piping water directly into (and out of) houses and buildings was a responsibility held by the consumers themselves. Water companies were responsible for providing water mains through the streets, and these mains fed communal pumps, but individual lines to houses were usually a luxury saved for the middle and upper classes. However, this "luxury" had its share of difficulties: houses with piped water commonly experienced issues with hardware and intermittent supply, not to mention that access to piped water was regulated by water charges, and even if the charges were paid, water was only accessible for a limited time each day.[57] Because of this, the residents of London knew all too well the alternative means for getting water. Those who did not have piped water – or those who did not have access to their piped water for any reason – relied on a communal pump, and fetching water by the bucket was normal for many working-class families.[58] Communal pumps were not the only source of water; many families, depending upon their location in the city, resorted to the original source of water – small rivers, ponds, canals, and even cesspools were often used as local watering holes.[59]

Things began to change in 1847 with the *Bill for Consolidating Acts authorizing Making of Waterworks for supplying Towns with Water*. The bill stipulated that

> the Undertakers [water companies] shall, upon the request of the owner of any dwelling-house in any street in which pipes shall have been laid down by them … lay down communication-pipes and other necessary works for the supply of such house with water,

[56] It is possible that part of the reason for Telford's commissioned report in 1834 was that with a new, more centralized government, there were hopes that implementing a wider water infrastructure was more accessible. Telford died in 1834, which may be one reason his plan was never followed through, though it is possible that the plan was simply too elaborate and expensive for even the newly strengthened government. Brioch, *London: Water and the Making of a Modern City*, pgs. 5-6.

[57] Before 1870, access to water inside a house was a matter between the landlord and tenant. Often, water access was restricted pending adequate payment – if the water charges were not paid on time, the water was not turned on. The rates were set at 2*s*, 11*d*, and this secured access to piped water for about two hours a day – or on alternative days depending on the arrangement. Further, piped water was never accessible on Sundays until the 1871 Metropolis Water Act was passed. Anne Hardy, "Parish Pump to Private Pipes: London's Water Supply in the Nineteenth Century," *Medical History* Supplement 11 (1991), pg. 78.

[58] Hardy, "Parish Pump to Private Pipes," pgs. 78-79.

[59] Hardy, "Parish Pump to Private Pipes," pg. 80.

> for domestic or other purposes, and shall keep the same in repair; and thereupon the occupier of such house shall be entitled to have a sufficient supply of water for his domestic purposes from the Undertakers.[60]

Though many water companies were reluctant to follow through on this mandate, it meant that any house in London could, in theory, have piped water. However, this did not automatically make piped water feasible for everyone. The bill continued that "the Undertakers may charge for such pipes and works in addition to the water-rate," meaning that piped water was only accessible to those who could afford it.[61]

The General Board of Health was not ignorant to the threat London's water posed. In 1850, they published *Report of the General Board of Health on Metropolis Water*, reiterating the need for a constant water supply through London, "more stringent purification and the extension of a piped supply."[62] Perhaps most importantly,

> Whilst we believe that Thames water, taken up beyond the influence of the metropolitan drainage, and filtered, may be used without injury to the public health, and may be employed temporarily until other sources can be laid under contribution, we advise that Thames water, and other water of like quality, as to hardness, be as early as practical abandoned.[63]

The General Board of Health firmly believed that the solution to the water problem was the consolidation of the major water companies into "one system, and kept in action under one supervision." This system would encompass "the whole distributory [*sic*] apparatus, small as well as large, service-pipes, and house-drains, together with water-mains, public drains, and

[60] Great Britain, *Waterworks clauses*, pg. 13.
[61] Great Britain, *Waterworks clauses*, pg. 13.
[62] Robson, *The Government and Misgovernment of London*, pg. 103.
[63] Great Britain, House of Commons, *Report by the General Board of Health on the supply of water to the metropolis*, Command Papers, volume 22, page XXII.1, paper number 1218 (London: Parliament 1850), pg. 321.

sewers."[64] The General Board of Health's grand plans for water supply in London, like so many other schemes for social reform in the mid-nineteenth century, never became reality.

The growing concern over the quality of London's water led to efforts to encourage companies to draw water from as far West as possible, thereby lessening the impact of industrial effluent and human detritus as the river flowed eastward into the city. This concern came to a head in the immediate years after the 1848 cholera epidemic and was formalized in the 1852 *Metropolis Water Act*. The 1852 *Metropolis Water Act* was another act that, though encouraging on the surface, made little practical difference. Through the act, "Parliament required that London's water companies draw water from the Thames at a point west of the metropolis."[65] This initiative, which required water companies to submit plans for new sources of water, addressed the concerns about the water quantity but did very little about the quality of water, even though the stipulation of "a point west of the metropolis" was an attempt to ensure water was drawn upstream of the city.[66] Many residents of London still had no direct access to water apart from the communal pump or a local source. The act, though it required companies to offer consumers a constant supply of water, only had to do so if:

> Either four fifths of the owners or occupiers of the houses on such main shall by writing under their hands have required such company to provide such supply, or until four fifths of the houses on such main shall be supplied with pipes, cocks, cisterns, machinery, and arrangements of all kinds for the reception and distribution of water.[67]

Despite looking like progress for the people, the high threshold for demand worked in favour of the water companies and brought little advancement.

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[64] Great Britain, *Report by the General Board of Health on the supply of water to the metropolis*, pg. 319.
[65] Brioch, *London: Water and the Making of a Modern City*, pgs. 43-44.
[66] Brioch, *London: Water and the Making of a Modern City*, pg. 44; Great Britain, House of Lords, *Metropolis Water Supply. A Bill Intituled An Act to make better Provision respecting the Supply of Water to the Metropolis*, Bills and Acts, volume 3, page III. [i], paper number 213 (London: Parliament 1852), pg. 2.
[67] Great Britain, *Metropolis Water Supply*, 1852, pg. 4.

The Metropolitan Board of Works was founded in 1855 under the *Metropolis Management Act* and became one of the most important centralized boards in mid-nineteenth-century London.[68] Following closely behind the 1854 cholera epidemic, the Board's biggest project was the Thames Embankment, which limited access to the Thames, as well as expelling water from London and taking control of all the sewers in London.[69] The *Thames Embankment Bill* was first passed in 1862 and specified that

> the Metropolitan Board of Works should cause to be commenced, as soon as might be after the passing thereof, the necessary Sewers and Works for the Improvement of the Main Drainage of the Metropolis, and for preventing the Sewage of the Metropolis from passing into the River Thames within the Metropolis, and that for the Purposes of the Act now in recital the said Board might construct any work through, along, over, or under the Bed and Soil and Banks and Shores of the River Thames … and whereas it is expedient that the Metropolitan Board of Works should be empowered to form the Embankment and new Streets …[70]

The Thames Embankment project served two purposes: the Metropolitan Board of Works was concerned about the pollution of the Thames from the city but was also anxious about the presence of stagnant water pools in London. The Embankment plans included sewer lines which would safely remove sitting water from urban London. In the pre-bacteriological era of the 1860s, this was of paramount importance because of the lingering attachment to miasmatic theories of disease. Miasma, originating from the Greek word meaning "stain or defilement," was understood as an "ill-defined emanation from rotting organic matter."[71] Simply put, the miasmatic theory of disease upheld that disease was spread through a yet-undetermined mechanism associated with foul smells. Sitting water, human waste, and any piles of rubbish that

[68] Robson, *The Government and Misgovernment of London*, pg. 103.
[69] Brioch, *London: Water and the Making of a Modern City*, pg. 33.
[70] Great Britain, House of Lords, *Thames Embankment. A Bill Intituled An Act for embanking the North Side of the River Thames from Westminster Bridge to Blackfriars Bridge, and for making new Streets in and near thereto*, Bills and Acts, volume 7, page VII. [i], paper number 187 (London: Parliament 1862), pg. 4.
[71] See the section describing the etymology of the work "Miasma" in *Oxford English Dictionary*; "Miasma Theory," in John Last, ed., *A Dictionary of Public Health* (Oxford, UK: Oxford University Press, 2007).

gathered in the streets were understood to be the cause of disease.[72] Although the precise mechanism was debated, many believed that miasma included particulates from rotting detritus which circulated in the air and precipitated epidemic diseases. Consequently, waves of bad-smelling water that wafted through the city was considered as a warning sign that dangerous epidemics could erupt. Stagnant cesspools of human and animal excrement were considered especially problematic. This is one of, if not the primary, reason why the sanitation revolution of the mid 1800s focussed so heavily on water and waste removal and as mentioned above, draining water into the Thames, at which point the danger would flow eastward out of the city.[73]

The water of the River Thames, the heart and soul of London, was thus both its biggest asset and biggest danger. By keeping the Thames clean and removing the potential for sitting wastewater from different locations in the city, the Embankment project, which was estimated to cost one and a half million pounds sterling, was believed to fortify London's public health on both sides of the embankment walls.[74] Following completion of the Thames Embankment, the Metropolitan Board of Works began plans for a city-wide waterworks which would draw clean water and deliver it to London's residents and ensure that waste water flowed safely away. However, these

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[72] William Bynum and Roy Porter, eds., "The Concept of Miasma," *Companion Encyclopedia of the History of Medicine* (London: Routledge, 1993), pg. 295.

[73] The Sanitation Revolution is often credited as beginning with Edwin Chadwick's 1842 report on *The Working Conditions of the Urban Poor*. His study, which surveyed the working and living conditions of residents across the city, found abhorrent living conditions that were primed for the spread of disease. Chadwick, one of the biggest revolutionaries in the realm of public health, advocated cleaned spaces (lime or white-washed walls, for example) and the safe disposal of any matter that could begin to putrefy and cause a stench. Ian Morley, "City Chaos, Contagion, Chadwick, and Social Justice," *Yale Journal of Biology and Medicine* 80:2 (June 2007), pg. 61; "1842 Report on the Sanitary Condition of the Labouring Population of Great Britain," *U.K. Parliament*, last modified 2021, available online at: https://www.parliament.uk/about/living-heritage/transformingsociety/livinglearning/coll-9-health1/health-02/.

[74] Great Britain, House of Commons, *Thames Embankment Bill. Copy of a report to the First Commissioner of Works, of the estimated expenditure to carry into effect the provisions of the Thames Embankment Bill; distinguishing the cost of the approaches to the embankment, and of the street between the embankment and the Mansion House; also the estimated cost of the low level sewer, and the length of the embankment and of each street; &c.* House of Commons Papers, volume 47, page XLVII.507, paper number 171 (London: Parliament 1862), pg. 1.

plans were never followed up on and the Board of Works was subsumed in 1888 under the reorganization of local governments across England and Wales.[75]

LONDON'S POOR LAW

The New Poor Law of 1834 was vital in the process of sanitary reform because it created centralized administrative points across London through Poor Law Unions, which, in turn, created a hierarchical system of administration. Victorian London was organized into five districts: west, north, central, east, and south. Each district was divided into sub-districts. During the cholera outbreaks of 1849 and 1854, there were thirty-six sub-districts; at the time of the 1866 epidemic, there were thirty-seven. Historically, these sub-district boundaries coincided with parish boundaries laid out by the Church of England, though this was no longer the case as early as the 1830s.[76]

The Elizabethan poor law system, now known historically as the Old Poor Law, made local parishes responsible for securing poor relief, keeping the peace, and maintaining the roads and the churchyard.[77] The most socially prestigious of these was the churchwarden, who had the honour of maintaining the local church, but arguably the most important to the people was the Overseer of the Poor.[78] Before 1834, poor relief often took the form of outdoor relief, where the primary goal was to provide basic food, clothing and shelter so recipients did not need to enter

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[75] Brioch, *London: Water and the Making of a Modern City*, pg. 33.
[76] Pool, *What Jane Austen Ate and Charles Dickens Knew*, pg. 167
[77] The poor relief system also provided medical care, and Dorothy and Roy Porter argue that the parish system under the Old Poor Law "was commonly humane and even generous … laying out money not just on food but on the varied necessities of life: clothes, shelter, fuel, and medical treatment." They go on to say that sizeable sums of money – up to £20 – were routinely spend on medical fees. All of this points to the nature of the Old Poor Law: a humanitarian response to poverty in the community. This is a stark contrast to what the New Poor Law became. Dorothy and Roy Porter, *Patient's Progress: Doctors and Doctoring in Eighteenth-century England* (Oxford, UK: Polity Press, 1989), pg. 8.
[78] Pool, *What Jane Austen Ate and Charles Dickens Knew*, pg. 167.

the poorhouse.[79] While effective at keeping people out of the poorhouse, this approach was criticized for providing little to incentivize people to work and become self sufficient.[80] In a practical sense, with the dramatic population and economic growth in England from 1760, lawmakers increasingly saw the need to consolidate the smaller parishes into larger administrative units.

Under the *Poor Law Amendment Act* of 1834, parishes were grouped into Poor Law Unions (Unions of parishes), and the parish Overseers of the Poor were replaced with elected Boards of Guardians, overseen by the new Poor Law Commission in London.[81] The Poor Law Commission was formed in part to change the perception of poor relief, but also to provide a national-level administrative agency which oversaw all the workhouses in the country.[82] The New Poor Law focused ostensibly on deterring people from asking for help by framing welfare relief as a social punishment and focusing on indoor relief in Poor Law Union workhouses. The poorhouse was purposefully painted in dark colours: the food was meagre; residents wore standard uniforms; no personal effects were permitted; there were no alcohol, firearms, or tobacco; no access to regular church services; families were separated; and residents performed hard and menial labour. As Anne Crowther has observed, the law "was based on a hard belief that the deserving and the undeserving poor could be distinguished from each other by a simple

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[79] The Old Poor Law attempted to classify its poor into three categories: the able-bodied poor who needed work, the vagrants who were deemed too lazy to work, and infirm (the sick and/or elderly). The infirm were often accepted into poorhouse to be cared for, while the vagrants were disciplined with whipping for their lack of motivation to work. The able-bodied poor were found jobs. The goal of outdoor relief was to provide the able-bodied with work so that they could raise themselves out of poverty while ensuring they had basic necessities during the process. Anne Digby, *The Poor Law in Nineteenth Century England and Wales* (London: Historical Association, 1982), pg. 6.
[80] The most noteworthy work on the history of Old Poor Law is Paul Slack, *The English Poor Law, 1531-1782* (Cambridge, UK: Press Syndicate of The University of Cambridge, 1990).
[81] Crowther highlights this point as important in the shift of poor relief from a community-based effort into an institutional, highly governed system of addressing poverty. See M.A. Crowther, "From Workhouse to Institution," in Crowther, *The Workhouse System, 1834-1929: The History of an English Social Institution* (Athens, GA: The University of Georgia Press, 1981), pgs. 54-87.
[82] Pool, *What Jane Austen Ate and Charles Dickens Knew*, pg. 244.

test: anyone who accepted relief in the repellent workhouse must be lacking the moral determination to survive outside it."[83] By making the workhouse a place of deterrence (with even the name denoting the negative connotation of the poorhouse), the Poor Law Commission hoped it would encourage the Victorian poor to work harder, and if working harder did not solve the problem of poverty, the issue was classified as a moral deficiency.[84]

Over time, the Unions of the New Poor Law became central to many aspects of the administration of public health. In London, the sub-districts (the old parishes) were responsible for their respective workhouses. However, because of the cost of maintaining and staffing these new institutions, and the small size of some parishes, it was common, and permitted, for multiple sub-districts to share a union workhouse. For example, in 1866, the Western sub-district of Chelsea North-west contained two workhouses: one belonging to the sub-district, and one that was affiliated with another district.[85] Because Poor Law Unions were collective workhouses which served multiple parishes, each parish contributed a set amount which was "in proportion to its poor relief expenditure over the previous three years."[86]

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[83] Crowther, *The Workhouse System, 1834-1929*, pg. 3.

[84] Crowther defines the difference between workhouse and poorhouse: a workhouse "clearly implied a regulated institution in which people of working age were set to labour. A poorhouse was either an institution for the old and helpless … or an unregulated receptacle for all kinds of paupers." Crowther, *The Workhouse System, 1834-1929*, pg. 24; Pool, *What Jane Austen Ate and Charles Dickens Knew*, pgs. 244-245.

[85] It was only in the 1860s that the records began distinguishing if a workhouse belonged to the district or was merely in the geographical space of the district. For instance, in the 1854 *Weekly Returns of Births and Deaths in London*, the list of sub-districts only indicates a workhouse in the sub-district if the workhouse is not affiliated with that sub-district (*W*) and in some instances textually indicate which sub-districts are responsible for the workhouse. In the 1866 *Weekly Returns*, workhouses are identified as local (*W*) and not affiliated (*w*) with textual explanation.

[86] These workhouses were paid for using poor rates, which were taxes levied in the parish to support the cost of the pauper poor. Established as early as the 1660s, poor rates were one aspect of the Poor Law that did not significantly change with the 1834 New Poor Law. The Unions were funded using poor rates; the only difference was that the "the whole of the Expence [*sic*] as well of upholding the united Workhouses therein as of maintain and relieving the Poor of the respective Parishes of such Unions, is assessed upon such Parishes in the respective Proportions fixed at the Period when such Unions were formed." Great Britain, House of Lords, *A Bill Intituled An Act for the Amendment and better administration of the Laws relating to the Poor in England and Wales*, Bills and Acts, volume 1, page 1.1, paper number 137 (London: Parliament 1834), pg. 10; Peter Higginbotham, "The New Poor Law," *The Workhouse: The Story of an Institution*, available online at: https://www.workhouses.org.uk/poorlaws/newpoorlaw.shtml.

In response to the growth of population in London (and England more generally), the number of workhouses rose significantly over the middle decades of the century. By 1866, there were forty-eight named in the *Weekly Returns of Births and Deaths in London*.[87] However, the increase in the population did not unilaterally mean more workhouses; it was the social conditions in which the population grew that made them necessary. The over-population of London, combined with the economic state and industry, resulted in many more residents seeking poor relief than decades earlier.

The workhouse infirmary was a big part in why London's residents may have ended up in the workhouse. The workhouse offered free, if rudimentary, medical care, and people with little to no access to any sort of surgeon, physician, or apothecary often ended up seeking services from the workhouse infirmary, either on an in-patient or out-patient basis. However, it is important to recognize that entering the workhouse was still a last resort, even for those facing life-threatening illnesses. The care in the workhouse infirmary was basic and the wide range of illnesses presented challenged the system in unprecedented ways, which ultimately led to a substandard degree of care for more complex cases. The workhouse infirmaries, while staffed by medical professionals, were not welcoming places and both medical staff and patients tried to limit their time there as much as possible. However, sickness was intrinsically linked to poverty

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[87] In 1866, the *Weekly Returns* listed the following workhouses throughout London: St. Mary Paddington, Kensington Town, Fulham, Chelsea North-west (one self-administered; one belonging to St. George, Hanover Square), May Fair, St. Margaret West, Charing Cross, Golden-square, Rectory Marylebone, Hampstead, Tottenham-court (belonging to the Strand), Camden-town, Islington West, Islington East (one self-administered; one belonging to West London), Hackney (one self-administered, one belonging to East London), St. Giles South, St. Andrew East Holborn, St. James Clerkenwell, West London North, Hoxton New Town (belonging to St. Luke, Middlesex), Haggerstone West, Mile End New Town, St. John St. George East, Shadwell, Ratcliff, Limehouse, Mile End Old Town East (one self-administered, one belonging to London City), Bow (one belonging to London City; one belonging to Stepney), Poplar, Christchurch Southwark, St. John Horsleydown, St. Mary Magdalen, Borough Road, St. Peter Walworth, Lambeth Church 2nd, Norwood, Battersea (x2), Camberwell, Greenwich East, and Lewisham Village. General Register Office, *Summary of Weekly Returns of 1866* (1867), pgs. xii-xiii.

and for many, there was no other option than to enter the infirmary ward and hope that they survived their illness long enough to leave the workhouse.[88]

The Rise of Vital Statistics

Victorian London was defined in part by its expanding infrastructure but also by its rapid population increase. Public health initiatives, in part, depended upon an accurate knowledge of the evolving demographic context. Keeping track of the people of England through registration processes was no small task and, like every other aspect discussed in this chapter, has a complex history. However, the time period under study witnessed a revolution in the way the British state counted the general population, including the establishment of vital registration (in 1837) and the expansion and formalization of the modern census (in 1841).

Historians disagree as to the motivations of why "counting people" became important at the dawn of the Victorian era. M.J. Cullen believes that the registration of births, deaths, and marriages has always reflected the religious tensions in England. The primacy of the Anglican church in parochial registers was challenged by Dissenters, thus eventually resulting in a civic-based collection of information.[89] Edward Higgs, by contrast, argues that the evolution of registering these life events reflected the changing legal nature of social reform and land ownership in early modern England.[90] Simon Szreter has suggested that the evolution of vital

[88] For an in-depth study of the workhouse infirmary, see the edited collection "Medicine and the Workhouse," ed. Jonathan Reinarz (Rochester, NY: University of Rochester Press, 2013). This collection addresses the various themes present in the current scholarship on workhouse infirmaries, including medical staff, the variety of ailments present, and patient cases when records are available, but also highlights the themes which need further exploration – for example, seeing the workhouse infirmary as an institution within a rapidly industrial world and the impact this had on patients both inside the infirmary as well as those faced with the decision to enter it.

[89] M.J. Cullen, "The Making of the Civil Registration Act of 1836," *Journal of Ecclesiastical History* XXV:1 (January 1974), pgs. 39-59.

[90] Edward Higgs, "A Cuckoo in the Nest? The Origins of Civil Registration and State Medical Statistics in England and Wales," *Continuity and Change* 11:1 (1996), pgs. 115-134.

statistics had very little to do with religion or legal reform, but instead reveals the changing goals of public health in England. He insists that the organization created to oversee the collection of statistics – the General Register Office [GRO] – should be considered outside of the scope of particular individuals (mainly William Farr and Edwin Chadwick). Rather, it ought to be considered as an important institution that, along with the medical officers of health, drastically changed the understanding of public health in nineteenth-century England.[91] The following section will provide a history of the General Register Office (GRO) which draws on all three perspectives, illustrating how the original collection of vital statistics began as a religious event but transformed into an institution which influenced public health responses to epidemics in Victorian England.

Registration of births, death and marriages had traditionally been an ecclesiastical responsibility, so any attempt by the government to create a uniform, secular system was open to controversy and contestation. Following several failed attempts, it was not until 1835 that any legislation regarding civil registration was positively received. The bill, entitled *An Act for Registering Births, Marriages, and Deaths in England,* proposed that the registration of births and deaths was compulsory (the same had been true in the 1834 drafted bill) but rather than being overseen by a religious organization, the "main innovation of the Registration Bill was the proposed utilisation of the facilities which the new Poor Law had provided."[92] Using the New Poor Law administrative framework did two things: it removed any religious bias from recording registrations, and it eased the administration burden by taking advantage of an already-existing

[91] Simon Szreter, "Introduction: The GRO and the Historians," *The Society for the Social History of Medicine* (1991), pgs. 401-414.
[92] Great Britain, House of Commons, *Registration of births, &c. A bill for registering births, deaths and marriages in England*, Bills and Acts, volume 1, page I.309, paper number 33 (London: Parliament 1836), pg. 7; Cullen, "The Making of the Civil Registration Act of 1836," pg. 53.

form of local government. The bill proposed a hierarchical system: the Registrar-General was to be nominated by the government and the Registrars and Superintendent Registrars were selected by the local Boards of Guardians.[93] The *Registration Act* became effective on 1 March 1837, as did the *Act for Marriages in England*.

Both of these acts were non-denominational. The *Registration Act* required that all births were reported directly to the Registrar by the child's parents within forty-two days of birth and that deaths were reported by the next of kin within five days.[94] The *Marriage Act* stipulated marriages were recorded upon receiving a request for a certificate of marriage. This could be done after seven days if the marriage was performed with a license, or after twenty-one days if there was no marriage licence.[95] The *Marriage Act* was instrumental in making marriage a civil event rather than a religious one. According to section XI of the act,

> every Superintendent Registrar shall have authority to grant Licences for Marriage … provided also, that nothing herein contained shall authorize any Superintendent Registrar to grant any Licence for Marriage in any Church or Chapel in which Marriages may be solemnized by the Church of England, or in any Church or Chapel belonging to the Church of England, or licensed for the celebration of Divine Worship according to the rites and ceremonies of the Church of England, or any License for Marriage in any registered buildings which shall not be within his district.[96]

While the authority of the Church of England remains clear, the *Marriage Act* was a breakthrough moment in allowing anyone in the English population to register a legal marriage regardless of their religious affiliations.

[93] The role of the local Board of Guardians was the one amendment made by the Whigs when the bill was presented in the House of Commons. The original bill proposed that the Registrars and Superintendent Registrars were to be selected by the Poor Law Commissioners. Cullen, "The Making of the Civil Registration Act of 1836," pgs. 53-54.
[94] Great Britain, *Registration of births*, pg. 7.
[95] Great Britain, *Registration of births*, pg. 5.
[96] Great Britain, House of Commons, *Marriages. A bill, [as amended by the Lords] intituled an act for marriages in England*, Bills and Acts, volume 1, page 1.435, paper number 534 (London: Parliament, 1836), pg. 6.

The *Registration Act* not only laid out the stipulations on how births, deaths, and marriages were recorded, it created the structure through which records were kept. Clause II read:

> And be it Enacted, That it shall be lawful for His Majesty to provide a proper Office in London or Westminster, to be called "The General Register Office," for keeping a Register of all Births, Deaths and Marriages of His Majesty's Subjects in England, and to appoint for said Office, under the Great Seal of the United Kingdom, a Registrar General of Births, Deaths and Marriages in England, and from time to time at pleasure to remove the said Registrar General, and appoint some other Person in his room.[97]

In conjunction with the Registrars and Superintendent Registrars selected by the Boards of Guardians, the General Register Office created a hierarchical structure for the collection of registrations for the English population. The General Register Office [GRO] came into effect on 1 March 1837.

The GRO was not initially intended as a collection point of statistical information. Its original purpose, as laid out by the acts which formed it, was nothing more than a civic collection of registrations of births, deaths, and marriages which did not rely on any religious affiliation. However, the GRO quickly evolved into something much greater. While the 1836 bill was being debated, there was interest from medical statisticians that the cause of death be included in every death registration. In fact, this was even promised by John Wilks, the President of the Protestant Society for the Protection of Civil Liberty, to win the support of the Provincial Medical and Surgical Association and the *London Medical Gazette* in 1833.[98] Despite the interest in including the cause of death, the bill was passed without stipulating the inclusion of the cause of death.[99]

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[97] Great Britain, *Registration of births*, pgs. 1-2.
[98] The debate over the Bill originated as a religious matter – Anglicans versus Unitarians. However, there were political party affiliations which rose out of the religious debates – the Whigs were the ones who upheld the statutes of the Church of England while the Tories wanted a civic, not religious, collection of information. Cullen, "The Making of the Civil Registration Act of 1836," pgs. 40, 55.
[99] Interestingly, however, in the Bill's appendices, the form for registering a death does include a column labelled "cause of death"; Great Britain, *Registration of births*, pg. 20.

The rise of vital statistics produced by the GRO is heavily credited to the first and second Registrar Generals, Thomas Lister (1836-42) and George Graham (1842-79). Under them, the GRO's Department of Statistics was formed, headed by medically trained William Farr.[100] Farr was hired by the GRO in 1837 to help with the initial organization of the incoming information. However, with support and backing from Edwin Chadwick and Neill Arnott, he was permanently hired by the GRO in 1839 as the Compiler of Abstracts.[101]

Trained in medical statistics, William Farr understood the value of collecting death records – including the cause of death – to create patterns which could be analyzed in the name of public health.[102] Farr's main tool was the life-table, a table which "could demonstrate how life expectation at different ages varied according to occupation, wealth and hygienic conditions."[103] The life-tables became much more useful after the 1841 census, a task over which the newly-created GRO was given jurisdiction. In 1842, Farr was reappointed as the Superintendent of the Statistical Department within the GRO, his salary increasing to nearly match that of the Registrar General himself.[104]

The GRO was instrumental in the rise of vital statistics, and the implications this had for tracking mortality were significant. As discussed in the Sources section of the Introduction, the

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[100] Simon Szreter has argued that too much of the GRO's history has focused on Farr, giving historians a skewed perspective on the origins and purposes of the GRO in its early years. Szreter, "The GRO and the Historian," pgs. 402-403.

[101] Dorothy Porter, *Health, Civilization, and the State: A History of Public Health from Ancient to Modern Times* (London: Routledge, 1999), pg. 72; John Eyler, "Farr, William (1807-1883)," *Oxford Dictionary of National Biography*, last modified 23 September 2004; Bill Luckin, "Arnott, Neil (1788-1874)," *Oxford Dictionary of National Biography*, last modified 23 September 2004.

[102] Farr even made a note in his journal in 1836 when the bill was being debated about the exclusion of cause of death; Cullen, "The Making of the Civil Registration Act of 1836," pg. 56; Porter, *Health, Civilization, and the State*, pg. 72.

[103] Interestingly, the life-tables are often cited in the history of insurance, arguing that they were one of the first ways to measure risk in any given population – see Richard Singer, "The First Mortality Follow-up Study: The 1841Report of William Farr (Physician) on the Mortality of Lunatics," *Journal of Insurance Medicine* 33 (2001), pgs. 298-309; Porter, *Health, Civilization, and the State*, pg. 73.

[104] Farr's influence on medical statistics extended far beyond life tables. One of his most significant contributions to the rise of public health education was nosology, the classification of disease. Eyler, "Farr, William (1807-1883)."

collection of statistics led to a streamlined understanding of disease classification via nosology and the adoption of standard nomenclature. The collection and publication of the *Weekly Returns of Births and Deaths in London* led to a greater understanding of epidemic diseases due to the increased awareness of the scope of the disease. When cholera epidemics threatened, special care was taken to document the rise of mortality; notes written by medical officers of health were included to highlight the imminent danger. As cholera epidemics progressed, the GRO went to great lengths to chart mortality. Apart from the standard mortality figures, the *Weekly Returns* grew thick with inclusions of observations from medical officers, as well as special appendices which provide detailed accounts of cholera mortality across London.

The inclusion of these appendices, as well as the detailed records of cholera mortality in neighbourhoods, sub-districts, and districts, illustrate how the rise of vital statistics changed the Victorian understanding of epidemic cholera. Though the disease was still not fully understood from a medical perspective – which will be discussed in Chapters Three and Four – the collection of vital statistics represented the cooperation between medical officers and government officials. This is, perhaps, one of the biggest achievements of first the 1848 *Public Health Act* and, subsequently, the 1855 *Metropolis Local Management Act*, as it demonstrates the successes of a hierarchical model within public health infrastructure in an urban centre. Though vital statistics did not stop cholera epidemics from occurring, they were a considerable asset for medical practitioners and public health reformers in understanding the movement of the disease which helped guide the evolution of public health in nineteenth-century London.

CONCLUSION

By the 1880s, London was a very different place to live compared to half a century earlier. The population had risen considerably, which forced a myriad of changes in the way the city operated. The population boom challenged the housing infrastructure, which created a starkly different London living experiences which was class-based: the middle-classes took pride in their single dwelling homes while the lower classes, often dock workers or other manual labourers, created their own social identity in the East End. Subsequently, the housing crisis and booming population highlighted the need for social and sanitary reform.

The 1848 *Public Health Act* was monumental in bringing all nuisances under the purview of a single administrative board, which was perhaps its biggest success. The new central administrative model adopted by London nearly a decade later, in 1855, allowed the city to adequately address multiple aspects of sanitation and social concerns – everything from sewers to water to providing medical care for the poor. Of course, these changes were accompanied by new ways of social monitoring; the General Register Office and the collection of vital statistics laid important groundwork which ensured the success of the efforts put forth by the new Boards of Health by providing a transparent understanding of the effectiveness of policies, or lack thereof. Whereas this chapter addressed *living* in London, Chapter Three focuses more on the latter part of the first research question: what was like to *be sick* in and *die* in London? The next chapter uses vital statistics as a way to engage with the medical realities of Victorian London; understanding the mortality rates published in the vital statistics puts into context the three cholera epidemics discussed in later chapters – how they were tabulated, interpreted, and the relationship between mortality and the evolution of sanitary policies.

Chapter Three

Sickness and Dying in London

The first research question of this thesis is comprised of multiple parts: living, being sick, and dying. While Chapter Two addressed the living conditions in London, and how rapidly evolving public health legislation influenced London living, this chapter situates disease, particularly infectious diseases, within Victorian society. The chapter begins with a summary of medical care in England, highlighting how a rapidly changing medical marketplace began to challenge the traditional trifecta of medical practitioners, before probing the contemporary understandings of disease origins based on the works of surgeon John Hunter and physician Joseph Adams. These medical practitioners, who played an important role in the early classification of disease, greatly influenced William Farr. Using Hunter and Adams's terminology, Farr devised life-tables that shed new light on the mortality patterns present in London from 1840 until 1870. This chapter examines contemporary debates and discussions arising from this data, which in turn provides an understanding of the overall mortality patterns experienced in London, as well as the patterns which reflect zymotic (contagious) diseases. Farr's life-tables collated data by age and sex, which are discussed as potential factors that influenced mortality. The chapter concludes with an examination on the seasonality of different diseases. Throughout the chapter, there is emphasis on zymotic disease mortality patterns before narrowing in on mortality patterns from the cholera years: 1849, 1854, and 1866.

MEDICAL CARE IN VICTORIAN ENGLAND

Medical care, and the organization of the medical professions, underwent significant changes over the nineteenth century. The traditional trifecta of medical practitioners – the physician, the surgeon, and the apothecary – was slowly being dismantled in England to reflect medical care which was more based in hospital care, scientific methods, and practical skills, rather than a classical medical education. During the early modern era, formal medical practitioners belonged to one of three branches: university-educated physicians who rarely did any of the "dirty" work of medicine and primarily observed their patients; surgeons, who did the grisly work such as setting bones and pulling teeth; and apothecaries, who compounded and distributed medicines to enact physical change.[1] However, this traditional organization of medicine was beginning to change at the turn of the century. Ivan Waddington argues that there came a point in the early nineteenth century when the division began to give way to new models of medical education and a call for the unification and registration of all medical practitioners, ultimately culminating in the 1858 *Medical Registration Act*.[2] What once began as a medical system based on class and social rank was slowly replaced by a system in which medical skill was considered more valued than abstract theoretical knowledge.[3]

The transformation of medicine was due, in part, to the rise of university-affiliated hospital education and training in new scientific and technical innovations, from the microscope to

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[1] E.C. Spary, "Health and Medicine in the Enlightenment," in *The Oxford Handbook for the History of Medicine*, ed. Mark Jackson (Oxford, UK: Oxford University Press, 2011), pg. 83; Roy Porter, *Disease, Medicine, and Society in England, 1550-1860* (Cambridge, UK: Cambridge University Press, 1995), pgs. 18-19.

[2] The 1858 *Medical Act* created the General Medical Council, which required that all practitioners be registered with the institution, regardless of their "rank" within the profession. The *Act* was the first time medical registrations were handled by one professional body; before that, there were societies and associations for each of the three branches: The Royal College of Physicians (est. 1518), the Company of Barber-Surgeons (est. 1745, with the Royal College of Surgeons becoming its own entity in 1800), and the Worshipful Society of Apothecaries (est. 1617). Ivan Waddington, *The Medical Profession in the Industrial Revolution* (Dublin: Gill and Macmillan Humanities Press, 1984), pgs. 3-6, 96, 184.

[3] Waddington, *The Medical Profession in the Industrial Revolution*, pgs. 9, 16.

microbiology. William Bynum suggests that medical practice and technological advances became increasingly intertwined as the century progressed. The dramatic expansion in the number of hospitals, new systems of diagnosing disease (for example, nosology, which was based on physical, empirical observations), and the rise of empirical evidence at both the bedside and in the laboratory, all contributed to the scientific advancement of medicine in the nineteenth century.[4] Similarly, Rosemary Stevens argues that the emergence of clinical-based teaching programs to ensure qualifications of medical practitioners quickly advanced in the nineteenth century, with more practitioners obtaining hands-on experience and licences through diploma programs designed for surgeons and apothecaries, instead of the traditional Oxbridge education required by the Royal Society of Physicians to be granted a physician's license.[5] The importance of occupational skills (hospital experience and anatomical understandings of the body) rather than theoretical knowledge (an Oxford or Cambridge "gentleman's education") compelled the three branches to restructure themselves around two principal groups: general practitioners and consultants.[6]

Despite the rapidly changing sphere of medical care, the medical marketplace by the advent of the cholera epidemics in the 1830s was still pluralistic, with many participants and competing therapeutic modalities; patients sought out who they wanted to treat them based on preference, trust, accessibility, and cost. The apothecary was the most affordable, while the physician treated the upper classes. The surgeon was called in for difficult procedures,

[4] William Bynum, *Science and the Practice of Medicine in the Nineteenth Century* (Cambridge, UK: Cambridge University Press, 1994), pgs. 25-54.
[5] Rosemary Stevens, *Medical Practice in Modern England: The Impact of Specialization and State Medicine* (New York: Routledge, 2003), pgs. 11-25.
[6] As the profession progressed, many families began looking for healthcare which provided care for all members of the family, including women and children. This new demand for multi-faceted practitioners was another factor which altered the traditional trifecta, pushing away from stratification and towards a more "well rounded" general practitioner. Waddington, *The Medical Profession in the Industrial Revolution*, pg. 25.

particularly in the era before the widespread use of anaesthesia, and usually as a last resort.[7] Many nineteenth-century medical practitioners sought to expand their areas of expertise with formal education, which permitted them a wider scope of practice that many historians have understood as the precursor to the general practitioner who dominated the non-urban practice later in the century.[8] However, healing interventions extended beyond these three formal branches of medicine. Healing and treatment were familial and communal affairs, and many patients sought informal care from friends, family, neighbours, and the community at large.[9] Historians have thus referred to the Victorian era as one reflecting a complicated medical "marketplace." The very name suggests that the patient was a consumer "shopping around" for the best solution to their ailment.[10] The open structure of the medical marketplace makes it difficult for historians to accurately grasp how often medical attention was sought.[11] Indeed, some historians have posited an "iceberg effect," suggesting that while primary sources often capture elite formal health care encounters, they offer only a glimpse of the much larger body of medical support offered and obtained below the water's surface.[12]

[7] This was an era before anesthetic or an antiseptic, so surgery was risky and painful. Most of the time, surgery was done only after all other options had been exhausted.
[8] This model of evolution within the medical market was first penned by Irvine Loudon in *Medical Care and the General Practitioner, 1750-1850* (Oxford, UK: Clarendon Press, 1986). The evolution of skills eventually came to include male-midwifes; Loudon, *Medical Care and the General Practitioner*, pgs. 2-4; Adrian Wilson, "Midwifery in the 'Medical Marketplace'," in *Medicine and the Market in England and Its Colonies,* c. *1450* – c. *1850*, eds. Mark S.R. Jenner and Patrick Wallis (New York: Palgrave Macmillan, 2007), pg. 153.
[9] It was often an important role for women to care for their families, and it was not uncommon for women to call upon each other for help in the case of sickness or injury. Recipe books and remedies were frequently shared, often during social gatherings. R. Porter, *Disease, Medicine, and Society in England*, pg. 21.
[10] The term first emerged in the mid 1980s by several historians, including Lucinda Beier, Roy Porter, Irvine Loudon, and Harold Cook. Mark Jenner and Patrick Wallis, "The Medical Marketplace," in *Medicine and the market in England and its colonies, c. 1450-1850*, eds., Mark Jenner and Patrick Wallis (New York: Palgrave Macmillan, 2017), pg. 1-2.
[11] The first national medical register was published in 1779, and shows about 3000 entries of physicians, surgeons, and apothecaries. R. Porter, *Disease, Medicine, and Society in England*, pg. 19.
[12] The iceberg effect is a "theory that suggests that we cannot see or detect most of a situation's data." Roy Porter, "The Patient's View: Doing Medical History from Below," pg. 187-188; "Iceberg Principle – Definition and Example," *Market Business News*, last modified 2020, available online at: https://marketbusinessnews.com/financial-glossary/iceberg-principle-definition-example/.

In pre-Victorian days, the openness of the medical marketplace was not highly contested by the elite physicians who, at least nominally, had authority over the other formal branches of medicine. This was mostly due to their clientele. The skills of the physician were requested almost exclusively by the social elite, who were able to afford their services.[13] Because they could support themselves through wealthy clients, physicians did not bother too much about how the rest of the population sought medical treatments. This began to change by the late 1830s, about five years after the first epidemic of cholera passed through Britain. Michael Brown argues that the late 1830s represents something of a paradox, as physicians became convinced of the need for unifying the medical profession (a movement also known as "medical reform") in the midst of a growing *laissez-faire* market.[14] From an economic point of view, physicians were drawn to the open market as they had a monopoly on the elite classes and "where most are cured, the money will go; for in this enlightened age, people like to go with their money to the best market."[15] From a medical perspective, however, there were concerns about the quality of medical care being provided by individuals posing as "doctors." Despite having the wealthiest clientele in a competitive medical system, university-educated physicians and other medical practitioners began to demand that the medical marketplace become a more regulated and closed system for the sake of the public good.[16] They believed all practitioners needed to be approved and monitored according to a uniform set of guidelines. These guidelines included formal

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[13] For more information about the different relationships between patients and practitioners, especially based on social and economic circumstances, see Dorothy Porter, "Consultations," in *Patient's Progress: Doctors and Doctoring in Eighteenth-century England*, by Dorothy Porter and Roy Porter (Oxford, UK: Polity Press, 1989), pgs. 70-95.

[14] Michael Brown, "Medicine, Quackery and the Free Market: The 'War' against Morison's Pills and the Construction of the Medical Profession, c. 1830-1850," in *Medicine and the market in England and its colonies, c. 1450-1850*, eds., Mark Jenner and Patrick Wallis (New York: Palgrave Macmillan, 2017), pg. 238-240.

[15] Joseph Webb, *York Herald* (1 November 1834), quoted in Brown, "Medicine, Quackery and the Free Market," pg. 251.

[16] Brown writes that "there were those who maintained that in order to protect the health and welfare of the public, there were aspects of the social and economic life in which market forces and individual liberties had to be curtailed." Brown, "Medicine, Quackery and the Free Market," pg. 255.

education and apprenticeship, as well as licensing and permits to practice. Physicians and surgeons had taken steps to form local medical societies for the organization and regularization of their profession long before the 1830s. However, the push for medical reform sought to unify orthodox practitioners and exclude “irregular” or “alternative” medical practitioners – practitioners who provided medical care outside the boundaries of individuals who held qualifications as physicians, surgeons, or surgeon-apothecaries. After several failed attempts, the *Medical Registration Act* of 1858 created this new system of national registration. Medicine was thus in a state of transformation and consolidation at the outset of the period under study.

DEATH IN VICTORIAN LONDON

London’s mortality rate was a topic of considerable interest to contemporary observers, undoubtedly due to the rapid population increase and ecological impact of industrialization on the metropolis. As the capital city grew in population size and density, housing conditions became grim, air quality likely decreased, and London’s streets became notoriously filthy. Rotting food, stagnant water, putrefying animals, open cesspools, human and animal waste, and strewn garbage characterised London’s back alleys and heavily travelled streets. As many urban and medical historians have observed, the environment was a breeding ground for infectious diseases. Despite this fact, London’s mortality rate remained surprisingly consistent between 1841 and 1871. In this thirty-year period, the annual number of recorded deaths rose from 45,284 to 80,282, which, given the accompanying increase in the general population, represented approximately an annual mortality rate of 2.3 percent of the population.

The decennial censuses offer a useful, if imperfect, counting of the population of London during the Victorian era. Figure 3.1 below shows the numbers reported by the General Register

Office during the census years of 1851, 1861, and 1871, along with yearly records from 1855 onwards, which were reported in the *Weekly Returns of Births and Deaths in London*. It is important to remember, however, that in non-census years, the population is an estimate based on the birth and death rates.

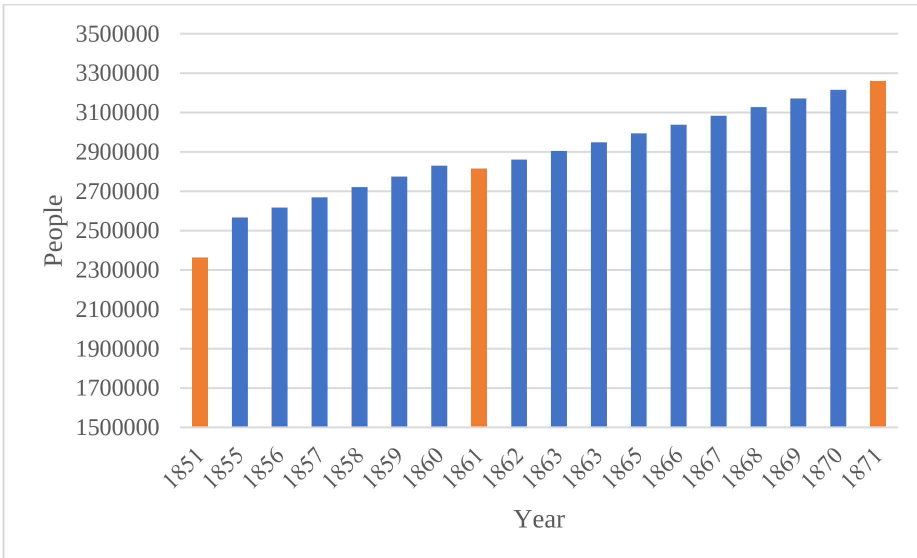

Figure 3.1 - London population statistics

Overall, the growth of London's population was steady. The dip in 1861 can be accounted for due to the source of the statistics in the previous year – 1861 was a census year, while the figure in 1860 was an estimation that proved slightly higher than reality. The change in population between 1859 and 1861 still suggests growth in 1860 despite the overly optimistic estimation made in that year.

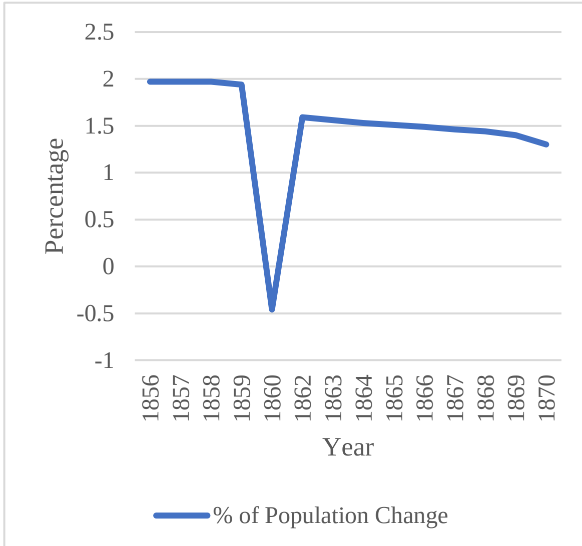

Figure 3.2 – Annual change in population (shown as a percentage), 1856-1870

Figure 3.2 shows the non-census years beginning in 1856 when population estimates were regularly made. It shows that while London's population continued to increase over the early and mid-Victorian periods, the *rate* of increase declined over time. The exception to this, of course, was in 1860, when the estimated population declined slightly (less than half a percent). 1860 aside, the overall decline could be attributed to a slowing birth rate – one which was still greater than the death rate but decreasing each year – or an increasing death rate. Of course, the net population change was a balance of both of these factors but let us consider the death rate in greater detail, specifically as it pertained to disease.

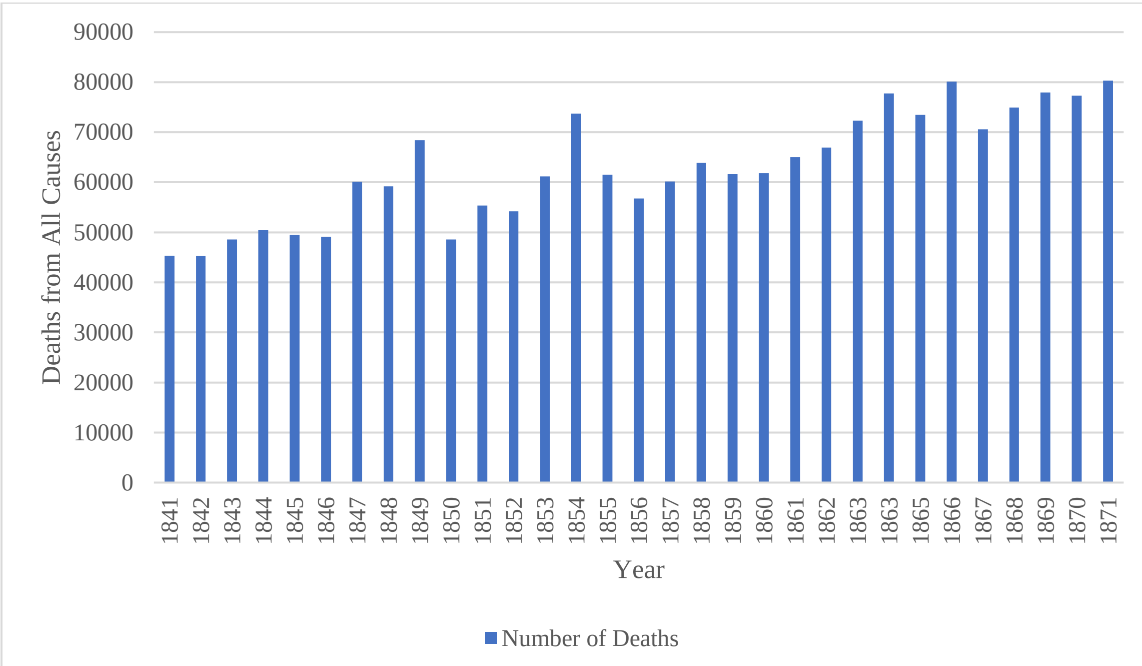

Figure 3.3 – Number of deaths from all causes, 1841-1871

Figure 3.3 shows the absolute number of deaths recorded each year. Not surprisingly, these numbers, although they trend upwards with the general rise in the population, vary on a yearly basis. For example, the "cholera years" under examination in this thesis are easily identifiable based on the spikes in deaths seen in each of the respective years – 1849, 1854, and 1866. There were, of course, other epidemic outbreaks which occurred during these years, such as typhus in 1863. Moreover, there were other, relatively constant factors which influenced death rates – things like maternal mortality, childhood ailments, suicide, and fatal occupational accidents. Presumably, these did not change much from an individual year to the next, which leaves the presence of epidemic disease as the biggest factor in driving up the number of deaths each year.

Other environmental factors affecting specific years could potentially include weather (particularly fog and air pollution, leading to respiratory disease) and natural disasters such as famine and drought.[17] Figure 3.4 below shows this yearly mortality rate (total deaths as a percentage of estimated population) for the years 1855 through 1871.[18]

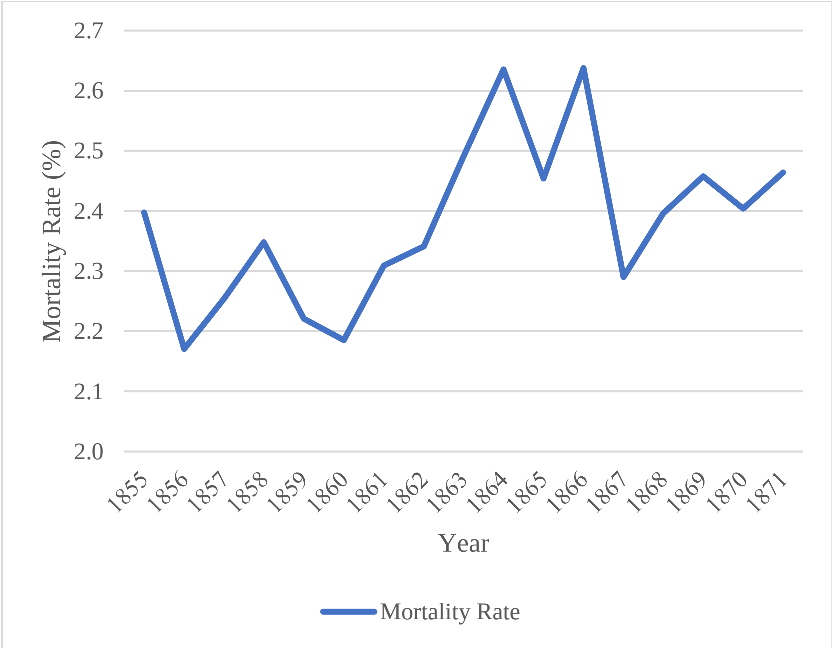

Figure 3.4 – Mortality rate, 1855-1871

[17] The question of weather is heavily intertwined with environmental health, which in turn is related to industrialization, as air pollution was a large by-product of mechanization in the nineteenth century. Bill Luckin's article "'The Heart and Home of Horror': The Great London Fogs of the Late Nineteenth Century," *Social History* 28:1 (2003), pgs. 31-48, argues that the increased fogs caused by excessive smoke due to London's rapid industrialization led to concerns about health, particularly respiratory conditions. Not only did the continuous burning of coal represent a moral dilemma, in which people were accused of squandering precious natural resources, the inherent "blackness" of London's air shut out certain economic sectors (particularly fine arts, such as linens, and artwork was often destroyed by the air particles) but people were shut up in their homes, unable and/or unwilling to open windows for ventilation, leading to what physicians at the time called suffocation from lack of fresh air. Luckin's work is a pioneering piece which aims to tie together medical, environmental, urban, and meteorological history during the nineteenth century. Other histories of London's smoke pollution include Stephen Mosely, *The Chimney of the World: A History of Smoke Pollution in Victorian and Edwardian Manchester* (Cambridge, UK: White Horse Press, 2001).

[18] Despite the thesis covering the 1848-49 cholera epidemic, this figure begins with 1855 because that was then the *Weekly Returns* consistently began publishing a yearly summary page at the beginning of the year's *Returns*. Before 1855, any information included regarding population and total number of deaths was not consistently provided.

As we can see, the mortality rate in London fluctuated year to year, though the changes were minor – any fluctuation between years was less than half a percent. While many historians argue that the nineteenth-century's mortality patterns show a decline, it is important to distinguish when this decline occurred. Figure 3.4 above suggests that until at least 1871, the mortality rate in London did decline occasionally from year to year but not consistently over the period under study. This is supported by the works of Hardy, Razzell, Harris and Hinde, Luckin and Mooney, and Logan, all who argue that mortality in England did not really begin a significant decline until the 1870s. Before that, and what this glimpse of a subset of years shows, is that any trend of decline before 1871 was fragile, if it existed at all.[19] In an epidemic year, the absolute number of deaths increased due to cholera, but overall, the number of births still outpaced the number of deaths, enabling London's population to continue to grow. However, in a year that did not see an epidemic (cholera or otherwise), the birth rate exceeded the death rate to a higher degree, which produced a lower mortality rate while accelerating London's population growth. Even though London's population growth began to slow during the 1860s, there was never a year in which the number of deaths was greater than the number of births which ensured London continued to grow even in the face of an increasing yearly number of deaths and a relatively steady mortality rate.[20]

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[19] The question of England's changing mortality rates during the nineteenth century is one of the most-studied topics in medical history, and has been discussed by numerous historians, including McKeown, Szreter, Guta, Millward and Bell, Hardy, Razzell, Harris and Hinde, Luckin and Mooney, and Logan. However, it is agreed by many that the decline of mortality in England was not that dramatic before the 1870s, and that the mortality rate before then remained fairly consistent. Thomas McKeown, *The Modern Rise of the Population* (London: Edward Arnold (Publishers) Ltd., 1976). pg. 50; W.P.D. Logan, "Mortality in England and Wales from 1848 to 1947: A Survey of the Changing Causes of Death during the Past Hundred Years," *Population Studies* 4:2 (1950), pg. 134.

[20] The above discussion focused primarily on the changing birth and death rates and how they related to London's population changes over the nineteenth century. Of course, the population rate of London was also influenced by in- and out-migration. The nineteenth century experienced a range of migration patterns as many people moved from the rural townships into the more urbanized centers. The most popular of these were London, Northwest England, and South Wales – primarily the thriving industrial towns such as Liverpool, Manchester, Leeds, Hull, Sheffield, Nottingham, Leicester, and Birmingham. Given that employability was one of the biggest factors in long-distance moves (Turnbull and Pooley have an in-depth discussion on the different push and pull factors which determined the

ZYMOTIC DEATHS

Pre-bacteriological understandings of diseases in Victorian England were based on three main theories of disease occurrence: poison, putrefaction, and fermentation.[21] The idea that diseases were associated with poisons first appeared in the work of Giovanni Maria Lancisi (1654-1720) but in the nineteenth century, the concept was expanded by John Hunter. Hunter believed that morbid poisons were diseases themselves, and each disease was a unique morbid poison. The origin of the poison was the disease itself rather than being produced by vegetables, minerals, and animals. Morbid poisons, which referred to the "'increasing agents' of contagious diseases" were pathologically based: blood became tainted with morbid poison, and tainted blood had the ability to transmit the disease.[22] This poisoned blood became a vector for spreading the disease around the body but also between humans. Hunter's student, Joseph Adams, further delineated morbid poisons into contagious and infectious (replacing the terms simple and compound, as had been applied by Hunter). Contagious morbid poisons were unidentified in origin but could only be spread through "contact with a person, or matter from a person under a similar disease." Conversely, infectious morbid poisons were identifiable and "may at any time be generated by crowding together the sick or wounded of any description … [they] do not require for their production matter similar to their effect."[23] This relationship

mobility patterns and differences between long-haul and short haul moves), it makes sense that the movement from rural to urban coincided with the rise of industrialization and urbanization. However, it is important to recognize that this particular migration pattern was limited. As more urban centers were connected via rail and steamship, and as the industrial revolution led to specific regions with specialized manufactured products, the migration rates began to slow down. This, in conjunction with the growing suburbanization of urban centers, led to a decline in rural to urban migration patterns throughout England which was observable by the 1900s. R. Lawton, "Population Changes in England and Wales in the Later Nineteenth Century: An Analysis of Trends by Registration Districts," *Transactions of the Institute of British Geographers* 44 (May 1968), pgs. 60, 62; Jean Turnbull and Colin Pooley, *Migration and Mobility in Britain Since the Eighteenth Century* (London: Taylor & Francis, 1998), pgs. 53, 64-71, 83.

[21] While other explanations of disease existed – for example, chemical processes – poison and fermentation theories were the two most prominent. Margaret Pelling, *Cholera, Fever, and English Medicine, 1825-1865* (Oxford, UK: Oxford University Press, 1978), pg. 113.

[22] Pelling, *Cholera, Fever, and English Medicine*, pg. 115.

[23] Joseph Adams, *Observations on Morbid Poisons*, *Chronic and Acute,* 2nd edition (London, 1807), pg. 6.

between cause and effect is key to understanding the difference between contagious and infectious morbid poisons. While the term "morbid poison" was specifically applied to understanding "contagious" diseases – that is, diseases that spread between people – there were nuances between contagious and infectious morbid poisons. Contagious poisons produced effects (symptoms) like that which caused the disease and were spread through direct contact whereas infectious disease effects (symptoms) had origins in other factors, often environmental, and there existed no relationship between the morbid poison and the symptoms presented. In this case, the spread between people did not rely on direct contact. For example, smallpox was considered a contagious disease because someone who came in contact with smallpox matter yielded the same effects (symptoms) as the cause.[24] Diseases such as "fevers" in prisons and hospitals, however, yielded symptoms not identifiable with a specific cause, which likely had to do with factors such as over-crowding, poor ventilation, and unsanitary conditions.[25]

The relationship between symptoms and cause reflected an evolving understanding of symptomology and disease identification. The more specific and identifiable the symptom, the easier it was to identify the cause of the disease. Certain diseases such as smallpox or cholera, which had symptoms that were very well known and easily recognized, were labelled as contagious morbid poisons because the relationship between cause and symptom was well established and the disease was easy to follow through contact tracing. Other diseases – particularly "fevers", which was often a catch-all term for any disease which resulted in a raised body temperature and yet could have multiple different causes – were harder to trace because the

[24] It is important to remember that one of the things which defined contagious morbid poisons was the inability to trace the origin. Today, it is easy to perform contact tracing based on known exposures. However, in the nineteenth century, the idea of contagious morbid poison was rooted in the fact that the disease was untraceable, and that its cause was traceable through the symptomology.
[25] Adams, *Observations on Morbid Poisons*, pg. 6.

symptomology was so broad and unspecific. When the relationship between symptom and cause was not obvious, the disease was grouped as an infectious morbid poison. Overall, morbid poisons were understood as a pathological process in which diseases produced a poison that had the ability to spread the disease. The relationship between the cause of disease and symptomology determined if the poison was contagious or infectious.

The biggest issue with the theory of morbid poisons was that it did not clearly explain where disease came from, just that the blood became poisoned by the disease. The theory of fermentation was developed primarily by Justus Liebig in the 1830s and 1840s, who "explained the disease process in terms of fermentation, and fermentation, putrefaction, and decay in terms of a mode of change characteristic of organic molecules."[26] The basis of Liebig's work lay in organic chemistry; believing that organic molecules – which were the basis of all living things – were unstable because of their size, the molecules were prone to reactions caused by "changes in temperature and electrical condition, or friction or contact with bodies of apparently totally different natures" which led to new organic formations within the body.[27] This was the foundation for the Liebig theory of catalysis, which was the microbiological explanation for how putrefaction and fermentation began.[28]

Putrefaction was the result of organic substances mixing with water, which contained oxygen molecules. Oxygen was understood as a "physical disturbance" which caused organic molecules to "break into smaller organic molecules. These were then slowly oxidized into

[26] Pelling, *Cholera, Fever, and English Medicine*, pg. 120.
[27] Pelling, *Cholera, Fever, and English Medicine*, pg. 120-121; Justus von Liebig, *Familiar Letters on Chemistry, in its Relations to Physiology, Dietetics, Agriculture, Commerce, and Political Economy*, 3rd edition (London, 1851), pg. 259.
[28] The theories of catalysis were intended to explain how substances – organic and inorganic – broke down; that is, what was the *catalyst* for this process? V.I. Kuznetsov, "The Development of Basic Ideas in the Field of Catalysis," *Chymia* 11 (1996), pgs. 183-184.

inorganic compounds."[29] However, after the initial exposure to oxygen, the process continued. This autonomy is what defined putrefaction – the "spread through the whole mass, with or without the co-operation of that cause."[30] This meant that exposure to oxygen was only necessary to start the process of putrefaction; once the organic substance had begun putrefying, the process continued even if there was no oxygen present.

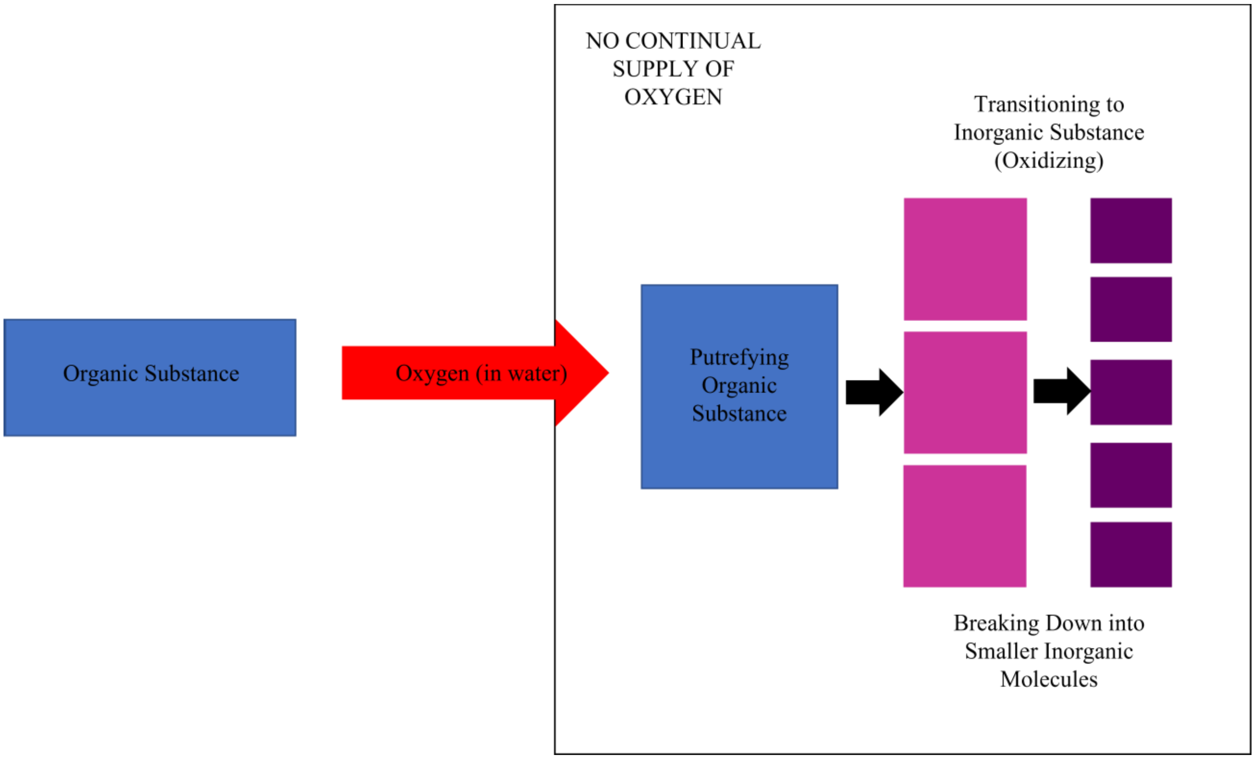

Figure 3.5 – The process of putrefaction

Conversely, fermentation was the result of nitrogenous organic matter which interacted with gluten and sugar molecules, the most common nitrogenous organic matter being yeast. It was purely a chemical change which depended on the presence of air and water.[31] Organic substances

[29] Christopher Hamlin, "Providence and Putrefaction: Victorian Sanitarians and the Natural Theology of Health and Disease," *Victorian Studies* 28:3 (Spring 1985), pg. 385.
[30] Liebig, *Familiar Letters*, pg. 183.
[31] John Eyler, "The Conversion of Angus Smith: The Changing Role of Chemistry and Biology in Sanitary Science, 1850-1880," *Bulleting of the History of Medicine* 54:2 (Summer 1980), pg. 218; Justus von Liebig, *Chemistry and Its Application to Agriculture and Physiology*, 4th edition (London, 1847), pg. 304.

which came into contact with nitrogenous organic matter led to a cyclical effect; fermenting substances produced more organic compounds which continued to ferment. According to Liebig, "the presence of water is quite necessary for sustaining the properties of ferment, for by simple pressure its power to excite ferment is much diminished, and is completely destroyed by drying."[32] If the organic substance did not continually decompose, the fermentation process ended when organic compounds were oxidized into inorganic compounds (putrefaction).[33]

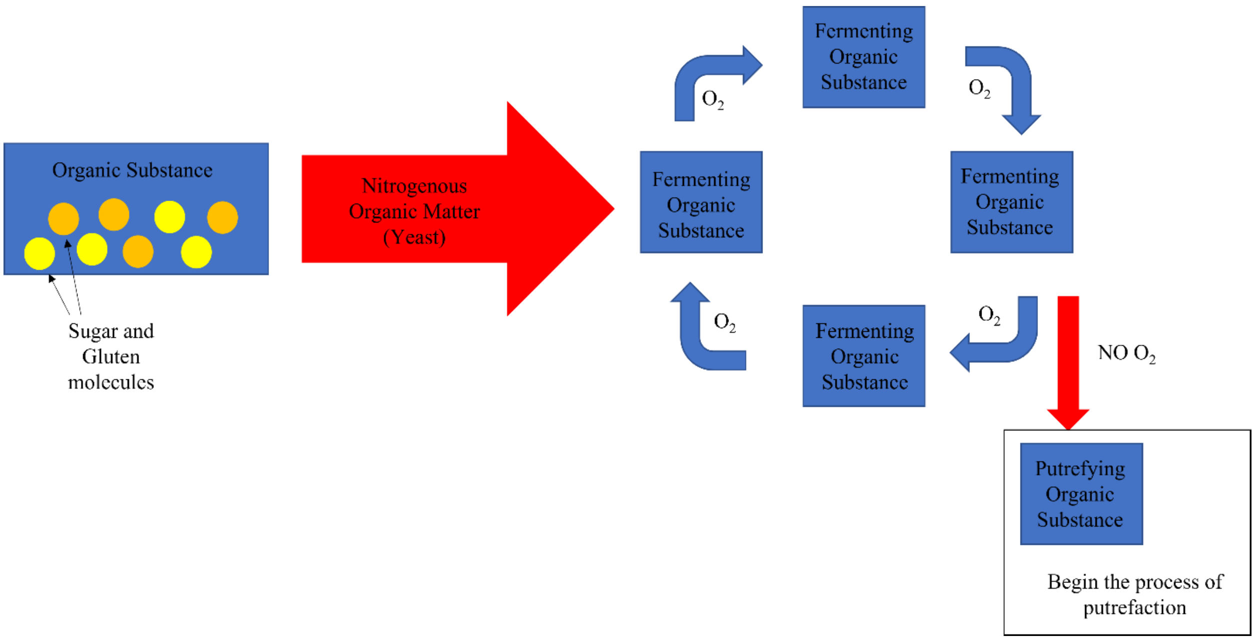

Figure 3.6 – The process of fermentation

Liebig defined contagious diseases as the result of consuming items – food or drink – in a state of putrefaction (which he called the "exciters"), which led to a continual process of putrefaction within the blood. If gluten was present, the process became one of fermentation within the blood. Regardless of if a reaction was classified as putrefaction or fermentation, Liebig firmly believed that, rather than the poisonous substances produced by these organic reactions, it was the process

[32] Liebig, *Chemistry and Its Application to Agriculture and Physiology*, pg. 303.
[33] Hamlin, *Providence and Putrefaction*, pg. 385.

of decay itself which was the seat of contagious disease, primarily identified by its self-sustaining cycle.[34]

Liebig's theory of putrefaction and fermentation within the body was grounded in the blood: "when a quantity, however small, of contagious matter, that is of the exciting body, is introduced into the blood of a healthy individual, it will be again generated in the blood, just as yeast is reproduced from wort. Its condition of transformation will be communicated as a constituent of the blood."[35] Blood was particularly complex and therefore susceptible to the "exciters" which led to instability and reactions between organic molecules and air, water, or yeast. Of course, the "exciters" could be contagious – an organic compound in a state of decay – or non-contagious, which were inorganic compounds. Inorganic compounds either "'destroyed the continuity' of particular organs, as did sulphuric acid, or they operated chemically by forming more or less stable combinations with constituents of the body."[36] Because these inorganic compounds did not engage in a continual process of putrefaction or fermentation within the body, they were non-contagious organic substances. A contagious organic substance was one which increased the amount of morbid material within the blood through a self-propagating cycle.

The idea of contagious diseases was constantly evolving. For Hunter and Adams, all morbid poisons were diseases, yet they distinguished between contagious and infectious diseases. Contagious diseases were a morbid poison within the blood and spread by direct contact; infectious diseases were also morbid poisons within the blood, but these morbid poisons were the result of environmental factors which could be used to explain diseases in groups of

[34] Christopher Hamlin, *A Science of Impurity: Water Analysis in Nineteenth Century Britain* (Berkeley, CA: University of California Press, 1990), pg. 130.
[35] Liebig, *Chemistry in Its Application to Agriculture and Physiology*, pg. 397.
[36] Pelling, *Cholera, Fever, and English Medicine*, pg. 123.

people living in the same environment even if there was no direct contact. Liebig's understanding of contagious disease built on this idea by breaking down the *cause* of the morbid poison as an organic chemistry process. Rather than assume that all morbid poisons were contagious diseases, Liebig specified that contagious diseases had an "excitable" cause, meaning an organic chemical reaction was ongoing within the blood, creating a morbid poison that sustained itself.[37] Conversely, a non-contagious disease was the result of an inorganic "exciter" that disrupted the blood and created a morbid poison which could not sustain itself. For example, a morbid poison that resulted from consuming rotting meat would be considered inorganic because it came from outside the body, could not propagate itself, and could not be spread to other people through contact, whereas a disease such as smallpox was the result of an ongoing chemical process which was the result of an organic "excitable" cause, the "produce" of which – in the case of smallpox, the pus taken from vesicles – could infect blood in other people, thus making them sick.

WILLIAM FARR'S LIFE-TABLES

These evolving understandings of contagious disease illustrate the challenges of disease pathology in pre-bacteriological days. However, disease classification was significantly streamlined by William Farr in his attempt to collect data about the morbidity and mortality of England's population. Based on William Cullen's nosology – the process of disease classification – Farr first presented tables of disease causation which were arranged by the "seat, or organs involved, and the pathological 'nature' of disease."[38] Most noteworthy of this table, which was first presented in 1837, was the classification of "epidemic, endemic, and contagious"

[37] Liebig, *Chemistry in Its Application to Agriculture and Physiology*, pgs. 396-97.
[38] Pelling, *Cholera, Fever, and English Medicine*, pg. 92.

diseases as one category. Farr grouped these three together because, as shown above, it was increasingly difficult to delineate a disease as a result of constitutional processes *or* environmental factors, as the two were almost always intrinsically combined.[39] While we have already differentiated disease as contagious or infectious according to Hunter, Adams, and Liebig, it is important to also consider the difference between "endemic" and "epidemic." These terms were defined by Joseph Adams in his 1807 publication *On Morbid Poisons*. Adams laid out the definitions as follows:

> The first [endemic] might be extended to all the diseases which are found only in certain districts and climates, but it is not intended to include those which attack only certain constitutions or under certain circumstances of living …they prevail also at certain seasons only. Whether they are infectious it is not our business to enquire; but in their origin they are unconnected with the morbid secretions of the human body… they are, however, all of them confined to the inhabitants of particular countries, and may, therefore, when they rage, be strictly called endemic. *Epidemic* is a term which should be applied only to such diseases as are confined to no particular country or district, but originating in some unknown properties of the atmosphere, extend according to the progress of the wind … these in their origin being no way connected with diseased secretions, do come within the description of morbid poisons.[40]

The difference between endemic and epidemic diseases rested on two basic distinctions: the scope and spread of the disease. Adams emphasized that an endemic disease could or could not be infectious, but it is limited to a specific region and/or season. Comparatively, epidemic diseases were "extended according to the progress of the wind," implying that their scope and spread was far-reaching. In both cases, there is no indication about what *caused* an endemic or epidemic apart from the fact that they were "unconnected" and "no way connected" with disease secretions. Strictly speaking, this could indicate that all endemics and epidemics were infectious in nature, as they do not originate with morbid secretions, but this is a hasty assumption. Adams

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[39] Pelling, *Cholera, Fever, and English Medicine*, pg. 105.
[40] Adams, *Observations on Morbid Poisons*, pgs. 5-6.

was specifically talking about the *origin* of an endemic or epidemic rather than its spread. There is the distinction that while endemics are wholly unconnected, epidemics "do come within the description of morbid poisons," meaning that the spread of the disease could be through direct contact. This difference indicates that there may have been an understanding that endemics were more infectious while epidemics tended to be more contagious, but it was impossible to determine without knowing the specifics of the disease. Regardless of the nuances between endemic and epidemic, Farr grouped them together which suggests that both endemic and epidemic diseases were considered contagious to a degree. By grouping endemic and epidemic diseases with contagious diseases, Farr effectively "brought a new unity to the group," in which "each was 'excited by organic matter in a state of pathological transformation.'"[41]

In 1842, Farr replaced the "endemic, epidemic, and contagious" category with a new term: *zymotic*. The word originates in Greek, meaning "to ferment," which reflected the pathological understanding of the diseases within the category. Farr firmly believed that "'the blood is probably in the greater number of them, the primary seat of disease; and they may be considered, by hypothesis, the results of specific poisons, of organic origin, either derived from without, or generated within, the body.'"[42] The defining factors of Farr's zymotic group heavily aligned with Hunter, Adams, and Liebig: the blood was the seat of the disease, and the disease was the result of a poison which came from an organic exciter inside or outside the body. Specifically, however, Farr believed that each disease was caused by an identifiable exciter which produced a unique poison, though it was possible for one exciter to be the cause of multiple diseases. For example, while marsh fever and yellow fever were believed to be caused by the same exciter,

[41] Pelling, *Cholera, Fever, and English Medicine*, pg. 105.
[42] Quoted in Pelling, *Cholera, Fever, and English Medicine*, pg. 102.

cholera was the result of the transformation of matter called cholerine.[43] Similarly to what was observed above about endemic versus epidemic diseases, the specificity of symptoms aided in distinguishing and identifying between diseases. In cholera, where the symptoms were so universally known, it was easy to assign its cause to cholerine, whereas in fevers, in which many symptoms are similar, the poison could be vaguer, hence the exciter of the disease covering multiple, similar diseases.

In the *Weekly Returns of Births and Deaths*, which reported and attempted to classify all the deaths in London, and which Farr oversaw during his time as the Registrar General, the term "zymotic" did not replace "endemic, epidemic, and contagious diseases" until 1844. Prior to 1844, the tables of mortality listed the following diseases as endemic, epidemic, and contagious: smallpox, measles, scarlatina, whooping cough, croup, thrush, diarrhoea, dysentery, cholera, influenza, typhus (1)(*sic*), erysipelas, syphilis, and hydrophobia. Ague and remittent fever were included under typhus when they occurred. The list of zymotic diseases in 1844 remained the same, though ague and remittent fever were given their own categories rather than being grouped under typhus. The zymotic causes of death remained the same until 1858, when the *Weekly Returns* began breaking down the category into more specific groups. Within zymotic diseases, there were miasmatic, enthetic, dietic, and parasitic.

Though all zymotic by definition, these sub-categories reflected the supposed cause of poison and spread. Miasmatic diseases were communicable through air and water while enthetic diseases required direct contact for transmission (and therefore were properly understood as the most contagious). The other two categories of zymotic disease reflected a growing scientific understanding of the body and its relationship with the environment. Dietic diseases were the

[43] Pelling, *Cholera, Fever, and English Medicine*, pg. 102.

result of nutritional processes within the body – either too much or too little of a specific nutrient – while parasitic diseases "are so called from the fact that a great variety of lesions and symptoms of organic disorder are brought about by the presence of *animals* or of *plants* (sic) which have found a place to live and subsist within or upon some tissue, organ, or surface of the body of man, or of other animals and plants."[44] While all still zymotic in the sense they relied on an exciter to begin an organic process within the body which produced a poison, the subdivisions of zymotic diseases into the four categories reflected a growing understanding of disease causation and the effects of lifestyle and environment on disease.[45]

Zymotic diseases were a significant part of morbidity and mortality in nineteenth-century London but to what degree? Figure 3.7 compares the number of all deaths to the number of deaths reportedly from zymotic causes. For the purpose of contextualizing the spikes in all deaths and zymotic deaths, cholera deaths are also plotted on this graph.

[44] William Aitken, *The Science and Practice of Medicine, Volume 1*, 3rd edition (London, 1864), pgs. 735, 802.
[45] In 1858, the *Weekly Returns* lists the following diseases under each category: Miasmatic – smallpox, measles, scarlatina, quinsy, croup, whooping cough, typhus (and infantile fever), erysipelas, metria, carbuncle, influenza, dysentery, diarrhoea, cholera, ague, remittent fever, rheumatism. Enthetic – syphilis, stricture of urethra, hydrophobia. Dietic – privation, want of breast milk, purpura and scurvy, alcoholism. Parasitic –thrush, worms.

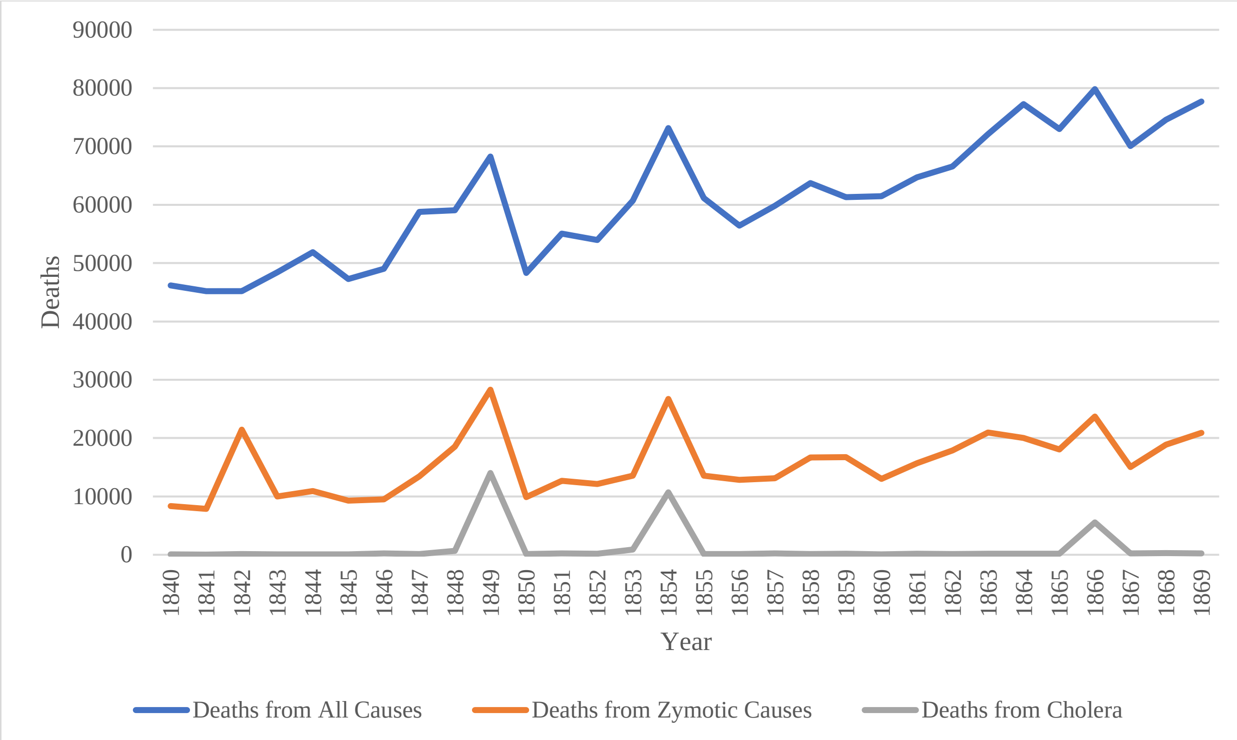

Figure 3.7 – Comparison of deaths from all causes, zymotic causes, and cholera, 1840-1860

As Figure 3.7 shows, the pattern of deaths from zymotic causes was a relatively close fit to the patterns caused by the fluctuation of overall deaths – though there are some peaks of infectious disease deaths (specifically 1842) and one decline of infectious disease deaths (1860) that do not correspond to the general trend. When patterns like these happen, it is likely that either a non-infectious disease was felt in epidemic proportions, or deaths caused from infection rose while another, non-infectious cause of death, declined.[46]

[46] The classifications of death by the General Register Office encompassed seventeen classes: Zymotic Class; Dropsy, Cancer, and others of uncertain seat; Tubercular Class; Of Brain, Nerves, &c.; Of Heart, &c.; Of Respiratory Organs; Of Digestive Organs; Of Kidneys, &c.; Of Uterus, viz. Puerperal Disease, &c.; Of Joints, Bones, viz. Rheumatism, &c.; Of Skin, &c.; Malformations; Debility from Premature Birth, &c.; Atrophy; Age; Sudden; Violence, Privation, &c.. This list, which is taken from the 1855 *Weekly Return of Births and Deaths in London*, remained relatively consistent throughout the years. According to these classes, anything outside of the Zymotic Class would technically be classified as non-infectious. However, recognizing that our understanding of the body is far more technically advanced now than it was then, it is plausible that there were many infectious deaths which were classified under other categories, though they would not have been understood as such at the time.

To understand these patterns more closely, the figure below shows how much zymotic deaths contributed to the overall mortality between 1840 and 1869. Recognizing 1849, 1854, and 1866 as epidemic years of cholera (highlighted in red), obvious years with unusual patterns are 1842, 1848 (though 1848 is likely due to the rise of cholera late in the year), and most of the 1860s. 1863 had a zymotic disease rate which nearly matched the cholera epidemic year of 1866, suggesting there might have been another infectious disease epidemic that swept through London that year.

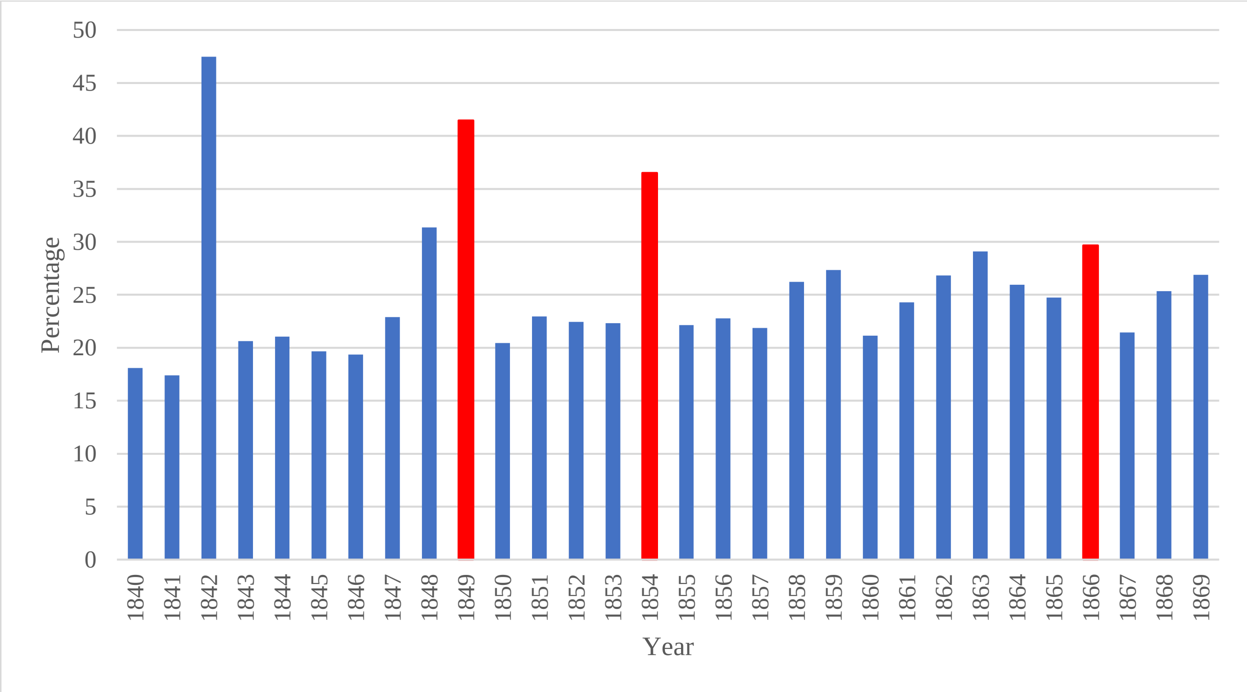

Figure 3.8 – Percentage of all deaths from zymotic causes, 1840-1869

Figure 3.8 shows that most years, infectious disease mortality contributed to between twenty and twenty-five percent of the overall mortality, and that the number of zymotic deaths during epidemic years declined over time.[47] The formal average, including the epidemic years, is 25

[47] The exception to this is 1842, which experienced a higher number of zymotic deaths than usual. Though there is nothing in the *Weekly Returns of Births and Deaths* that immediately suggests itself as the cause for this, it is a point of further study as to what was happening in London in 1842 to produce this mortality pattern.

percent, while the average without the epidemic years is 24 percent. This suggests that while cholera epidemics were deadly, the number of zymotic deaths in 1849, 1854, and 1866 remained relatively proportional to non epidemic years. This phenomenon was undoubtedly caused by an increase in the number of overall deaths during epidemic years; a high number of zymotic deaths contextualized in a high number of overall deaths resulted in the same percentage of zymotic deaths as non epidemic years, when overall mortality and the zymotic death figures were smaller.

Factors in Determining Mortality Patterns

Population and mortality statistics can be broken down and analysed by a variety of factors – some social, some geographical, and some seasonal. All of these factors influenced mortality patterns in general, and zymotic diseases in particular. The following sections will look at social and physical distinctions within society, along with seasonal variations, in both the general and zymotic mortality trends. The comparison is useful, as it can highlight differences unique to infectious diseases and the relationship between infectious diseases and overall mortality.

Sex

Analyzing mortality statistics according to sex is fairly straightforward. Figure 3.9 shows the male and female deaths per year from 1840 till 1869. In most years, as many men and boys died as women and girls, with a slightly higher proportion of men (51.39 percent males versus 48.61 percent females for the period listed in the chart). In London's population, which was approximately 53 percent female and 47 percent male, the mortality rate for the sexes can be best understood by acknowledging the risks faced by each sex.

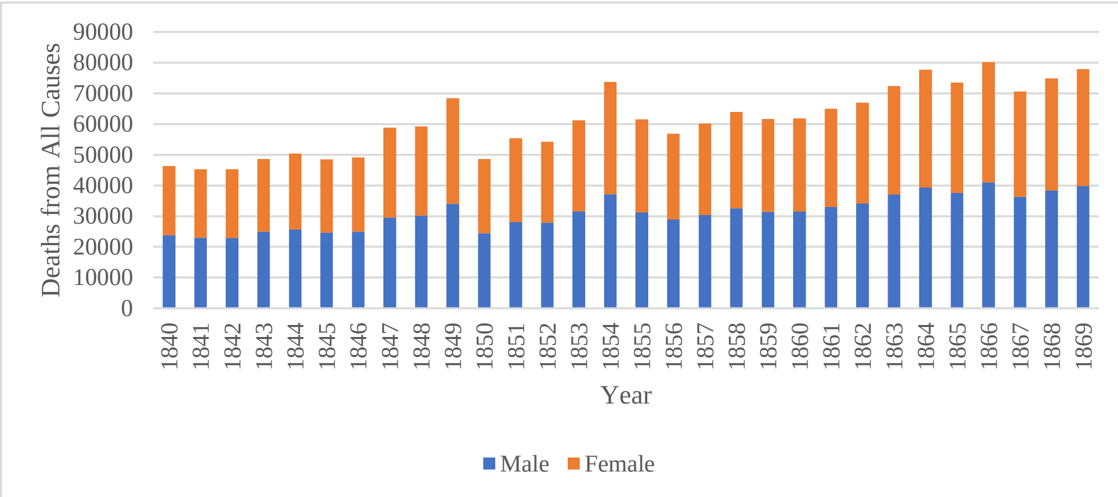

Figure 3.9 – Deaths from all causes broken down by sex, 1840-1869

Males, in general, had a slightly higher mortality rate than females during the Victorian era. There were likely multiple causes for this phenomenon. One possible reason was occupation and occupational hazards. Men worked outside of the home and were exposed to more dangers in the industrial sectors than women. Similarly, because men disproportionally worked outside of the household, they were therefore more often exposed to community diseases. Violent death is another possible explanation. Deaths related to military service, as well as a much higher rate of suicide may also have played a part.[48] One last hypothesis is healthcare-seeking behaviour. Women were very attuned to the health of themselves and their families; if someone needed medical attention, it was the woman's job to ensure the health of the individual. How much of a role did men play when it came to seeking healthcare of injuries and illness? Were men more hesitant to seek out medical care, choosing to minimize their conditions for the sake of money

[48] Olive Anderson devotes an entire chapter to the gendered patterns of suicide in Victorian and Edwardian England in her book *Suicide in Victorian and Edwardian England*, but she very clearly states that the rate of suicide was "three of four more times more frequent among men than among women." Olive Anderson, *Suicide in Victorian and Edwardian England* (Oxford, UK: Clarendon Press, 1987), pg. 41.

and employment? Or was it that men sought healthcare after it was too late – when an injury had turned gangrenous or an illness was too far gone?[49]

Conversely, it is important to recognize that women had a unique risk of death: childbearing. The maternal mortality figures for the mid-nineteenth century are relatively consistent, with rates between four and six maternal deaths per 1,000 live births. Though these numbers are relatively low, it is important to consider that there were anywhere between 1,700 and 2,400 live births per day across England and Wales between 1850 and 1890, which works out to a daily average of eight to twelve deaths related to childbirth.[50] Deaths related to childbirth were often one of two things: accidents, which "was normally believed to cover ectopic pregnancy (the foetus developed outside the uterus in the uterine tubes) leading to abortion and sepsis, eclampsia (convulsions and coma associated with high blood pressure and fluid retention

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[49] There is vast scholarship on the gendered nature of nineteenth-century medicine and women's roles in caring for family, friends, neighbours, and sometimes, in rural areas, complete strangers. For an overview, see Chapter 2, "An Overview of Nineteenth-Century Caregiving," in Emily K. Abel, *Hearts of Wisdom: American Women Caring for Kin, 1850-1940* (Cambridge, Mass.: Harvard University Press, 2000), pgs. 37-67. Though an American study, the motivations and actions of women across America would have heavily mirrored those of British women. Apart from understanding that women were much more aware of the physical ailments of their families and children, the questions asked in the text above speak more about men's health seeking behaviour than their roles as caregivers. Much less research has been done on this trend historically, though in current day medicine it is a well-studied phenomenon that men are far less likely to seek help for a mental or physical ailment. In fact, the lack of scholarship has been noted by many – for example, Hilary Marland points out that "few studies have engaged with comparisons of men and women as patients", and the gap is observable in studies such as F.B. Smith, *The People's Health*, which does not mention the sex breakdown of health-seeking behaviour in the entire section on hospitals. Further, the rise of feminist studies in 1970s challenged the use and notion of "gender" and "sex" as frameworks for analysing healthcare in the nineteenth-century. One of the landmark essays which started this trend was Joan W. Scott's "Gender: A Useful Category of Historical Analysis," *The American Historical Review* 91:5 (1986), pgs. 1053-1075. Scott's argument for the use of gender as a historical analytic tool pushed historians to think critically about how sex and gender defined and shaped the healthcare experience. For example, the essay collection edited by Anne Digby and John Stewart, *Gender, Health and Welfare* (London: Routledge, 1996) focuses on how the rise of the British welfare state was intrinsically tied to women's agency in the healthcare sphere – both as consumers for themselves and their children, but also as formal and informal practitioners. So while there is little historical evidence to support the belief that men sought healthcare less than women, there are several factors which suggest this may have, in fact, been the case. The pressure of needing to work and support a family and keep them out of the workhouse, coupled with the emerging feminized welfare-state, are two such examples. Hilary Marland, "Women, Health, and Medicine," in *The Oxford Handbook of the History of Medicine*, ed. Mark Jackson (Oxford, UK: Oxford University Press, 2011), pg. 485.

[50] Irvine Loudon, *Death in Childbirth: An International Study of Maternal Care and Maternal Mortality, 1800-1950* (Oxford, UK: Clarendon Press, 1992), pgs. 12-15.

late in pregnancy), and 'exhaustion.'"[51] Interestingly, deaths labelled as "accidents" were rarely accompanied by accusations towards the midwife or physician.[52]

The other cause of death common to childbirth was puerperal fever, which was more based in the pathology of pregnancy and "meant at various times a single comprehensive disease covering diverse kinds of inflammation and symptoms, or congeries of different forms of infection, or specific streptococcal infections, and also included excessive bleeding and paralysis of the limbs."[53] Despite the fact that abortion was made a felony in England in 1803, many local apothecaries had the ability to help women get rid of an unwanted pregnancy. The law depended on proving that the fetus had "quickened" and been killed in the womb, meaning that the mother had felt her child move and proactively killed it. This was nearly impossible to prove, so the majority of abortion cases were never prosecuted. Abortion is an ancient practice and while many were successfully carried out, there was always a risk of women dying in the process – sepsis was common, as was an overdose of savin, croton, or arsenic, which were the most common drugs given to induce abortion. It was usually only after a woman's death that an abortionist was brought before the courts and prosecuted – after all, a dead body is convincing evidence.[54]

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[51] F.B. Smith, *The People's Health, 1830-1910* (New York: Holmes and Meier), pgs. 13-14.

[52] It is interesting to note, however, that wealthy women had an increased risk of death in childbirth because they had access to physicians. In this age, at the dawn of formalized obstetric practice, women were at an increased risk when being delivered by a physician with little to no training and/or experience and without proper instruments, as opposed to women who were delivered by midwives and women friends, who were very practiced and skilled in the art of delivery babies. Peter Razzell and Christine Spence, "The Hazards of Wealth: Adult Mortality in Pre-Twentieth-Century England," *Social History of Medicine* 19:3 (2006), pg. 402.

[53] Smith, *The People's Health*, pg. 13.

[54] Smith, *The People's Health*, pgs. 74-76.

Age

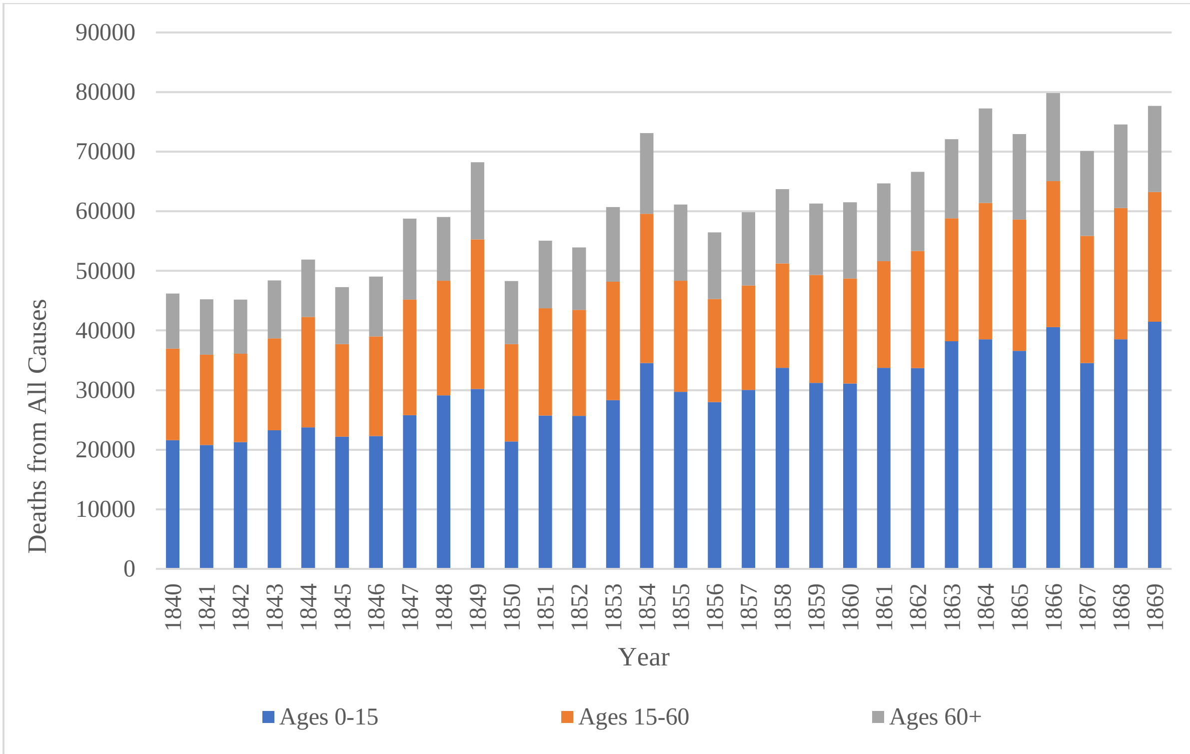

Figure 3.10 – Deaths from all causes by age, 1840-1869. The data from 1855 onwards has been simplified into the three age brackets consistent with data from 1850-1854: the 0-19 deaths are grouped under Ages 0-15, the 20-39 and 40-59 deaths under Ages 15-60, and the 60-79 and 80+ deaths under Ages 60+.

Age was another critical factor in determining the risk of mortality from disease. As Figure 3.10 clearly shows, the majority of deaths during these years involved children. Infant mortality (less than one year) in this era was quite high, rising to as much as 150 to 160 deaths per 1,000 live births.[55] McKeown and Record suggest the following approximate breakdown of childhood mortality in 1841, 1851, and 1861:

[55] The number of infant deaths per 1,000 live births varied, though it continually rose until 1850. It was then that it began to decline, though the decline was slow, dropping only a handful of deaths per 1,000 live births until 1912, when the number was 113 deaths per 1,000 live births. Smith, *The People's Health*, pg. 65; Thomas McKeown and R.G. Record, "Reasons for the Decline of Mortality in England and Wales during the Nineteenth Century," *Population Studies* 16:2 (1962), pg. 100.

Age	Deaths per 1000 Live Births, 1841	Deaths per 1000 Live Births, 1851	Deaths per 1000 Live Births, 1861
< 1 year	65	70	78
2 years	35	35	35
3 years	25	24	23
4 years	18	17	16
5-9 years	9	9	9
TOTAL	152	155	161

Table 3.1 – A reproduction of Figure 2, a hand-drawn figure in McKeown and Record, pg. 100. It is important to note that the total number of deaths per 1,000 live births appears to increase across the decades, but the original figure suggests that the number remained consistent. The ambiguity of the hand-drawn figure – a fault they acknowledge by claiming the numbers which make up Figure 2 are on a logarithmic scale – makes it difficult to support this claim with concrete evidence. To address this issue, McKeown and Record's subsequent Table 1 uses numbers from census and *Weekly Return* records. This table shows that infants (< 1 year old) had a mean mortality rate of 66 deaths per 1,000 live births between 1841 and 1850. For comparison, five-year-olds report a mean mortality rate of 9 deaths per 1,000 live births. McKeown and Record, "Reasons for Mortality Decline in England," pgs. 100-101.[56]

There are two things to be learned from this pattern: the first is that infant mortality was a serious and growing public health challenge; however, if children survived the standard slate of illnesses, they began to acquire immunity and the risk of death decreased by the onset of adolescence. However, once children grew into young adults, they began experiencing the same risks of deaths faced by the working population. This suggests that all ages between 15 and 60 experienced a relatively similar amount of mortality risk.[57] Women of childbearing age similarly faced risks of maternal mortality during their years before menopause, risks that were associated

[56] Both McKeown and Record and Logan have works which examine, in-depth, the role age played in mortality and its relationship with specific causes of death. Similarly, F.B. Smith's book dissects mortality risks for the different life stages.

[57] While the gap between ages 15 and 60 may seem unnecessarily big for this claim, it was chosen deliberately because it is the age classification provided by the *Weekly Returns* until 1855, thus making it easy to evaluate the numbers in Figure 3.10 with the textual discussion.

with increasing age and the number of pregnancies. However, many women by their mid-forties and early fifties would no longer be childbearing, thus the risk for that demographic would have diminished completely.[58]

Knowing the cause of mortality often leads to greater understanding of patterns of mortality based on age. Much like today, younger children tended to come down with infectious diseases more frequently than adults due to less developed immune systems combined with a lack of exposure and (in some instances) malnutrition. Figure 3.11 below shows the age breakdown of all deaths from zymotic causes between 1840 and 1869, which has been tabulated from the figures reported in the *Weekly Returns of Births and Deaths in London*.

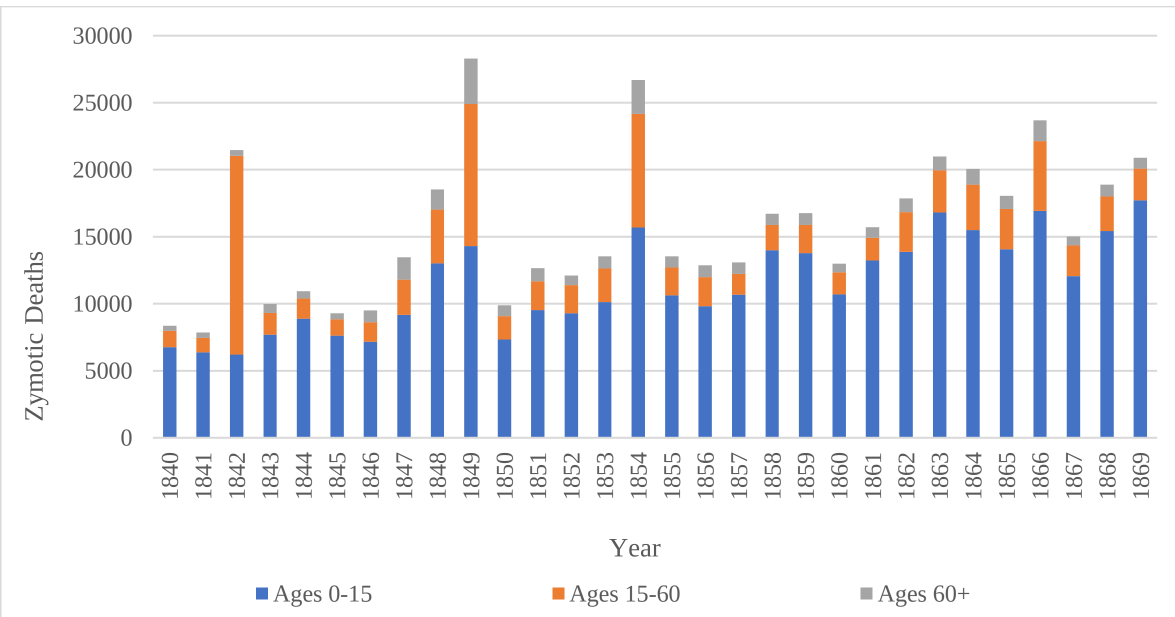

Figure 3.11 – Zymotic deaths by age, 1840-1869

Figure 3.11 charts the deaths from zymotic causes by age, once again illustrating clear spikes in overall deaths during the cholera years of 1849, 1854 and 1866. It reveals that far fewer adults

[58] Irvine Loudon, one of the leading authorities on maternal health and death in the nineteenth century, states that the standard childbearing age is considered between ages 15 and 44; Loudon, *Death in Childbirth*, pg. 16.

were dying of zymotic diseases compared to children each year, but that the cholera years reveal that cholera claimed a fair number of adults as well as children. Apart from 1842, and the cholera years, there is a noticeable number of zymotic deaths in the 0-15 age group compared to the other two age brackets.[59] The number of deaths in the 0-15 age group experienced little change between epidemic and non-epidemic years, further suggesting that zymotic deaths were far more prevalent in children than adults during any given year, and also that the rate of zymotic deaths for children aged fifteen and under remained relatively consistent compared to the other two age brackets. Conversely, the 15-60 and 60+ age groups experienced many more zymotic deaths during epidemic years, suggesting that zymotic deaths in these age ranges were more heavily influenced by the presence of an epidemic disease.

One final consideration is looking at the percentage breakdown by age of all causes of death, and zymotic causes. The provides a different perspective, as it shows just how high infant and childhood mortality was compared to the older population. Figures 3.12 and 3.13 show the age-based breakdown of mortality from all causes and from zymotic causes for the years 1840-1869.

[59] Interestingly, there is no clear reason why the 1842 year shows an increase in zymotic deaths in the *Weekly Returns of Births and Deaths in London*. Rather, the increased rate is due to a variety of higher-than-usual death rates of diseases including typhus, measles, scarlatina, whooping cough, and diarrhoea. The 1842 anomaly is an important consideration in this discussion because it shows that cholera was not the only zymotic disease that could cause the patterns of mortality to shift, and that numerous infectious diseases had the potential to greatly influence mortality rates in different age brackets.

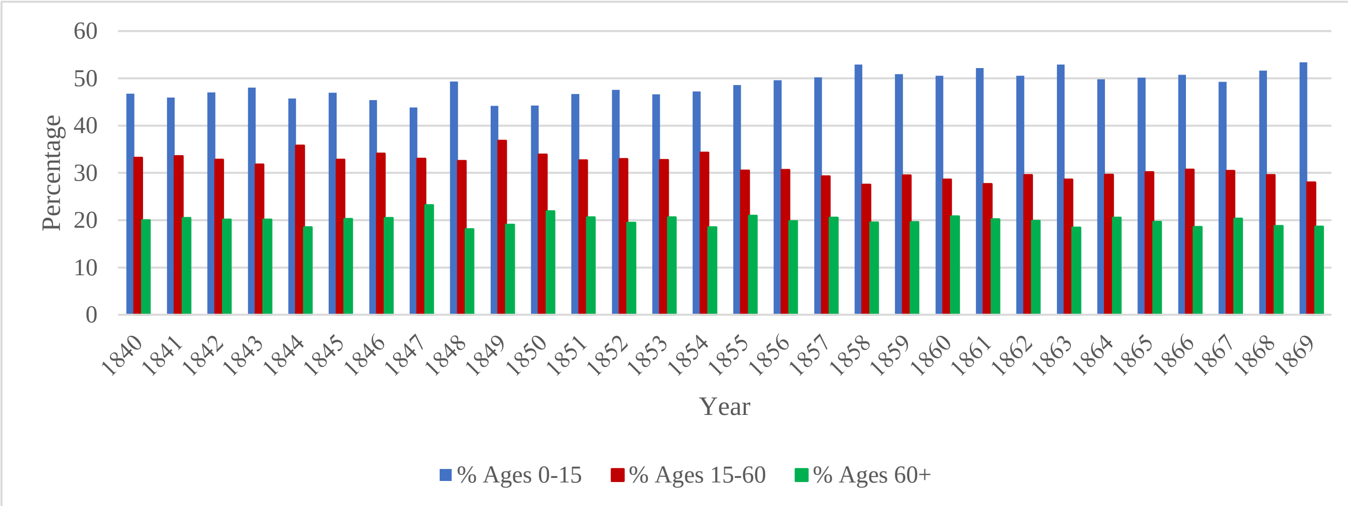

Figure 3.12 - Percentage of deaths (all causes) by age, 1840-1869

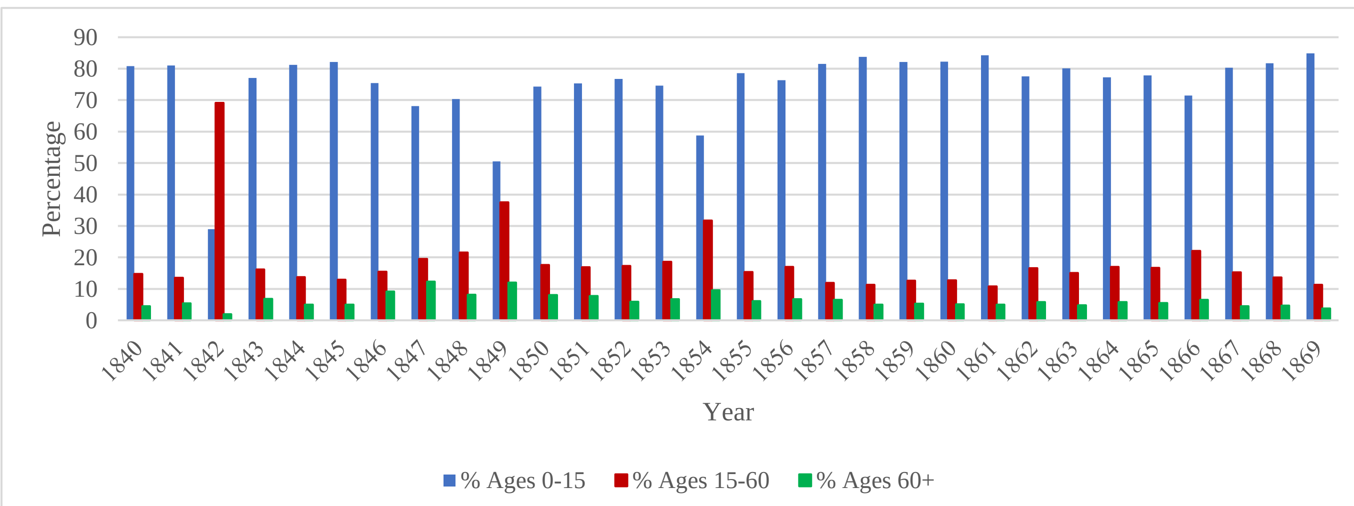

Figure 3.13 – Percentage of deaths (Zymotic causes only) by age, 1840-1869

The age-based breakdown of deaths in London from all causes remained relatively consistent throughout the population over these thirty years, meaning there was very little change within age-determined mortality patterns. However, infectious diseases consistently made up a greater portion of mortality amongst the younger population. This suggests that while infectious diseases were rampant in London, the older portion of the population had a lesser risk of dying from infectious disease and were more likely to die from non-infectious causes during non-epidemic years.

Seasonal Variations in Mortality

Seasonal patterns of mortality were pronounced in Victorian London. In general, the summer months – the months when the temperature was highest and people most active – yielded the greatest mortality of fecal-oral diseases, whereas winter months – when people were fighting cold temperatures and trying to stay warm in small, cramped spaces – produced high respiratory-based morbidity and mortality. The seasonality of diseases has been well observed by historical geographers of disease. Graham Mooney, for example, discusses how up to 40 percent of infant mortality occurred between July and September, primarily because so much infant death was caused by diarrhoeal diseases.[60] Anne Hardy's work shows that diseases such as whooping cough, rickets, measles, and typhus were predominantly winter diseases.[61] Typhoid, much like cholera and diarrhoea, was considered a summer disease.[62]

[60] Graham Mooney, "Did London Pass the "Sanitary Test"? Seasonal Infant Mortality in London," *Journal of Historical Geography* 20:2 (1994), pg. 158.
[61] Anne Hardy, *The Epidemic Streets: Infectious Disease and the Rise of Preventive Medicine, 1856-1900* (Oxford, UK: Clarendon Press, 1993), pgs. 16, 21, 45, 183-186, 199.
[62] Joseph Tien et al., "Herald Waves of Cholera in Nineteenth Century London," *Journal of The Royal Society Interface* 8 (2011), pgs. 758-760; Smith, *The People's Health*, pg. 85.

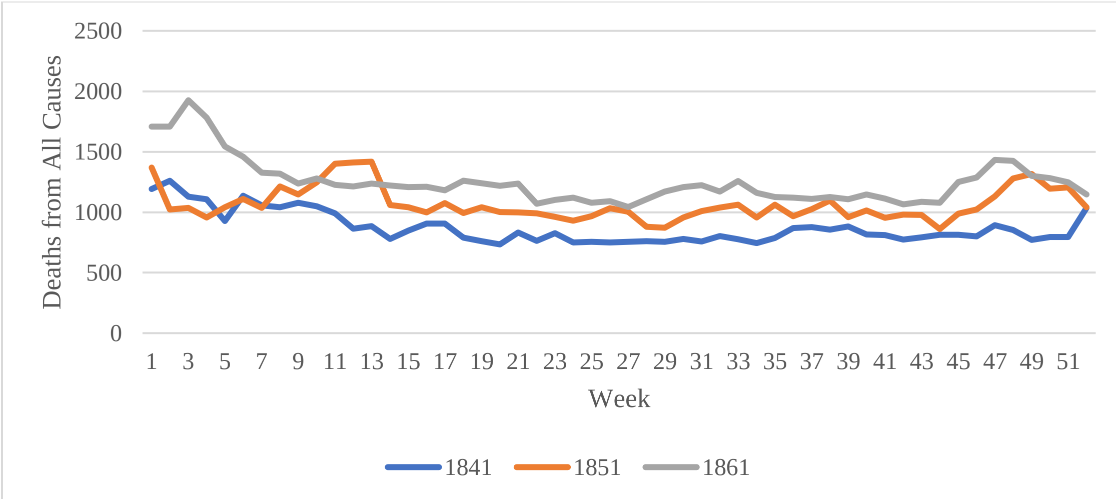

Figure 3.14 – Number of deaths from all causes per week in 1841, 1851, and 1861

Figure 3.14 charts the weekly breakdown of all causes of death during 1841, 1851, and 1861. These three years are only a sample of the yearly patterns between 1840 and 1869, and these census years were selected for two main reasons: first, there is the most complete data for these years, as the census returns provide additional insight into the life, health, and morbidity of the city. Second, these years were chosen because none of them contain known epidemic outbreaks of a specific disease. Given that this shows the total number of deaths from all causes, the mortality patterns merely show how seasonal fluctuations occurred in these three years. For example, 1861 experienced a high degree of winter mortality while 1851 saw a significant mortality rise in March and again in November. 1841, once it recovered from the winter diseases, experienced a relatively "slow" summer, with far fewer deaths recorded than either 1851 or 1861. The "summer" months – approximately Weeks 28 through 36, showed similar increases in 1851 and 1861.

Given that Figure 3.14 demonstrated the overall seasonal patterns of mortality, it is important to narrow the scope of the investigation to better understand the seasonal mortality of zymotic diseases. Figure 3.15 below demonstrates the number of zymotic deaths as a percentage of all deaths for 1841, 1851, and 1861.

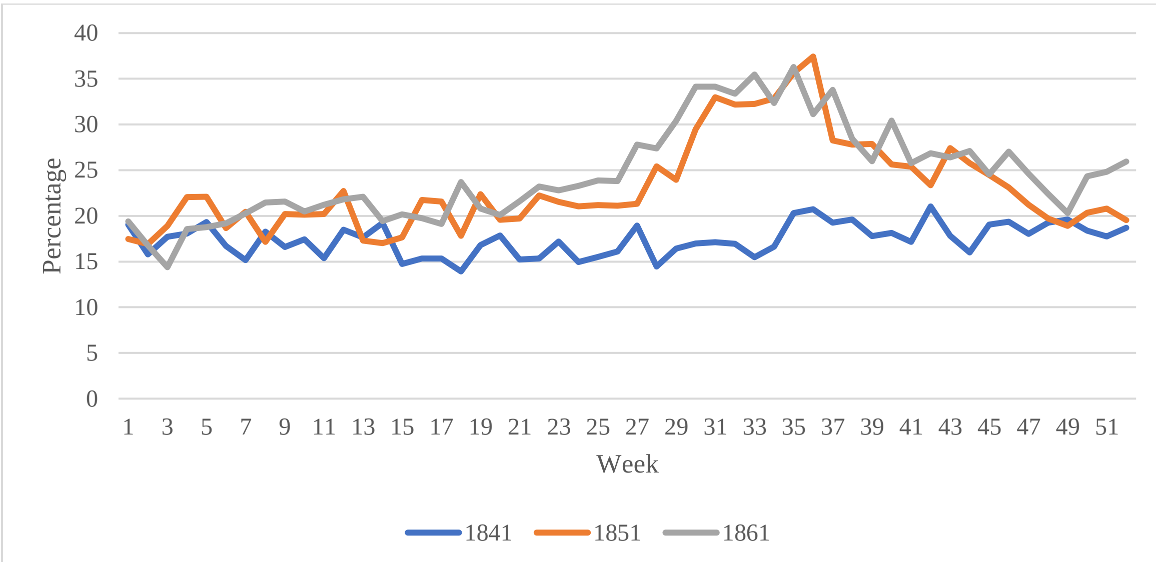

Figure 3.15 – Zymotic deaths as a percentage of total weekly deaths from all causes, 1841, 1851, and 1861

The zymotic death rates show distinct seasonality, with a high prevalence in the summer months, though 1841 has a consistent rate, never varying more than about five percent. In contrast, 1851 and 1861 zymotic mortality show the influence of seasonality much more clearly, both beginning to rise around Week 27 and peaking around Week 37. The highest point occurred in 1851, at Week 36, with zymotic deaths making up 37 percent of all mortality.

The patterns above reflect a sampling of three decades in the mid-nineteenth century, but do not show the patterns during an epidemic cholera year. There were three outbreaks of cholera during these decades: 1849, 1854, and 1866. Figures 3.16, 3.17, and 3.18 below illustrate the weekly mortality patterns produced during these three years.[63]

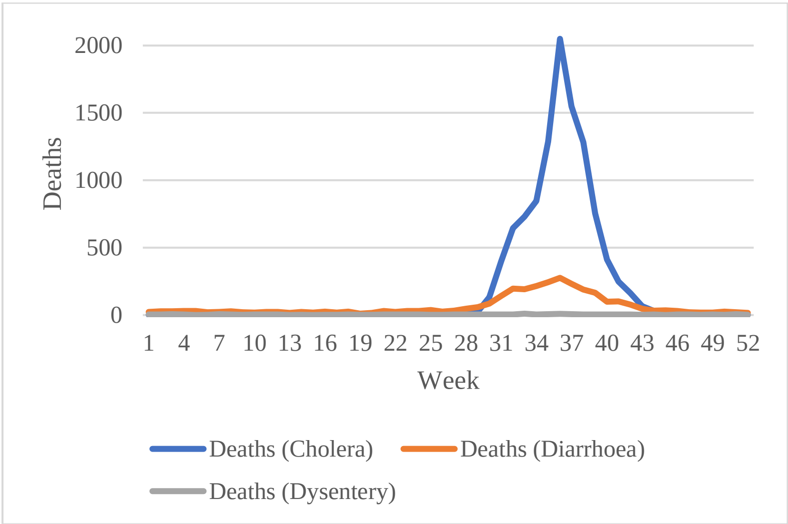

Figure 3.16 – Cholera, diarrhoea, and dysentery weekly deaths, 1849

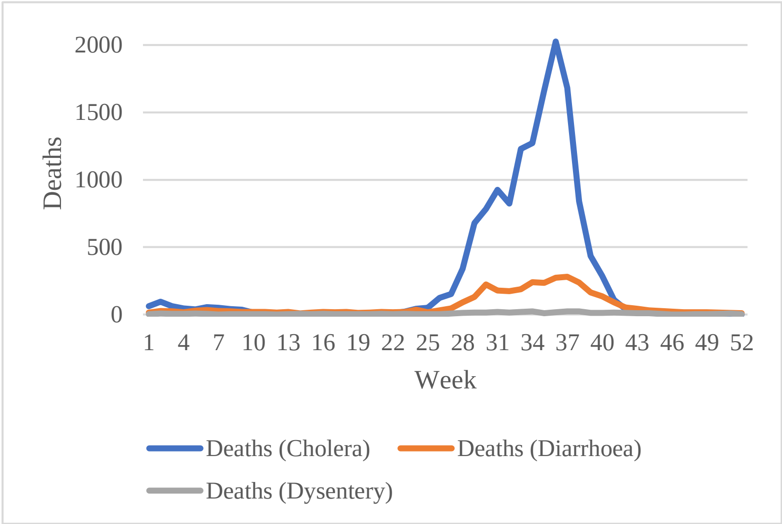

Figure 3.17 – Cholera, diarrhoea, and dysentery weekly deaths, 1854

[63] 1849 is used instead of 1848, as cholera only began to appear at the very end of the year and spiked during the summer of 1849.

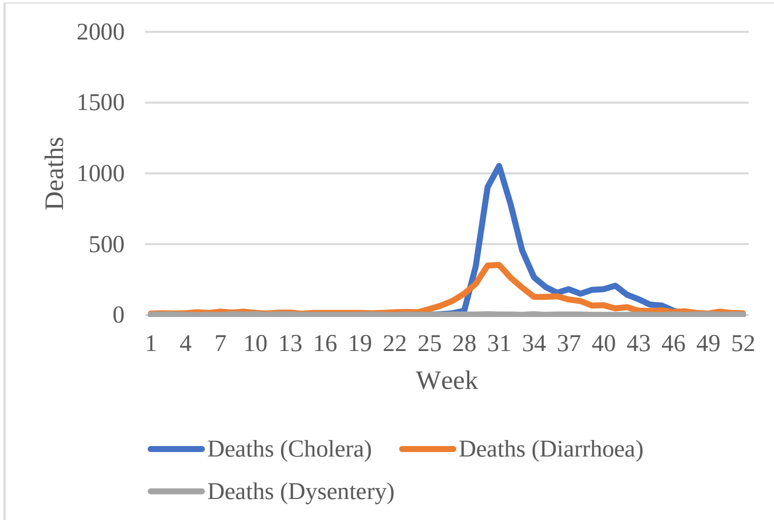

Figure 3.18 – Cholera, diarrhoea, and dysentery weekly deaths, 1866

From this comparison of epidemic years, it is clear the summer months proved an even bigger mortality risk for cholera. In nearly identical spikes, cholera mortality rose (and fell) sharply during the summer and early autumn months in all three years. Deaths attributed to diarrhoea have interesting patterns which is likely more about how it was diagnosed instead of being a considerable cause of death – this pattern, as well as the relationship between cholera and diarrhoea, will be discussed further in Chapter Four.

Not surprisingly, the incidence of zymotic deaths during epidemic years followed very closely the patterns produced by the overall mortality. Unlike Figure 3.15, which shows zymotic deaths as a percentage of all mortality for non-epidemic years, Figure 3.19 below shows zymotic deaths as a percentage of all deaths during the epidemic years. The difference between the two graphs highlights just how significant cholera epidemics were in altering the zymotic death rate, as Figure 3.19's patterns are much more definitive than those in Figure 3.15.

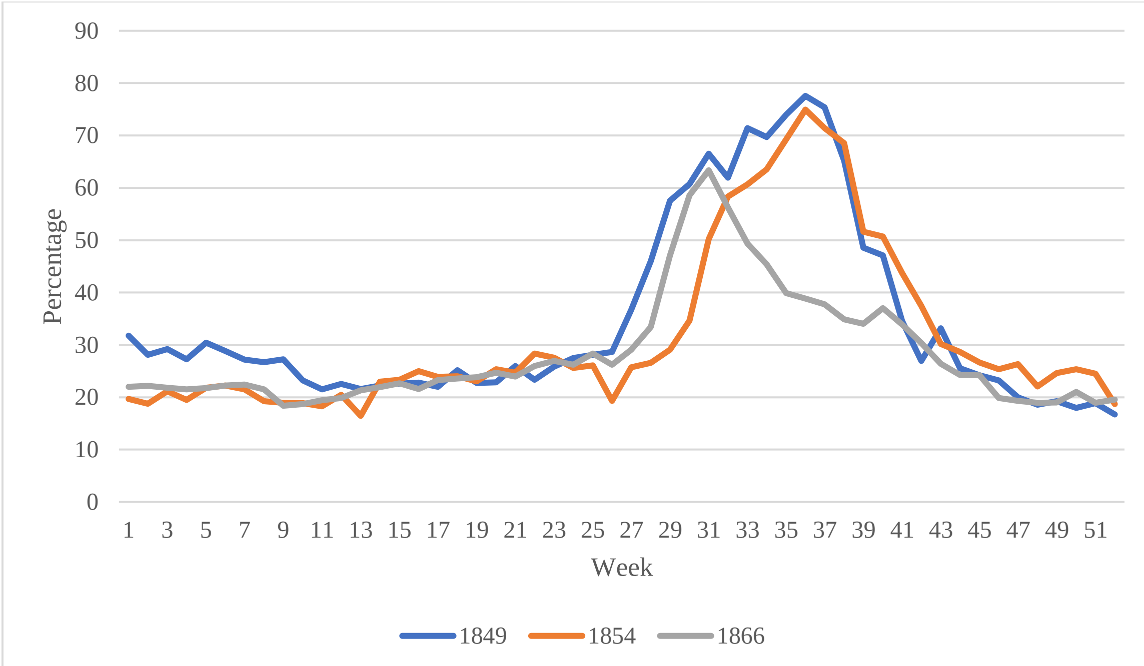

Figure 3.19 - Zymotic deaths as a percentage of deaths from all causes - 1849, 1854, and 1866

The pattern in 1849 shows a rise in infectious deaths beginning around Week 27 (early July) before seeing a dramatic increase at Week 29 and a climax in Week 36 (early September). 1854's epidemic was later, only beginning a real rise in Weeks 30-33. 1866 was the shortest and least severe epidemic, with its peak during Week 30. The zymotic mortality rates are an unparalleled resource in demonstrating the arc of each epidemic, highlighting its seasonal nature, indicating its significant contribution to the overall death rate, and specifying the weeks each epidemic began its increase and subsequent decline.

CONCLUSION

This chapter has provided a preliminary understanding of what it was like to *be sick* in and *die* in London. The available medical care was rapidly expanding with the rise of new practitioners, and this open market led to a push for licencing regulations from within the medical sphere. However, it was not only rising competition between practitioners that was challenging the medical world. Beliefs about contagious, infectious, endemic, and epidemic diseases were evolving in complex manners, and theories of disease causation and transmission were being developed in a pre-bacteriological era. Diseases began to be understood as the result of morbid poisons, putrefaction, and fermentation – all processes which were chemical transformations within the blood.

The introduction of the term *zymotic* into Farr's life-tables reflects the increasing scientific understanding of disease causation. Zymotic diseases, most often understood today as contagious diseases, made up the majority of London's mortality during the mid-nineteenth century. As the figures throughout the chapter have shown, London's mortality patterns can be examined from a breadth of perspectives. Not only can we evaluate the relationship between zymotic mortality rates and overall mortality rates, but it is also possible – and highly necessary – to examine mortality patterns with respect to sex, age, and seasonality. Chapter Four will continue to examine mortality patterns in London by focusing exclusively on cholera: the chapter will examine cholera's symptomology and treatments, its diagnosis, and its mortality patterns.

CHAPTER FOUR

CHOLERA IN VICTORIAN LONDON

This chapter continues the discussion of what it was like to be sick and die in London by narrowing in on cholera symptomology and treatment. Cholera was a disease over which physicians had little control. Because it was not fully understood in terms of its origins and pathophysiology, there was no known cure. Nevertheless, there was a plethora of preventative measures and potential remedies on offer for a desperate and frightened population. This chapter addresses the medical process of diagnosing and classifying cholera as a cause of death, suggesting that, because of its symptomology, the number of cholera deaths during nineteenth-century epidemics may have been significantly higher than reported figures.

In addition to examining cholera as it was understood by society and the medical profession, this chapter utilizes a qualitative approach by incorporating mortality data collated from the *Weekly Returns of Births and Deaths in London*. Using the crude mortality figures published in the *Weekly Returns* is the first step in addressing the second research question of this thesis: what was the cholera experience in London in 1849, 1854, and 1866? While the Chapters Five, Six, and Seven will address these epidemic years specifically and in far greater detail, this chapter provides the contextual framework for understanding mortality patterns in London's five districts: west, north, central, east, and south. The seasonality of cholera is demonstrated using comparative statistics, which emphasize the relationship between population density and cholera mortality within the five districts. The chapter concludes with a series of introductory choropleth maps which depict the district cholera mortality patterns during the peak weeks of the 1849, 1854, and 1866 epidemics.

Cholera in Nineteenth-Century Society

The symptomology of cholera was distinct from most other infectious diseases of the time. The micro-organism, *Vibrio cholerae*, attacked the body from within the gastrointestinal track after fecal material had been inadvertently ingested. The premonitory stage of the disease consisted of diarrhoea and was the point when a bowel disorder could transform into cholera. The second stage was when *cholera vibrio* embedded itself in the wall of the intestine, making it more permeable to water. The result of this process was severe vomiting and diarrhoea, which led to the collapse stage, characterized by severe dehydration. Most people died during this phase, though if they survived, they still faced a fever phase before fully recovering. In short, cholera was a disease which dehydrated the human body from the inside, which led to blood coagulating under the skin, resulting in a sunken, blue appearance, cramps and spasms, and ultimately organ failure. The symptoms most associated with the disease were the sudden and continuous vomiting, accompanied by diarrhoea. Observers during the Victorian era often described "rice water stools," referring to the appearance of a bowel movement towards the end of the disease – with nothing solid left in the bowel, the body evacuated what was left: mucus-type fluid.[1]

Cholera was well-known in Victorian society, not only for its painful and stigmatizing symptoms, but also because it was a disease which struck with little warning and killed quickly. The symptoms of cholera could progress rapidly, often claiming victims in a matter of hours, and it was not necessarily a private affair. Indeed, because cholera could come without warning, symptoms could appear while out in public, leading to an embarrassing public spectacle of the

[1] R.J. Morris, *Cholera, 1832: The Social Response to an Epidemic* (New York: Holmes & Meier Publishers, 1976), pgs. 15-16; Geoffrey Bilson, *A Darkened House: Cholera in Nineteenth-Century Canada* (Toronto: University of Toronto Press, 1980), pgs. 3-4.

near spontaneous release of bodily fluids – something Victorian society desperately tried to conceal. The loss of control over one's body was a threat unique to cholera, especially as the decline was so rapid that it was dehumanizing. Rather than a peaceful death, something prized and even romanticized in this era, deaths due to cholera were shrouded in stench, vomit, diarrhoea, and disfigurement.[2] Artists, during the devastating pandemic of 1831-2, attempted to represent the disfigurement of victims (Figure 4.1).

*Figure 4.**1** - These images show how cholera changed the physical appearances of its victims*
Top Left: "A young woman of Vienna who died of cholera, depicted when healthy and four hours before death." Coloured stipple engraving, c. 1831. Courtesy of Wellcome Images, available online at: https://wellcomecollection.org/works/vt5g3jxf.
Top Right: "A cholera victim with a typical facial appearance." Watercolour (by E. Schwarz?), after Robert Froriep, ca. 1831. Courtesy of Wellcome Images, available online at: https://wellcomecollection.org/works/twee76wv.

Cholera's symptoms were quick and severe, and doctors did not know how to effectively combat the disease. Nevertheless, contemporary practitioners employed the remedies that they had been trained to administer. In the first half of the century, the most common was to resort to bloodletting.[3] Bloodletting had been considered a cure for diseases for centuries, as it was an

[2] Richard Evans, "Cholera in the Nineteenth Century," *Past and Present* 120:1 (August 1988), pg. 127; Bilson, *A Darkened House*, pg. 4.
[3] Bloodletting as a treatment was less common in the latter half of the century, likely as a result of the changing medical and pathological understandings of cholera.

attempt to not only restore the body's natural humoural balance but it was also a way to literally purge the body of bad blood.[4] As discussed in Chapter 3, the blood was at the heart of all morbid poisons, which were the pathological base of all disease. It thus made intuitive sense that bloodletting would be a first line of defense against cholera. The actual practice was quite intrusive. When bleeding patients, physicians and surgeons attempted to extract approximately thirty ounces of blood. Ideally, blood was let from a vein, but it was not uncommon for the radial artery to be opened up if veins proved unsuccessful. Alternatively, leeches were also used as a method to bleed patients, and it was believed that the anus was the most successful spot to place them.[5] Not surprisingly, bloodletting did not do much to help cholera patients due to their already dehydrated state. Many physicians observed that the blood they were letting was often thick and dark in colour – one physician in Paris reported his patient's blood being like "gooseberry jelly" upon exsanguination.[6] Somewhat ironically, when physicians were able to obtain the desired thirty ounces of blood, their patient often survived. They believed this was proof that bloodletting was an effective treatment; however, what their success actually pointed to was a patient who was still relatively hydrated, thus making bloodletting possible.[7]

Apart from bloodletting, there were other practices that physicians used to try to elicit a response from the body, which was intended to bring back a patient's vitality, mainly restoring peripheral circulation. These ranged in severity, and as a whole, are grouped together as "a

[4] "Bad blood" was the result of an imbalance of the body's humours. The humoural theory was the basis of medical practice for centuries, stemming back from the Greek. For more information, see William Bynum, *The History of Medicine: A Very Short Introduction* (Oxford, UK: University Press, 2008), pgs. 12-13; Andrew Wear, *Knowledge and Practice in English Medicine, 1550-1680* (Cambridge, UK: Cambridge University Press, 2000), pgs. 37-39; Dorothy Porter and Roy Porter, *Patient's Progress: Doctors and Doctoring in Eighteenth-century England* (Oxford, UK: Polity Press, 1989), pg. 163.
[5] Norman Longmate, *King Cholera: The Biography of a Disease* (London: Hamish Hamilton Ltd., 1966), pg. 79.
[6] C.J. van Mons and P.A. Marcq, *Rapport sur le choléra-morbus adressé au conseil supérieur de la santé de la Belgique* (Bruxelles, 1832), pg. 40.
[7] Norman Howard-Jones, "Cholera Therapy in the Nineteenth Century," *Journal of the History of Medicine and the Allied Sciences* 27:4 (1972), pg. 375.

grotesque chapter in cholera's history" and described as a "benevolent suicide."[8] These extreme treatments included electric shock therapy, cauterization, blistering, cold and hot water baths, and pumping air into the patient's abdomen.[9] Shock therapy was conducted by attaching two probes to the body – the base of the neck and anus were most popular – and running an electric current through them. Cauterization occurred when hot irons were placed on the skin and the skin then beaten to prevent blistering from forming. The feet were a popular choice, but the spine was also deemed effective.[10] Alternatively, some physicians actively tried to create blisters using acid plasters. The plasters, which were usually soaked in varying mixtures of nitric, hydrochloric, and sulphuric acid, were applied directly to the skin, though sometimes an immersive bath was used. Baths did not necessarily have to be acidic to prove effective, and many patients experienced either hot or cold baths as a way to regulate body temperature. Additional methods to influence body temperature included extensive oral and rectal rehydration therapy, layering blankets, and wearing hot sand packets.[11] Finally, in an effort to bring vitality back into a dying patient, physicians occasionally tried inflating the belly by pumping air through the anus, going as far

Figure 4.2 – A dispensing pot of Blue Pills, England, 1880-1930. Courtesy of Wellcome Images, available online at: https://wellcomecollection.org/works/kjfzk6vp.

[8] Bilson, *A Darkened House*, pg. 161.
[9] Many of these treatments were devised on the principle of "counter irritation," which *The Cyclopaedia of Practical Medicine: Comprising Treatises on the Nature and Treatment of Diseases, Materia Medica and Therapeutics, Medical Jurisprudence, etc. etc.* states "has been adopted in medicine to designate any irritation artificially established with a view to diminish, counteract, or remove some other irritation or inflammation existing in the body." *The Cyclopaedia of Practical Medicine*, eds. John Forbes, Alexander Tweedie, John Conolly (London, 1833-1835), pg. 484.
[10] Charles Rosenberg, *The Cholera Years* (Chicago: University of Chicago Press, 1987), pgs. 66-67.
[11] Heat was considered particularly important at this phase, not only to control body temperature but also to help soothe the intense stomach cramps. Longmate, *King Cholera*, pgs. 77-78.

as to use a cork to plug the opening once the air was inside.[12] Not surprisingly, this never benefitted the patient.

Apart from physical treatments, orthodox medical practitioners resorted to drug therapy as common treatment intervention for cholera. Almost all the drugs were either purgatives or emetics, the aim being to "normalize in some way the secretions of the mucosa of the alimentary tract."[13] This course was even termed "the eliminative treatment" and was so common throughout England that is also gained the moniker of "the English treatment."[14] The most common purgatives were calomel and opium, while the favoured emetics were antimony salts, mustard, castor oil, or croton oil.[15] Calomel, known today as mercury chloride, was considered a common cure for many diseases and "blue mass" or "blue pills" were widely distributed by physicians and apothecaries as a remedy.[16] However, the range of drugs used to treat cholera was broad, and included: "aloes, ammonia, arsenic, bismuth, camphor, capsicum, colocynth, croton oil, ether, hellebore, Hyoscyamus, ipecacuanha, jalap, magnesia, phosphorous preparations, quinine, rhubarb, senna, and tinctures of iron."[17] This list, which reflects the numerous primary writings Howard-Jones draws upon, is extensive and suggests just how liberal nineteenth-century doctors were in treating cholera – how could so many different medicines, ranging from harmless aloe to deadly arsenic, prove useful at all, much less at the same time?

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[12] Howard-Jones, "Cholera Treatment in the Nineteenth Century," pgs. 382-385.
[13] Howard-Jones, "Cholera Treatment in the Nineteenth Century," pg. 380
[14]Longmate, *King Cholera*, pg. 76.
[15] Roderick E. McGrew, *Russia and the Cholera, 1823-1832* (Madison, WI: University of Wisconsin Press, 1965), pg. 129.
[16] Emily Winter, "Cholera: A Panoply of Useless Remedies," Drawing Blood: Comics and Medicine, last modified 27 November 2019, available online at: http://drawing-blood.org/dubious-remedies/cholera-a-panoply-of-useless-remedies/; Norbert Hirschhorn, Robert G. Feldman, and Ian A. Greaves, "Abraham Lincoln's Blue Pills: Did our 16th President Suffer from Mercury Poisoning," *Perspectives in Biology and Medicine* 44:3 (Summer 2001), pg. 318; Charles Rosenberg, *The Cholera Years*, pg. 66.
[17] Howard-Jones, "Cholera Treatment in the Nineteenth Century," pg. 382.

The cornerstone treatment for cholera in today's medical world is intravenous rehydration therapy infused with antibiotics. While the discovery of the cholera bacillus did not occur until the late nineteenth century, intravenous therapy was being used much earlier and although not a successful cure by any means in the nineteenth century, the idea of intravenous treatment was already being considered as early as the 1830s.[18] Ironically, however, the use of intravenous rehydration was not intended to rehydrate the body but, rather, as a way to turn black blood red again.[19] Russian physicians R. Hermann and Jaehnichen were the first to suggest that cholera patients needed to be rehydrated at a medical council in Moscow in 1830. The suggestion was novel, as it was firmly believed by most medical professionals that cholera patients should *not* be given water. Although Hermann and Jaehnichen were among the first to suggest rehydrating the body to restore fluidity to the blood, the idea caught on quickly. W. Stevens, a British physician, published a pamphlet the same year heralding the success of rehydrating yellow fever patients in the West Indies. Stevens was the first to concoct a "saline plan," which was an infusion of water with neutral salts which were injected into the veins of patients. The idea was taken up by an Irish physician, W.B. O'Shaughnessy, who published a paper in the *Lancet* entitled "Proposal of a New Method of Treating the Blue Epidemic Cholera." While the paper was the first to clearly lay out the saline plan and O'Shaughnessy gained notoriety for solving the rehydration problem, the pamphlet was actually a collection of medical ideas stemming back to the 1830 Russian medical council, showing that the evolution of intravenous therapy was a world-wide medical feat.[20] It was used widely throughout the British West Indies, Asia, Europe, and the British Isles

[18] Robert Koch discovered the cholera bacillus in January 1884, and while he is largely credited with the discovery, an Italian anatomist, Filippo Pacini, had correctly identified the bacillus in 1854 during an autopsy of a washerwoman who died of cholera. D. Lippi and E. Gotuzzo, "The Greatest Steps Towards the Discovery of *Vibrio cholerae*," *Clinical Microbiology and Infection* 20:3 (March 2014), pgs. 192-193.
[19] Howard-Jones, "Cholera Treatment in the Nineteenth Century," pgs. 387.
[20] Howard-Jones, "Cholera Treatment in the Nineteenth Century," pgs. 385-392.

with apparent great success. Once O'Shaughnessy's pamphlet was published, doctors began experimenting with rehydration therapies, though it must be stated that most cholera patients in London would have access to this treatment, as it was highly experimental and likely only affordable to the wealthy.

Regardless, some London-based physicians did attempt intravenous therapies. For example, Dr. Thomas Latta and Dr. R. Lewins reported to the Central Board of Health in London that they had injected 376 ounces of weak saline solution administered in several doses over fifty-three hours using the Reid's patent syringe. In a different case, 330 ounces were given within twelve hours. However, the process of rehydration, which Lewins called "wonderful and satisfactory," also proved deadly and ten out of his fifteen patients died after saline infusions. Apparent improvement followed by a quick death was a common issue with intravenous rehydration therapy. In a pre-germ theory era, rehydration therapy was fraught with danger as physicians used unsterilized needles to inject saline into their patients. Beyond the threat of sepsis, the injections were also prone to air embolisms. Air bubbles trapped inside the chamber of the needle were injected into patient's veins and could travel to the heart or lungs.[21] However, despite its downfalls in the nineteenth century, intravenous rehydration therapy was a medical discovery which, once perfected, came to be one of the most powerful medical procedures in the world.

Rehydration was a priority for British doctors, and many prescribed copious amounts of liquids to be taken orally or intravenously. For example, Dr. Shute in Gloucester, had a patient whom he convinced to consume seventeen gallons of cold water. Similarly, in Exeter, it was common practice for patients to drink three to four gallons before going to bed. Hydration was

[21] Howard-Jones, "Cholera Treatment in the Nineteenth Century," pgs. 391-392.

also attempted via saline injections – Dr. Baker in Leeds would inject anywhere from three to fourteen pints of saline into a vein at once – and salt enemas were also very common.[22]

Equally as important to treatment options were social responses that could be perceived of as constituting preventative measures. There was a wide array of protective measures one could take, many of which reflected the belief that cholera was a miasmatic disease.[23] The miasmatic theory upheld that "all smell is disease," and as such, people were often instructed to fortify themselves against odors.[24] One common way to do this was for individuals to cover their nose and mouth with a cloth soaked in a chemical or oil which blocked any smell.[25] Similarly, other pieces of clothing could be perfumed for this same purpose. However, layering on clothing served a dual purpose. Not only did it hinder "bad air" from reaching the nose, but it was also believed that the cold air could make one more susceptible to cholera. It was imperative to keep warm, especially around the stomach. As a result, people layered their clothing, wore warmed bags of sand and/or flax, or, in some cases, cholera belts.[26] Consumption of brandy was also intended to combat chills, as it was often served warm and people could visibly see the drinker appear warmer – the flush of the cheeks undoubtedly caused by consuming strong alcohol was taken as a sign of an effective drink.[27]

[22] It is worth noting that the physician accounts of the treatment of cholera rarely varied regardless of location. The work done by Geoffrey Bilson on cholera in Canada provides similar accounts as Longmate does for British doctors. These are nearly identical to the experiences written about by Howard-Jones detailing the work done in Russia. The similarities shows three things: 1) that cholera was a worldwide problem; 2) doctors, regardless of their training and post, had no real basis for how to treat it and 3) that the transfer of medical knowledge between continents highlights the trial-and-error approach of cholera treatment. Longmate, *King Cholera*, pg. 78.
[23] Bynum, *The History of Medicine*, pg. 75; D. Lippi and E. Gotuzzo, "The Greatest Steps Towards the Discovery of *Vibrio cholerae*," pgs. 191-192.
[24] Emily Winter, "Cholera: A Panoply of Useless Remedies."
[25] The most common of these was bleaching powder, then called chloruret of Lime. Emily Winter, "Cholera: A Panoply of Useless Remedies."
[26] Emily Winter, "Cholera: A Panoply of Useless Remedies"; for more information about the history of the cholera belt, see E.T. Renbourn, "The History of the Flannel Binder and Cholera Belt," *Medical History* 1:3 (1957), pgs. 211-225.
[27] Emily Winter, "Cholera: A Panoply of Useless Remedies."

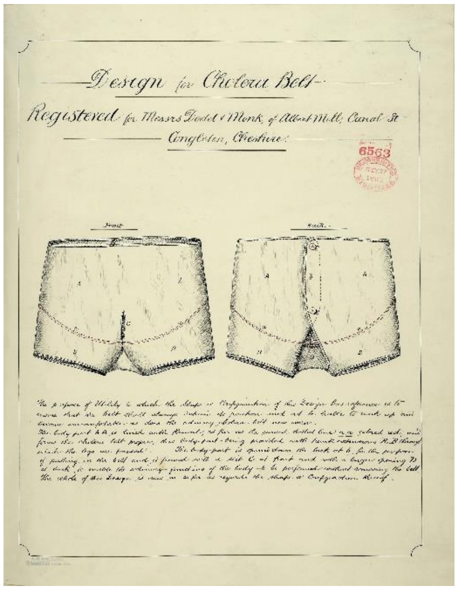

Figure 4.3 – Contemporary images which show the different preventative treatments for cholera
Top Left: "A design for a 'cholera belt'," 1882. Courtesy of the United Kingdom National Archives, available online at: https://www.nationalarchives.gov.uk/education/resources/coping-with-cholera/.
Top Right: "A figure dressed in a cholera safety suit." Coloured etching after J. Petzl (?), ca. 1832. Courtesy of Wellcome Images available online at: , https://wellcomecollection.org/works/nee3jsp3.
Bottom Left: "Fortifying Against the Cholera," Robert Seymour, 1831. Courtesy of the United States National Library of Medicine, available online at: http://resource.nlmnih.gove/101393384.

Despite the numerous treatment options for cholera – purgatives, emetics, physical therapies, and rehydration – it cannot be overstated that cholera was difficult to treat. Not only was it not understood in a scientific context, which made it hard for physicians to know *what* to treat, but the disease often claimed its victims too quickly for most treatments to be effective. Recovery rates, most of the time, were extraordinarily low.

Cholera was not known outside of India prior to the 1830s, and European and North American medical practitioners relied on the experiences of Indian medical practitioners when dealing with this new disease which had come from the East.[28] However, cholera had no clear cause. Some thought it was a disease of the blood, others thought it was the result of bad air, and still others linked cholera with the environment and poor sanitation.[29] Despite the competing theories of causation, the result was the same: nobody had a cure for this dreaded disease. The medical profession in the nineteenth century was undergoing a period of professionalization (as discussed in Chapter 3) but cholera complicated this process. The medical profession struggle to respond in a consistent and effective manner, calling into question their claim to medical knowledge and special legal status. Meanwhile, the popularity of irregular practitioners flourished, in part due to less intrusive approaches and

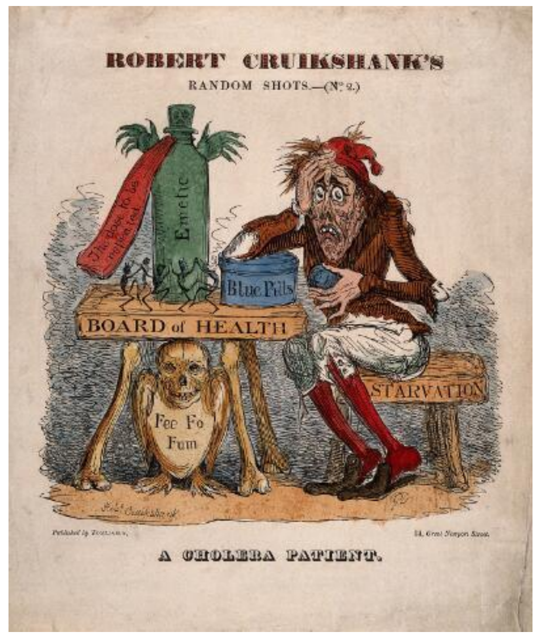

Figure 4.4 – "A cholera patient experimenting with remedies." Coloured etching by R.I Cruikshank, [1832?]. Courtesy of Wellcome Images, available online at: https://wellcomecollection.org/works/fsfbejss.

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[28] Bynum, *The History of Medicine*, pg. 75; Evans, "Cholera in the Nineteenth Century," pgs. 124-125; N. Howard-Jones's article, "Cholera Therapy in the Nineteenth Century", provides insight into the transmission of information between medical professionals, highlighting how ideas of how to treat cholera often originated in the East and moved westward.

[29] Assigning a cause and theory of transmission to cholera was highly contested in the nineteenth century, and the disease acted as a turning point in the major theories of disease. The disagreement centered on contagionist theories, which believed cholera was a contagious disease spread via direct contact, and the anticontagionists, who held that cholera was primarily a miasmatic disease, and therefore had strong connections with sanitation reform. For overviews of the contagion/anticontagion debate, see Chapter One, along with William Bynum, *The History of Medicine*, pgs. 75-77, Margaret Pelling, *Cholera, Fever, and English Medicine*, and John Eyler, "William Farr on the Cholera: The Sanitarian's Disease Theory and the Statistician's Method," *Journal of the History of Medicine and Allied Sciences* 28:2 (1973), pgs. 79-100.

their putative remedies. Feeling like they could not trust the medical profession, many sufferers and lay people turned to alternative practitioners and proprietary medicines, often driven by desperation to avoid contracting cholera.[30] This was true across the world; the images in Figures 4.1, 4.2, 4.3, and 4.4 range in publication from Europe, England, and America, suggesting that uncertainty about how to best prevent and treat cholera was a global phenomenon from the 1830s onwards.

Diagnosing Cholera

As detailed above, deaths from cholera in Victorian London could be swift and merciless. Medical officers of health, who were the ones responsible for reporting deaths to the General Register Office, often included observations in their reports about the progression of the disease which killed their victim.[31] The range of time varied considerably. There were observations which indicated that cholera lasted days (up to ten days was not unheard of), though many of the accounts suggest that cholera sometimes claimed its victim within twenty-four to forty-eight hours after the first onset of symptoms.

[30] Irregular practitioners, by and large, were any practitioners who did not have formal training or qualifications. They ranged from neighbourhood women to people who made their living selling medical advice and 'cures' for ailments. Many of these practitioners were well-meaning and offered simple cures which were well-known in families and neighbourhoods, though the 'quacks', as they came to be called, were often accused of trying to take advantage of the system by selling a magic bullet cure for diseases. The 'regular' medical profession – those with qualifications – found the irregulars difficult to deal with, as they often took business away from them. The desire for a monopoly on medical care which was regulated by licensing and formal education led to the rise of professionalism within the medical domain. For more information about the practice of 'irregular practitioners' and their relationship to patients, see Dorothy Porter and Roy Porter, "Irregulars" in *Patient's Progress: Doctors and Doctoring in Eighteenth-century England* (Polity Press: Oxford, UK, 1989), pgs. 96-114 and Roy Porter, *Health for Sale: Quackery in England, 1660-1850* (New York: Manchester University Press, 1989).

[31] The reports completed by the medical officers of health, who were appointed under the 1834 New Poor Law, were submitted to the General Register Office and compiled into the *Weekly Returns of Births and Deaths in London*. The *Returns* were used by physicians and statisticians within the GRO to tabulate death rates according to cause of death, age, and location. In the event of epidemic diseases, the medical officers often included more details such as the course of the disease (e.g. how long it lasted, the progression of symptoms) as well as observations about the living arrangements. These notes were used to further understand the epidemics, highlighting trends of mortality.

Surviving notes left by contemporary medical officers of health provide more information than just how long a victim suffered the dreaded effects of cholera. They often paint a picture of the situation in which the victim found themselves, which gives an insight into the disease experience. For example, the following account was published in the *Weekly Return for Births and Deaths in London* from the 6 October 1849 entry: at 14 Manners Street in Lambeth, a woman aged forty who "had been nursing her daughter, died on Monday, and was registered yesterday, after an attack of cholera of 12 hours' duration." There is a subsequent entry about the woman's daughter, who died two days later. For this thirteen-year-old, the medical officer observed that "several days before diarrhoea or vomiting, this young person complained of loss of appetite, and of being generally unwell, and was under treatment for it (the medical attendant fearing at the time it was the prelude to cholera); a few days afterwards gentle diarrhoea came on, and subsequently violent vomiting. During her whole illness, she complained of no pain."[32] These case notes provide a much fuller picture of what happened at 14 Manners Street: we know that a mother cared for her daughter, and died after a brief attack cholera; we know that the first sign of the daughter feeling sick was a loss of appetite and general malaise; we know that the family had secured medical aid, and that their attendant (it is impossible to know if it was a physician, surgeon, apothecary, or other form of practitioner) recognized the symptoms as those leading to cholera; and we know that the first symptoms of *cholera vibrio* that were identified were diarrhoea and vomiting.

These entries are just two of the thousands of cases for which notes exist within the *Weekly Returns* but nonetheless serve as examples of the timeline and diagnostic signs of cholera as they were understood during the 1849 epidemic. While the mother's death was straightforward –

[32] General Register Office, *Weekly Return of Births and Deaths in London* X:40 (1849), pg. 9.

"cholera (12 hours)" – the daughter's suffering lasted upwards of seven days. These descriptions and attributions of cause of death suggest an understanding of cholera's "symptom pattern" – the signs and symptoms which indicated cholera was present. Diarrhoea and vomiting were a common precursor to a diagnosis of cholera. In fact, many medical officers simply noted "premonitory diarrhoea" in their death certificates, thus strongly hinting at cholera without mentioning it by name. In response to this practice, the General Register Office included the following summary in the Week 29 publication of the *Weekly Returns* during the 1854 epidemic:

> When death has occurred in consequence of an attack of cholera, it is of much importance that the medical informant should state on his certificate, if possible, whether diarrhoea has or has not proceeded the commencement of spasms, vomiting, &c., those symptoms, namely, which constitute a well-marked case of cholera. When this premonitory diarrhoea has existed, the number of hours, days, or weeks its continuance before cholera supervened should be stated, if this can be ascertained. It is admitted that diarrhoea usually preceded an attack in 1849, and it is desirable that the proportion of cases in which this occurs should be accurately established from a large induction of facts in different epidemics.[33]

The importance of including the occurrence of premonitory symptoms, according to this 1854 account, was to distinguish a "well-marked case of cholera." Based on observations from 1849, there was a general understanding that cholera was usually preceded by diarrhoea and vomiting. Making notes of these symptoms on the record of mortality ensured that cholera deaths were classified correctly.

Classifying Cholera Deaths

The risk of misdiagnosis was something the medical officers of health and the General Register Office were aware of in the mid-nineteenth century. As the section above demonstrates, identifying specific symptoms of cholera minimized the risk of misdiagnosing cholera. However,

[33] General Register Office, *Weekly Return of Births and Deaths in London* XV: 29 (1854), pgs. 238-239.

even with the understanding of premonitory symptoms, there were doubtless many cases which were either classified incorrectly as cholera, or cases which were labelled as diarrhoea but were actually caused by cholera. One solution to help identify potential misdiagnoses in the records is to critically analyse the understanding and symptomology of gastrointestinal diseases in the nineteenth century.

The gastrointestinal disease grouping in the *Weekly Returns* included three principal, if overlapping, disease categories: diarrhoea, dysentery, and cholera. Dysentery was written about by Hippocrates, and is identified by an ulcerated bowel, which led to the passage of blood in the stool.[34] One of the earliest uses of the term outside medical texts was in the 1382 Wycliffe Bible in Acts 28:8: "The fadir of Puplius … traeulid with feueres and dissenterie or flix."[35] The coupling of dysentery and "flux" was common throughout the early modern period, as flux referred to the evacuation of the bowels, and dysentery was distinguished from diarrhoea (flux) by the term "bloody." A publication from 1767 by British physician Mark Akenside defined the symptoms of dysentery as "the more acute gripings [*sic*] in the belly, with a frequent inclination to still, and [one] who emits the evacuations with blood, or mucous matter … nor can any other disease be called by this name, unless these three symptoms be found therein."[36] Because of the presence of blood, dysentery was rarely mistaken for cholera and cholera rarely misdiagnosed as dysentery.

[34] Hippocrates, *Ancient Medicine: Airs, Waters, Places. Epidemics 1 and 3. The Oath. Precepts. Nutriment*, translated by W.H.S. Jones, Loeb Classical Library 147 (Cambridge, M.A.: Harvard University Press, 1923), pgs. lviii-lix.
[35]Literal translation: "The father of Paul … troubled with fever and dysentery, or flux."; Acts 2:28, Wycliffe Bible (1382).
[36] Mark Akenside, *A Commentary on the Dysentery: or, Bloody Flux*, translated by John Ryan (London, 1767), pgs. 1-2.

Diarrhoea was a term first defined by Hippocrates as the "undue laxity of the bowels" and the word itself comes from the Greek *διάρροια*, "to flow through."[37] Understood as "a disorder consisting in the too frequent evacuation of too fluid faeces, sometimes attended with griping pains," the connotations of diarrhoea have also remained fairly consistent. The World Health Organization's definition of diarrhoea depends on a higher frequency of bowel movements than normal.[38] Due to the presence (or absence) of blood, it was straightforward to distinguish diarrhoea from dysentery.

Differentiating between cholera and diarrhoea was a much more complex issue due to diarrhoea's classification as both general symptom and a specific disease. Diarrhoea has been understood as both its own cause of death as well as a symptom of other diseases since the era of Hippocrates and the presence of diarrhoea could lead to difficulty in correctly identifying the cause of death.[39] While diarrhoea can be symptomatic of another disease, it can still be deadly due to the risk of dehydration. What was difficult for medical officers of health was correctly identifying the official cause of death: was this a death due to the symptoms of a gastrointestinal issue (severe dehydration) or was the death classified by the underlying cause which produced this symptom (for example, cholera)? Of course, it is important to remember that our present understanding comes in the wake of the germ theory and an understanding of how our bodies cope with gastroenteritis and its unpleasant symptoms. For the period under study, there was no such understanding. Cholera was identified by rice-water stools, and dysentery by bloody stools.

[37] Hippocrates, *Ancient Medicine: Airs, Waters, Places. Epidemics 1 and 3. The Oath. Precepts. Nutriment*, pgs. lviii-lix; "Diarrhea," *A Dictionary of the History of Medicine*, edited by Anton Sebastian (London: CRC Press, 2019), pg. 250.
[38] "Diarrhoea," *World Health Organization*, last modified 2021, accessed 15 March 2021, available online at https://www.who.int/topics/diarrhoea/en/.
[39] Hippocrates himself included diarrhoea as a symptom of many different diseases within the Hippocratic Corpus. See Georgio Pappas, Ismene J. Kiriaze, and Matthew E. Falagas, "Insights into Infectious Diseases in the Era of Hippocrates," *International Journal of Infectious Diseases* 12 (2008), pgs. 347-350.

Diarrhoea had no indicators other than frequent bowel movements. This is why diarrhoea merited its own classification in the life-tables. From the perspective of medical officers and the General Register Office, as it was possible to die of diarrhoea and without knowing there existed an underlying cause, there was no reason not to record the death as such.

We know that there was an understanding that diarrhoea usually preceded an attack of cholera based on qualitative observations made during the 1849 epidemic. Recognizing and recording diarrhoea as a “premonitory symptom” of cholera suggests that there was at least some understanding of the relationship between diarrhoea and cholera – mainly that diarrhoea was a predictor of cholera. However, there is another relationship which is apparent through analyzing the number of reported deaths from diarrhoea in relation to the reported deaths from cholera. Figure 4.5 shows the rise of recorded deaths due to diarrhoea, dysentery, and cholera from 1840 until 1869, and from this graph, it is possible to observe that the number of reported deaths due to diarrhoea increased while cholera epidemics were occurring.

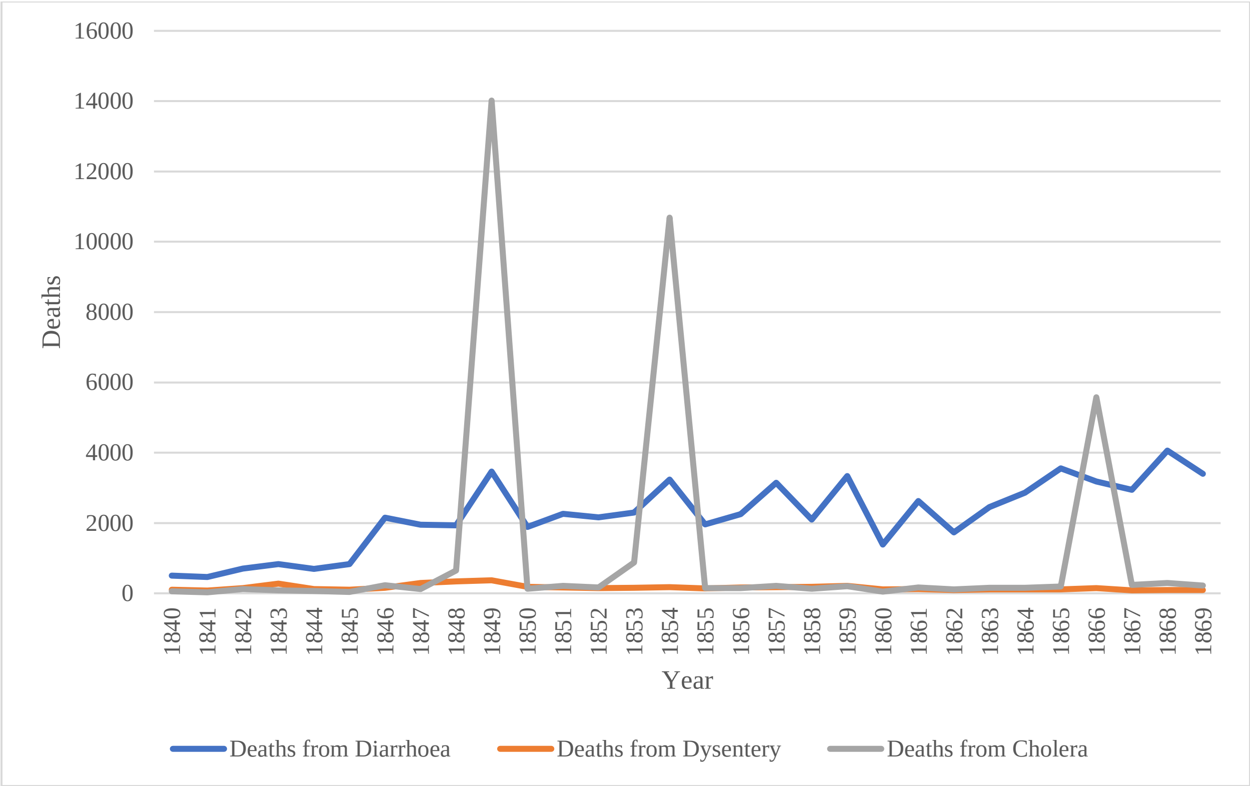

Figure 4.5 – Comparison of deaths from diarrhoea, dysentery, and cholera, 1840-1849

There were increases in cholera deaths in 1849, 1854, and 1866. While the increase of diarrhoeal deaths in 1849 and 1854 align with the cholera epidemics, the overall number of deaths attributed to diarrhoea was inconsistent throughout the decades, experiencing highs and lows at unpredictable intervals; along with increasing during cholera years, diarrhoeal deaths experienced increases in other years, such as 1846, 1857, and 1859. Recorded diarrhoea deaths declined right before and during the 1866 cholera epidemic. There are two reasons this could be: either the decline reflected the "chaotic" fluctuation pattern in diarrhoea deaths and was simply part of the unpredictable pattern, or there was a change in diagnostic patterns which led to an increase of cholera diagnosis rather than one of diarrhoea. Dysentery shows a slight increase during the epidemic years but, based on the symptomology discussed above and the data of the absolute numbers recorded, these deaths likely did not have much influence in altering how cholera was diagnosed.

The relationship between diarrhoea and cholera becomes more precise by looking at the epidemic years and the number of recorded deaths due to each cause. Figures 4.6, 4.7, and 4.8 below show the comparison of deaths from diarrhoea, dysentery, and cholera during each epidemic year.

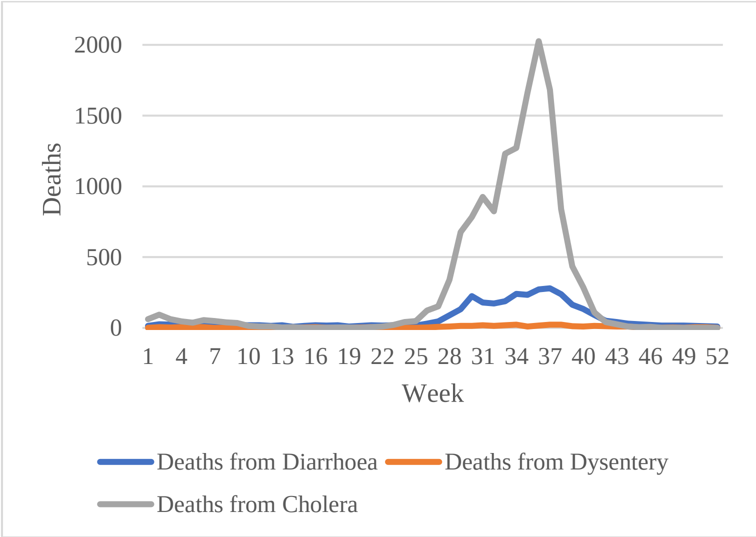

Figure 4.6 – Comparison of weekly deaths from diarrhoea, dysentery, and cholera during the 1849 epidemic

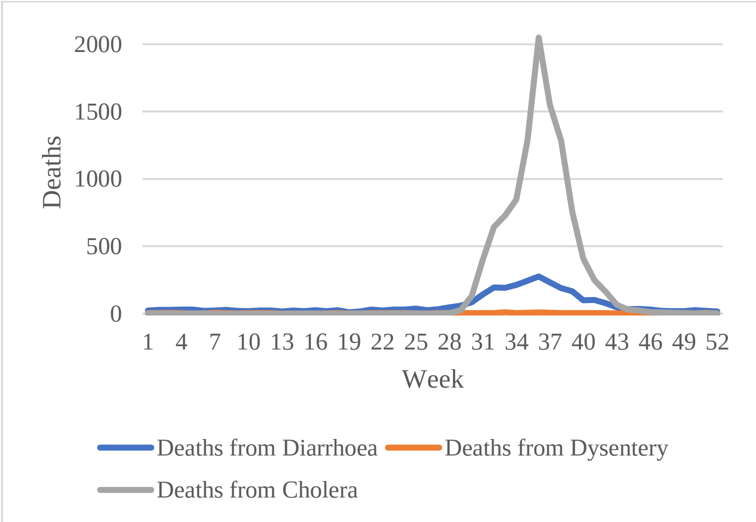

Figure 4.7 – Comparison of weekly deaths from diarrhoea, dysentery, and cholera during the 1854 epidemic

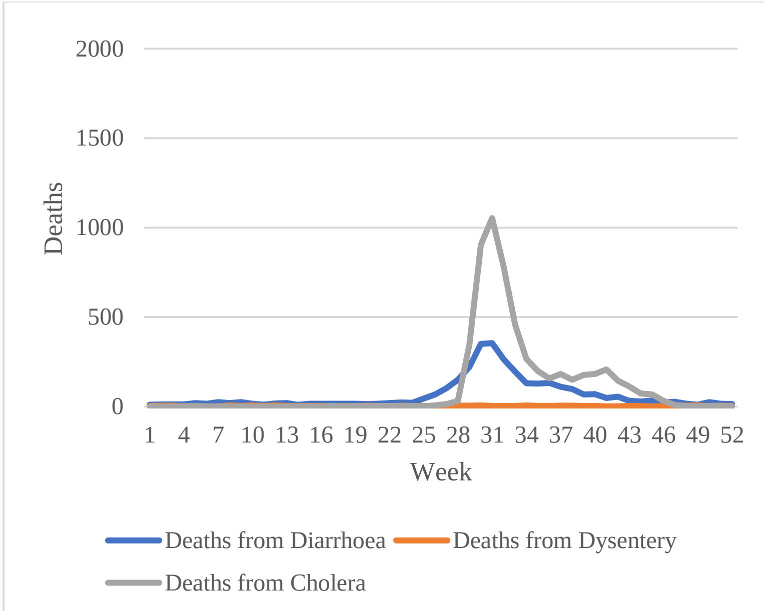

Figure 4.8 - Comparison of weekly deaths from diarrhoea, dysentery, and cholera during the 1866 epidemic

The number of dysentery deaths did not rise significantly during the cholera years. Based on the patterns of diagnoses discussed above, this is not surprising. However, the number of deaths from diarrhoea increased in conjunction with the rise of cholera deaths. In 1849 (Figure 4.6) and 1854 (Figure 4.7), deaths from diarrhoea began rising at almost the same time as the number of deaths from cholera. 1866 (Figure 4.8) does not show this pattern, as the number of diarrhoea deaths increased a few weeks before the sudden rise of cholera mortality. However, the high number of cholera deaths obscures the concurrent increase in the number of diarrhoea deaths, making it appear that there were only minor increases in deaths from diarrhoea despite a cholera epidemic. To get a better understanding of the relationship between diarrhoea and cholera diagnoses, it is important to first establish the average number of deaths from diarrhoea per week across a thirty-year period. This allows for an accurate comparison of weekly diarrhoea deaths in non-epidemic years to diarrhoea deaths in epidemic years, which will highlight the degree to which diarrhoeal deaths increased. Figures 4.9, 4.10, and 4.11 show the comparison of weekly diarrhoea deaths during epidemic years to the average number of weekly diarrhoea deaths over a thirty-year period.[40]

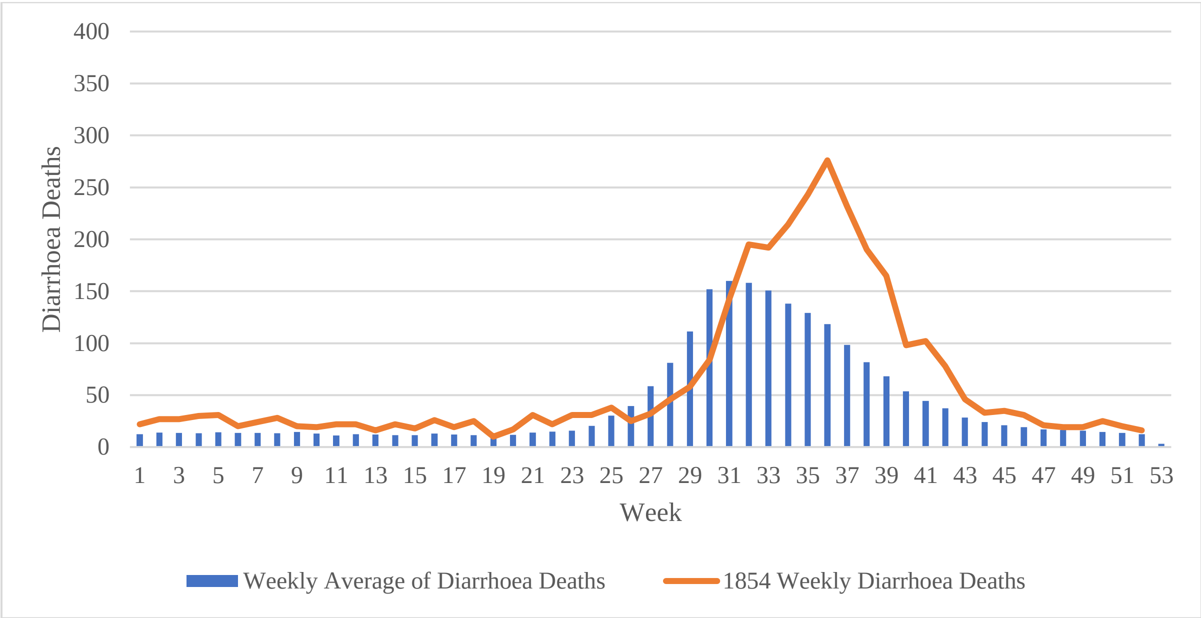

Figure 4.9 - Comparison of weekly diarrhoea deaths from 1849 to 30-year weekly average

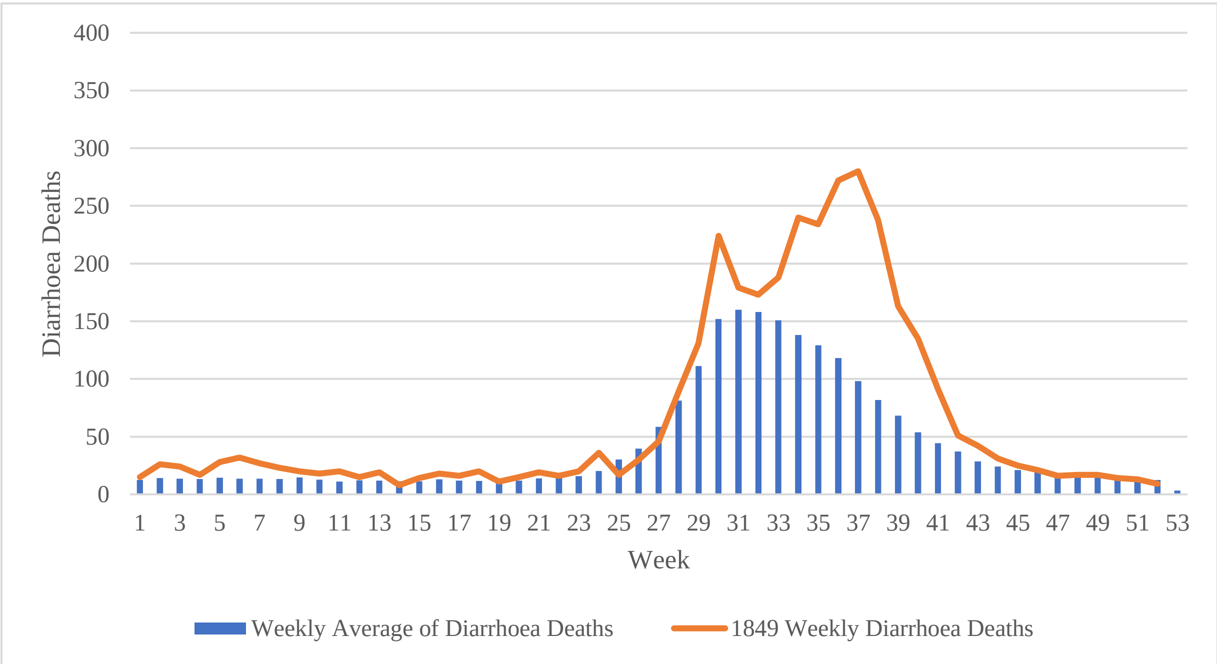

Figure 4.10 - Comparison of weekly diarrhoea deaths from 1854 to 30-year weekly average

[40] The average number of diarrhoea deaths was calculated from 1840 to 1869 using the *Weekly Returns of Births and Deaths in London.*

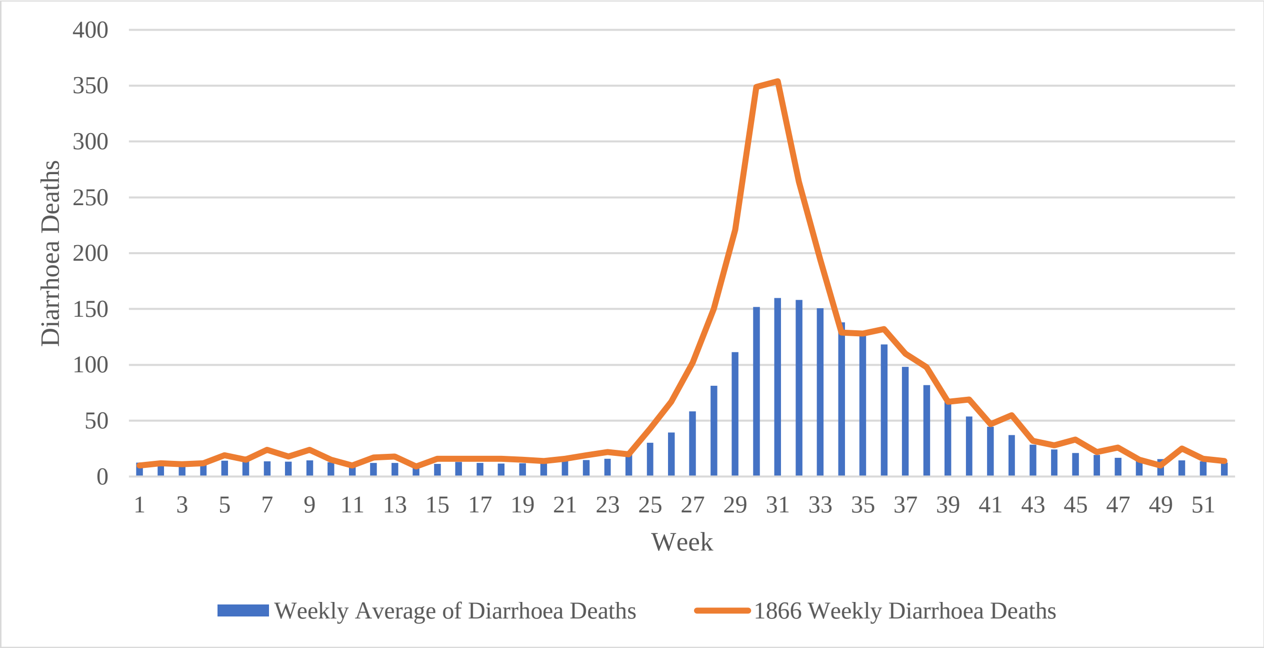

Figure 4.11 - Comparison of weekly diarrhoea deaths from 1860 to 30-year weekly average

A comparison of the average number of diarrhoeal deaths compared to the number of deaths from diarrhoea which were recorded during epidemic years shows that the number of deaths due to diarrhoea increased dramatically during the peak weeks of an epidemic year. The highest increase in 1849 was in Week 37 (181 cases above the average); 1854 was also Week 37 (147 cases above the average); 1866 was Week 30 (197 cases above the average). This demonstrates three things: one, the number of diarrhoea deaths recorded in epidemic years was more substantial than it initially appeared; two, assuming a correlation between the increasing number of diarrhoea deaths and the presence of cholera, the 1866 cholera epidemic occurred much earlier in the year; and three, that despite being earlier and also the shortest cholera epidemics, 1866 saw the biggest increase in the number of diarrhoea deaths arising out of the three epidemic years. While the number of diarrhoea deaths certainly increased significantly during epidemic years, adding a line which represents the total number of cholera deaths during each epidemic year

(Figures 4.12, 4.13, and 4.14) shows that, in retrospect, these increases were minor in comparison to the rapid rise of cholera deaths.

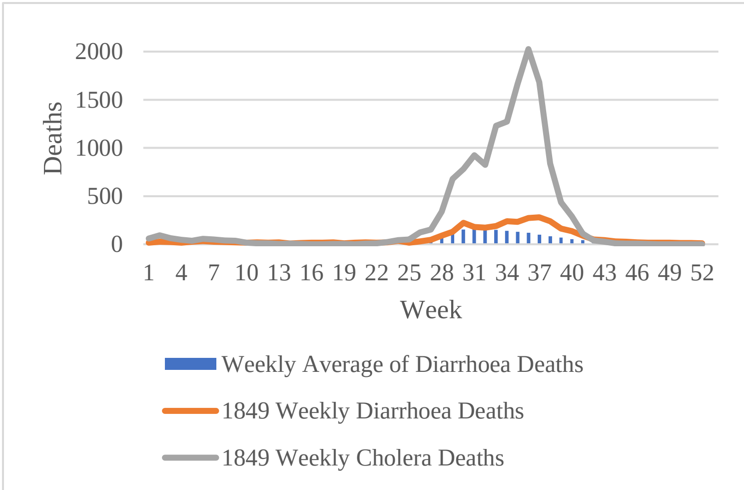

Figure 4.12 - Comparison of weekly diarrhoea deaths from 1849 to 30-year weekly average, with cholera deaths

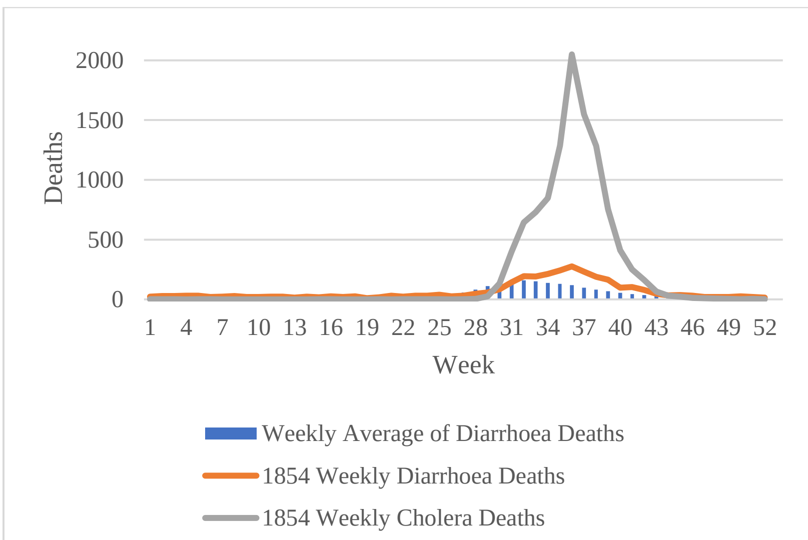

Figure 4.13 - Comparison of weekly diarrhoea deaths from 1849 to 30-year weekly average, with cholera deaths

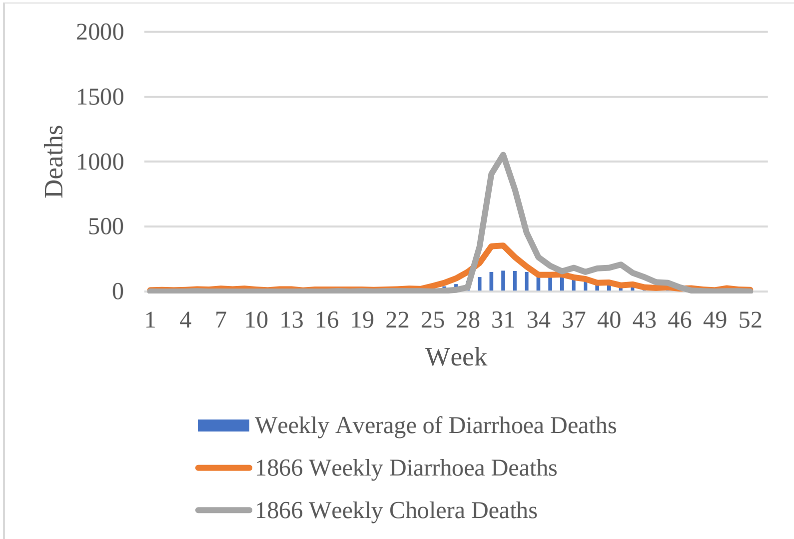

Figure 4.14 - Comparison of weekly diarrhoea deaths from 1860 to 30-year weekly average, with cholera deaths

The benefit of comparing the number of diarrhoea deaths with the number of cholera deaths per week is that it demonstrates that while diarrhoea deaths did increase, the real killer during these weeks was cholera. However, this comparison also suggests a pattern of potential misdiagnoses.

The lines which show the number of diarrhoea deaths and the number of cholera deaths are virtually identical in 1849 and 1854.[41] This includes little "blips" of cholera and diarrhoea which occurred earlier in the year, as well as weekly increases and decreases during the height of each epidemic. In every week that there was a rise in the number of deaths due to diarrhoea, there was also an increase in the number of cholera deaths, and the same can be said for the weeks which experienced a decrease in the number of diagnoses during each epidemic (for example, 1849 saw a decline of cases in weeks 31 and 32 in both diarrhoea and cholera). Therefore, it is highly likely that many of the deaths due to diarrhoea during epidemic years were misdiagnosed cholera cases. Medical officers of health understood that diarrhoea was a premonitory symptom of

[41] For a magnified version of Figures 4.12, 4.13, and 4.14, see Appendix B.

cholera. However, they had no way to distinguish deaths due to diarrhoea from deaths due to cholera when the only present symptom was diarrhoea. Given that the number of cholera deaths increased at almost identical patterns as the number of diarrhoea deaths, it is possible that the increased number of diarrhoea deaths were actually cholera cases for which no other symptoms had appeared.

1866 had a very different mortality pattern, but the same explanation can be offered. It is possible that the number of diarrhoea cases slowly began increasing, and medical officers of health had simply not realized it was the start of a cholera epidemic until a few weeks later, leading to the sharp rise of cholera deaths and the subsequent sharp decline in diarrhoea deaths. The correlation between an increase of diarrhoeal deaths and an imminent surge of cholera was not realized in a timely manner, as it had been in the two previous epidemics, thus leading to a great number of diarrhoea deaths being misdiagnosed as cholera before the epidemic became fully apparent.

The Seasonal Timing of the Epidemics

Cholera epidemics usually took place during the summer months, though there the notable exception to this rule were the “mini epidemics” which preceded the 1849 and 1854 cholera epidemics in 1848 and 1853. This mini epidemic of 1848 occurred roughly from the end of October 1848 and lasted until the end of April 1849. The timing of epidemic outbreaks was determined by a host of factors, including the weather. Traditionally, cholera was understood as a summer disease – the belief being that the warmer temperatures not only facilitated the spread of disease as a result of an increasing contamination of food and water, but also by increasing the amount of human contact outside of one’s immediate household. London, as a quickly growing industrial port city, would have experienced such a seasonality in terms of physical mobility. Sailors and tradesmen were much more active at the docks; street vendors and buskers took advantage of the warmer weather and set up in busy streets; children were outdoors playing; women were hanging their laundry outside; meat markets were notoriously foul-smelling as carcases baked in the sun – communal outhouses faced the same problem; fruit and vegetable stands stood exposed to the dirt and dust of London streets; the warm sunshine prompted thirst which was sometimes quenched by a pint of ale at the corner public house, and sometimes by a drink of water from a local water pump. Summer was the time when London came alive with people enjoying all that the city had to offer. This section will examine the seasonality of cholera, suggesting that while the disease was most prominent during the summer months, the epidemics began as early as spring and lasted well into late autumn.

The arrival of cholera was usually forewarned by the reports of the slow spread of the pandemic westward, across the principal cities of the European Continent. Though an epidemic of cholera in London was usually predicted by the arrival of cholera in Poland, Germany, the Netherlands, and France, there remain questions about the precise timing of the London epidemics. Given that the disease was usually detected at least six months earlier across the Channel in mainland Europe, there was still a degree of uncertainty as to when cholera would appear in England. The cholera mortality figures show the general pattern of each epidemic, as seen in Figure 4.15. Each epidemic pattern is discussed below, providing specific dates for each phase of the epidemics (beginning, increase, climax, decline, end). Any week where more than ten deaths due to cholera were recorded is considered significant; this is important when looking at the first weeks of an epidemic, as well as when the epidemic had declined enough to no longer be a threat to the general population.[42] It is also important to emphasize that, while 1848 and 1853 were not epidemic years, they are nonetheless considered because they represent an "extension" of both 1848 and 1854's epidemics, which challenges their seasonality.[43]

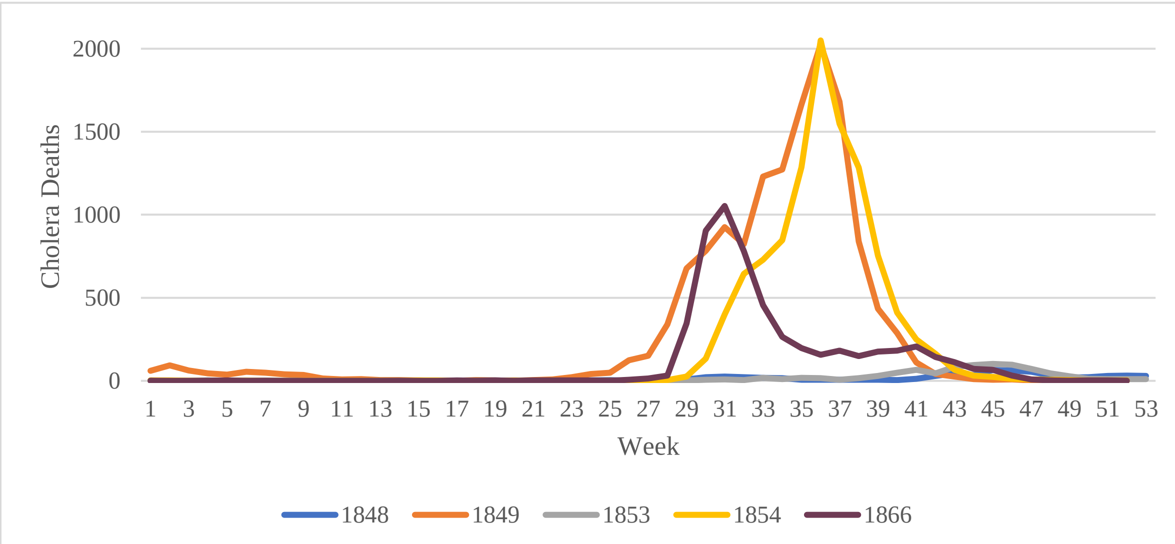

Figure 4.15 – Cholera mortality by week, epidemic years

The 1849 epidemic was unusual in the sense that it was preceded by a "mini epidemic" which caused a number of deaths from August 1848 until April 1849.[44] While the number of deaths seems small by comparison – approximately 1000 over nine months – this mini epidemic poses an interesting question regarding the spread and durability of cholera throughout the winter months before appearing in epidemic scale later in 1849. Once the mini epidemic faded away, there was a period without cholera until Week 23 (the week ending 9 June).[45] From that point,

[42] This number was used because, when looking at the mortality data, there is almost always a small number of deaths recorded under "cholera." Using ten deaths as an indicator allowed me to define when the recorded number of cholera deaths started being more than the normal handful which were consistently reported. Further, the *Weekly Returns* provided rough estimates of when the General Register Office considered the beginning of the epidemics, and the number of cholera deaths which coincided with these weeks was around this number. It is important to remember that the epidemics were fluid, meaning they had no firm "start" and "end" date; just because one week had nine cholera deaths rather than ten did not mean the epidemic was no longer present.
[43] The affect of the "mini epidemics" of 1848 and 1853 will be discussed in Chapters 5 and 6 respectively.
[44] This "mini epidemic" stretched from Week 30 in 1848 (the week ending 29 July) and lasted until Week 12 in 1849 (the week ending 24 March).
[45] By which it is understood that there were no significant number of cholera deaths; see footnote 42.

there was a relatively steady increase in the number of deaths until Week 32 (the week ending 11 August), which saw a slight decrease – approximately one hundred deaths less than the week before. The following week, Week 33 (the week ending 18 August) experienced a significant increase (nearly four hundred more deaths than Week 32). The epidemic climaxed in Week 36 at 2026 deaths (the week ending 8 September), before beginning a steady decline. By Week 45 (the week ending 10 November), the numbers of cholera deaths had subsided to fewer than ten per week.

Like in 1849, the 1854 epidemic also experienced a “mini epidemic”, which occurred from August until December 1853. These twenty weeks yielded nearly 850 deaths, the maximum number of deaths (102) occurring the week ending 5 November. The first week of 1854 had only two deaths attributed to cholera, meaning this mini epidemic did not spill into 1854; rather, it stood alone in its existence, with nearly twenty-nine weeks before cholera appeared again in London in July 1854.The epidemic in 1854 intensified much more quickly than the epidemic of 1848 due to the rapid increase in the number of deaths. Cholera first became apparent in Week 29 (the week ending 22 July) and increased exponentially until Week 36 (the week ending 9 September – 2050 deaths). Week 47 (the week ending 25 November) was the first week to experience less than ten deaths due to cholera. Not considering the 1853 mini epidemic, the 1854 epidemic curve is the most straightforward in its rise, climax, and decline.

The 1866 epidemic was by far the least deadly of the three epidemics under study. It also appeared earliest in the year and arguably had the shortest time until its climax, though it took a long time for the decline of deaths to become less than ten. Beginning in Week 27 (the week ending 7 July), the epidemic grew for only four weeks before climaxing in Week 31 (the week ending 4 August – 1053 deaths). The decline past Week 31 was lengthy and included several weeks which experienced minor increases in the number of cholera deaths (Weeks 37, 39, 40, and 41 – 9 September through 13 October). After Week 41 (the week ending 13 October), it took until Week 46 (the week ending 17 November) for cholera to decrease to less than ten deaths per week. There was a plateauing effect of the number of deaths between Weeks 36 and 43, where the number of deaths remained within a margin of approximately 100 deaths (maximum 207, minimum 112). This slowing of the decline is unique to 1866.

Cholera mortality appeared to present the following seasonality: Weeks 25 to 45 (approximately July – November) were the most common for cholera deaths to occur. As Figure 4.16 shows, the number of cholera deaths for non-epidemic years shows that this was consistently true.

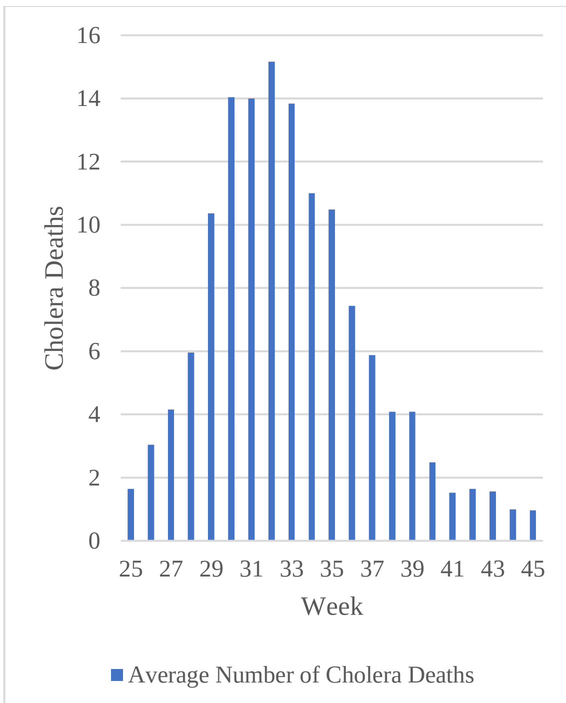

Figure 4.16 - Average number of cholera deaths during weeks 25-45 from 1840-1869, excluding epidemic years (1848-49, 1853-54, and 1866)

Though not epidemic in scale, nearly every year experienced some cholera deaths and the average number of deaths during Weeks 25 to 45 was small; about half of the weeks had fewer than ten deaths per week due to cholera and all of them were fewer than twenty deaths. Given that cholera consistently appeared during this twenty-week period, it becomes evident cholera cannot be classified simply as a "summer disease," given that it lasted well into the autumn months, with some years extending throughout the winter.

Geographic Distribution of Deaths from All Causes

Victorian London was broken into multiple administrative districts (see Chapter Two) which were used by the General Register Office when reporting data in the *Weekly Returns of Births and Deaths in London*. Five principal districts were broken into sub-districts. These districts and sub-districts, which were made up of historic parishes, became important building-blocks in the hierarchy of government and health care. Changes to sub-districts were common, and while the overall maps of the districts look similar over the three decades, the geographical area and population within each district varied, making it difficult for precise year-to-year (or epidemic to epidemic) comparison. Figures 4.17 and 4.18 are maps of London's districts and sub-districts. The five London districts were: west, north, central, east and south.

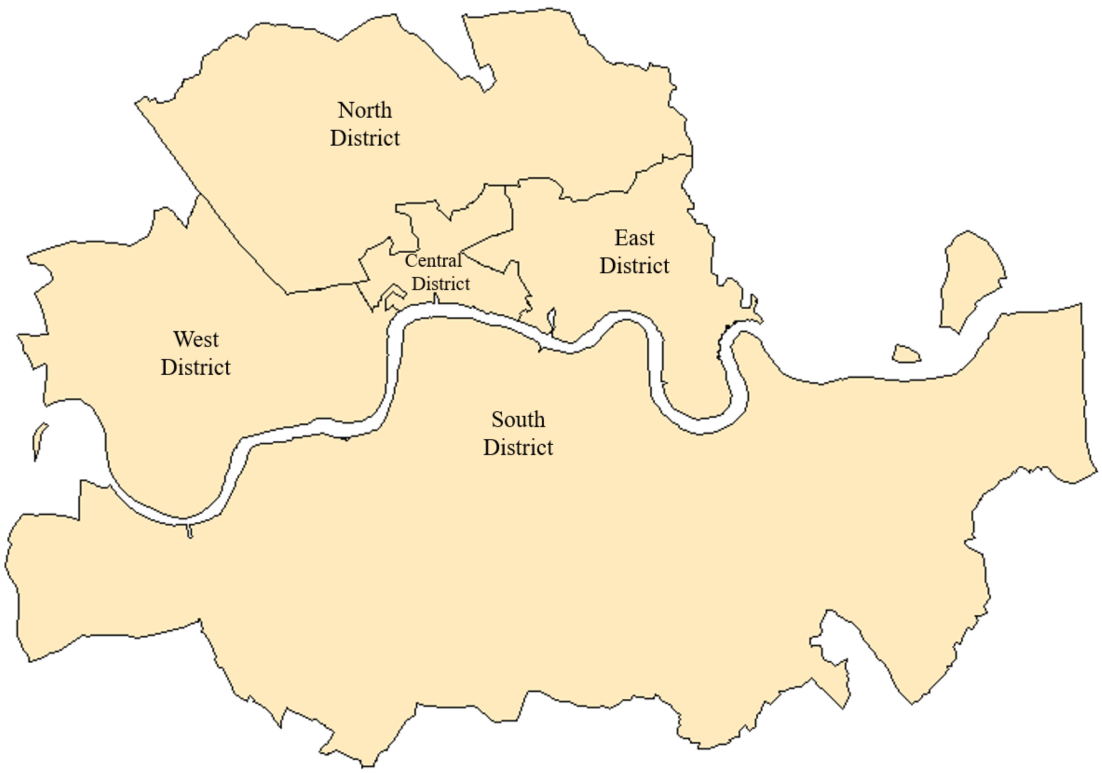

Figure 4.17 – London districts

London's sub-districts were:

West Sub-Districts: Kensington; Chelsea; St. George, Hanover Square; Westminster; St. Martin in the Fields; St. James, Westminster

North Sub-Districts: Marylebone; Hampstead; Pancras; Islington; Hackney

Central Sub-Districts: St. Giles; Strand; Holborn; Clerkenwell; St. Luke; East London; West London; London City

East Sub-Districts: Shoreditch; Bethnal Green; Whitechapel; St. George in the East; Stepney (in 1857, Stepney split into Stepney and Mile-End Old Town and this is reflected in the 1866 Weekly Return); Poplar[46]

South Sub-Districts: St. Saviour; St. Olave; Bermondsey; St. George, Southwark; Newington; Lambeth; Wandsworth; Camberwell; Rotherhithe; Greenwich; Lewisham

[46] Peter Higginbotham, "Mile End Old Town, Middlesex, London," *The Workhouse: The Story of an Institution*, available online at: http://www.workhouses.org.uk/MileEndOldTown/#:~:text=In%201925%2C%20Mile%20End%20Old,then%20as%20Mile%20End%20Hospital..

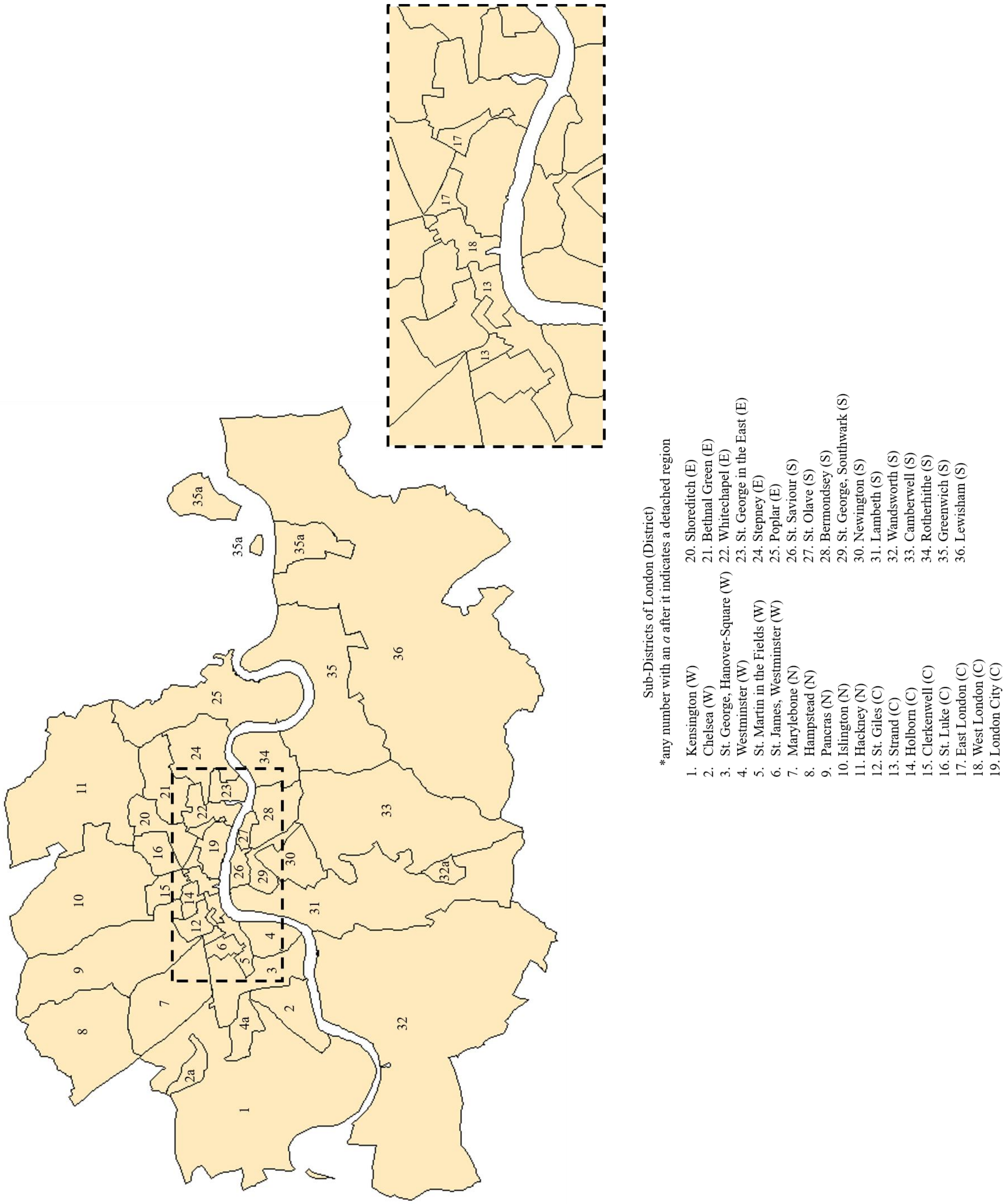

Figure 4.18 – London sub-districts

Population density played a critical role in determining the risk of contracting cholera. This section provides a glimpse at crude mortality figures mapped by London districts, first by looking at how population density influenced mortality patterns as a whole, and then by narrowing in on the mortality patterns presented in each cholera epidemic across the London districts.

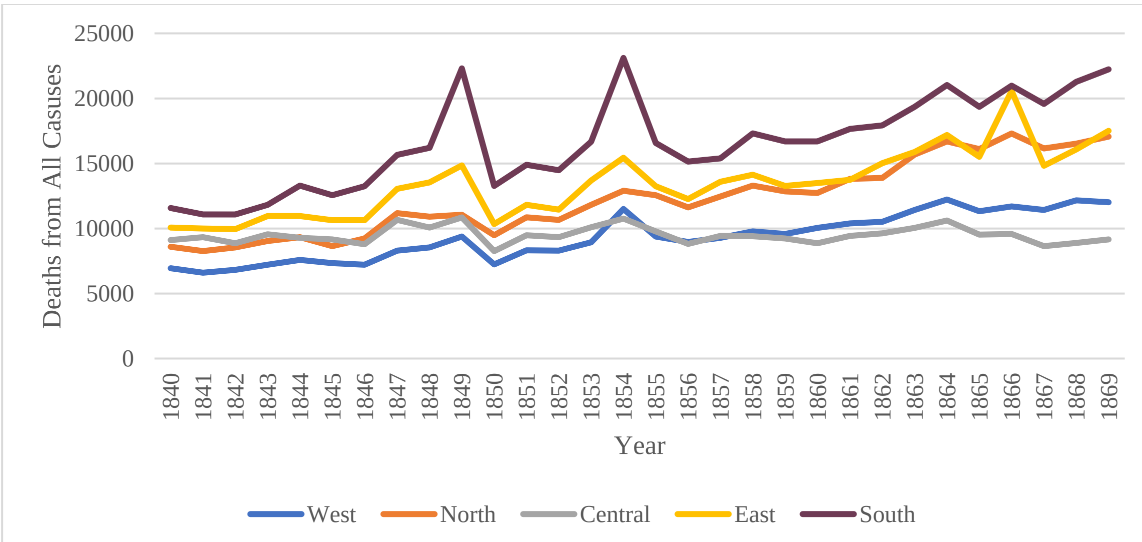

Figure 4.19 – Comparison of the total number of deaths from all causes by district, 1840-1869

Figure 4.19 shows the total number of deaths per year by district. It is possible to see some general trends: the west and central districts had the lowest amounts of total deaths, followed by the north district. The south district had the highest number of deaths every year, followed by the east district. 1849 saw the biggest difference in the number of deaths between the south and east districts; while the east district recorded 14,847 deaths (21.7 percent of the total for that year), 22,298 deaths were recorded in the south district (32.6 percent of the total deaths for that year). Conversely, the year with the lowest difference was 1866. The east district experienced 20,574 deaths (25.7 percent of total deaths) whereas the south district had 20,985 deaths (26.2 percent of total deaths).

Looking at the map of London's districts (Figure 21), it is obvious to see that the south is by far the largest district by area. A direct comparison between districts is problematic, given that a greater amount of space allows for a greater population; greater population yields more death. Two further calculations are therefore necessary: a comparison of deaths per district according to population and, secondly, a comparison of deaths per district according to geographic area in square miles, which was the unit used by the General Register Office. Together, these calculations provide the population density and corresponding mortality patterns in each district.

The population and geographic area information which exists for the districts is based on census records, which means verified figures are only available every ten years. Figure 4.20 shows the population growth which occurred in all the districts except the central district, which experienced a slight population decline.

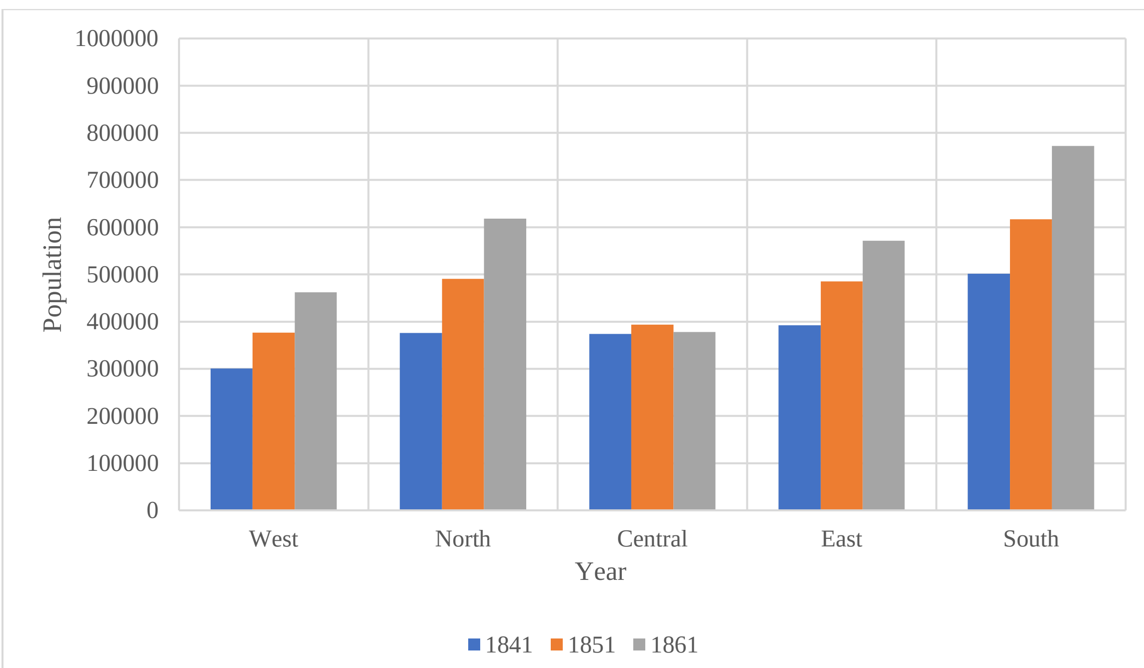

Figure 4.20 – Population growth by district, 1841, 1851, and 1861

Figure 4.20 shows that there was a steady increase in population in all districts apart from the central district, which experienced a small decline between 1851 and 1861, and again between 1861 and 1871. Despite almost uniform population increases, it is interesting to consider what percentage of London's population each district housed. Table 4.1 shows this number, as well as the percentage of deaths from all causes each district registered during 1841, 1851, and 1861.

District	**1841 % of London's Population**	**1841 % of All Causes of Death in London**		**1851 % of London's Population**	**1851 % of All Causes of Death in London**		**1861 % of London's Population**	**1861 % of All Causes of Death in London**
West	15%	15%		16%	15%		17%	16%
North	19%	18%		21%	20%		22%	21%
Central	21%	21%		17%	17%		13%	14%
East	20%	22%		21%	21%		20%	21%
South	26%	24%		26%	27%		28%	27%

Table 4.1 – a comparison of the percentage of London's population and the percentage of all causes of death in London per district, 1841, 1851, and 1861

Interestingly, London's population was relatively equally divided between the five districts, with all of them within a small margin of 20 percent, though by 1861, the central district housed far fewer people than any other district. However, the crude number of deaths which took place in each district varied considerably more. The south district, consistently housing between 26 and 28 percent of the population, recorded an equally higher number of deaths than any other district. The east district remained almost the same, as did the west and north districts. The central district decreased between the census years, along with its population.

While the discussion above considered the crude death figures, meaning the raw number of deaths registered, comparing the mortality rate in the districts allows for consideration of the differing populations. This, in turn, provides a more nuanced understanding of the breakdown of deaths across the London districts. Using the reported figures of the General Register Office's *Annual Summary* of 1871, Figure 4.21 shows the annual rates of mortality per one thousand residents in each district.[47]

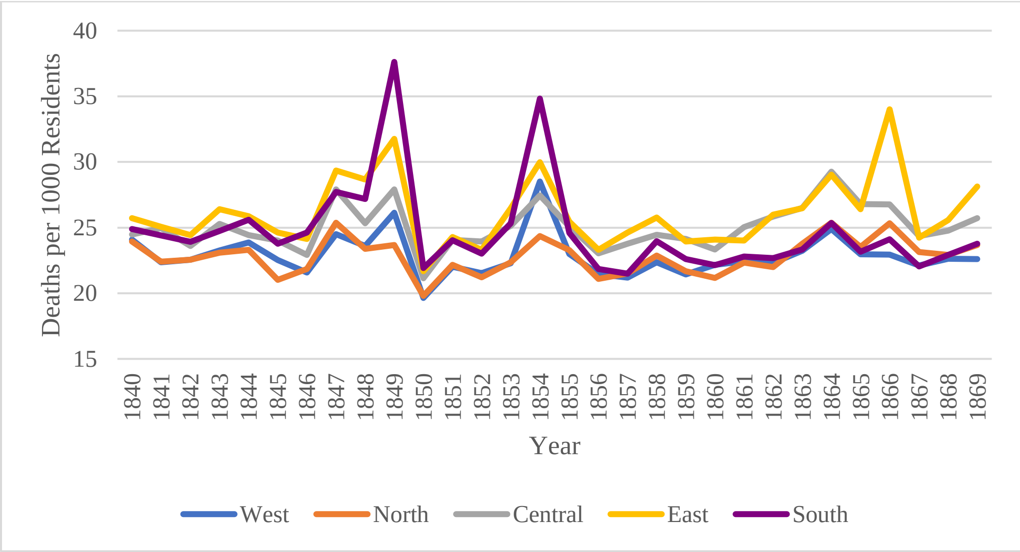

Figure 4.21 – Annual rate of mortality per one thousand residents in each district, 1841-1860

The west and north districts consistently had lower mortality rates than the other districts. The central and southern districts, by contrast, competed for the highest mortality most years, though on three different occasions one district was clearly successful in claiming the dubious prize of highest mortality. In 1849 and 1854, mortality rates in the southern district were much higher than in any other district, reaching as high as thirty-seven and thirty-four deaths per thousand, respectively. The other major spike is in 1866, when the east district far surpassed the others,

[47] This method requires accurate population and mortality data. The numbers represented in the graph below are taken from a table published in the 1870 *Weekly Returns of Births and Deaths in London*. These are calculations I did not do myself but were reported by the Registrar General. General Register Office, *Annual Summary, London and Other Large Cities, 1870* (London, 1870), pg. x.

with a rate of thirty-four deaths per thousand. Not surprisingly, these were the cholera epidemic years.

When looking at the patterns that emerge between geography and mortality, a few main themes present themselves: first, the East End was, in fact, the sickliest area of London in general. The mortality rates remain consistently high in the east district. This observation supports the characterisation of the poor, disease-ridden tenements of the East End, but also nuances our understanding of London by highlighting the problems of sickness and mortality south of the Thames.[48] Second, despite having a large geographic size, a large population, and the highest number of deaths from all causes, the south district experienced the highest mortality during the 1849 and 1854 epidemics. The cholera epidemic district mortality patterns are addressed in the discussion below.

Geographic Distribution of Deaths from Cholera

This section provides a brief overview of cholera's mortality patterns amongst the districts of London during the climactic weeks of the 1849, 1854, and 1866 cholera epidemics. These epidemics will be discussed much more thoroughly in the coming three chapters. This section serves as a transition point between research question two (what was it like to live in, be sick in, and die in London?) and research question three (what was the cholera experience in London

[48] One of the most common beliefs about London's mortality in the nineteenth century, as understood then and now, is that the East End, which was renowned for its poverty, industry, and immigrant populations, suffered the most from disease. As John Marriott observed, the East End in the nineteenth century was "seen as a site of danger, depravity and destruction, and hence one to be avoided by genteel and respectable persons." Marriott's book devotes an entire chapter to cholera in the East End, which claims that "in no area of the country did the scourge of cholera have such a pronounced effect on the public imagination as it did in East London." By contrast, although Razzell and Spence highlight the difference of "socio-economic characteristics and associated mortality rates" between the East and the West Ends of London they found surprisingly little evidence to support a strong connection between socioeconomics and mortality rate based on location. John Marriott, *Beyond the Tower: A History of East London* (New Haven, Connecticut: Yale University Press, 2011), p.123; Peter Razzell and Christine Spence, "The Hazards of Wealth: Adult Mortality in Pre-Twentieth-Century England," *Social History of Medicine* 19:3 (2006), pgs. 384-386.

during 1849, 1854, and 1866?). The above discussions about crude deaths and mortality rates in comparison to the districts' differing populations highlights the geographic patterns of mortality in London. However, those discussions dealt exclusively with mortality from all causes. This final section of the chapter narrows in on cholera mortality patterns amongst the districts, providing a brief overview of the patterns as well as presenting maps of the districts showing weekly progression of mortality during each epidemic. Figures 4.22, 4.23, and 4.24 show the weekly district cholera mortality for 1849, 1854, and 1866, respectively. It is important to note that all numeric figures in the following section are crude deaths, and not adjusted mortality rates to reflect population density.

The 1849 epidemic climax was in Week 36, with a total of 2,026 cholera deaths; 1,071 (53%) of them occurred in the south district. During the weeks surrounding the climax, the southern district continually experienced the highest number of cholera deaths. Despite the dominance of mortality in the southern district, the east district still experienced quite a significant degree of cholera mortality, well into the hundreds between Weeks 35 and 40. Figure 4.22 shows the weekly cholera mortality among the five districts from Weeks 35 to 40 in 1849.

1854's epidemic was similar to 1849 in terms of timing. Cholera ravaged London during the late summer and early autumn months. Also like 1849, the highest concentration of cholera deaths during 1854 was in the southern district. However, unlike the epidemic five years prior, there was not as much contrast between the south and the other districts during the 1854 epidemic, which suggests that the mortality was more evenly spread out in terms of geography. Figures 4.22 and 4.23 show this difference; while the colours in 4.22 (1849) are consistently darkest in the south district, 4.23 (1854) shows that, despite the south district still experiencing the highest number of cholera deaths (and therefore the darkest colour), the spread of cholera mortality was shared between the districts in a more even distribution. This leads one to question how many deaths were there in 1854 compared to 1849, and could it be that there were simply so many more deaths in 1854 that cholera mortality had a more extensive spread across the city? The crude mortality figures say this was not the case. The total number of cholera deaths in all districts during Week 36, 1849, yielded 2,026 deaths; in 1854, there were 2,050 cholera deaths in all of London for the same week. While 1849 and 1854 had almost identical mortality during their highest weeks, the patterns of district deaths was unique; 1849's epidemic heavily favoured the south district, while 1854 had a more even spread between the five districts.

The epidemic of 1866 provides a different epidemic narrative, one which the Figures below highlight with poignant clarity. Climaxing much earlier in the season, the geographical patterns of cholera deaths are dissimilar those of the earlier epidemics. Out of 1,053 deaths in Week 33, a staggering 916 (87%) of them occurred in the east district. The other four districts shared the remaining one hundred and thirty-seven deaths. The reasons for this pattern will be discussed in-depth in Chapter Seven.

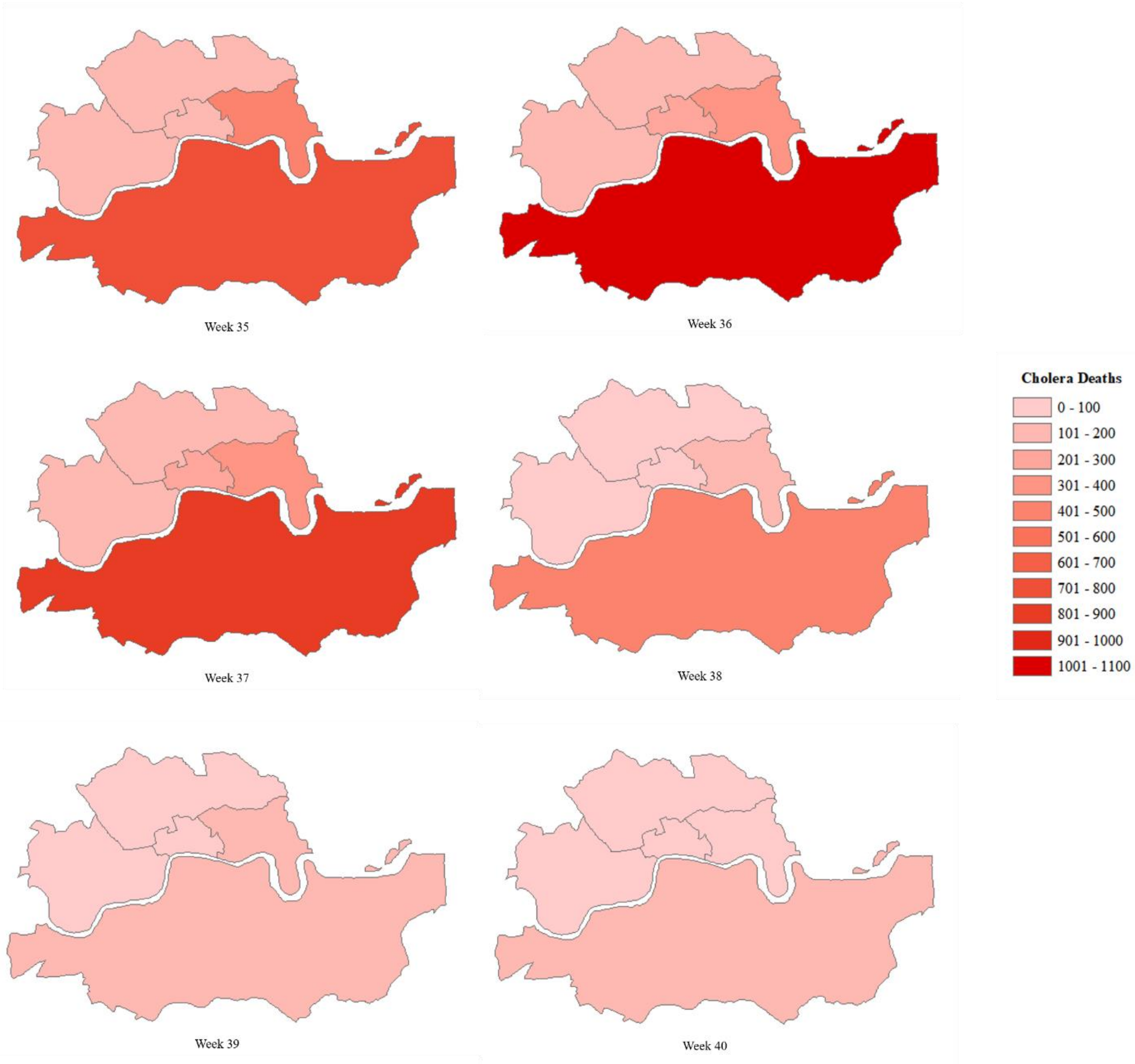

Figure 4.22 – Weekly district cholera deaths, Weeks 35-40, 1849

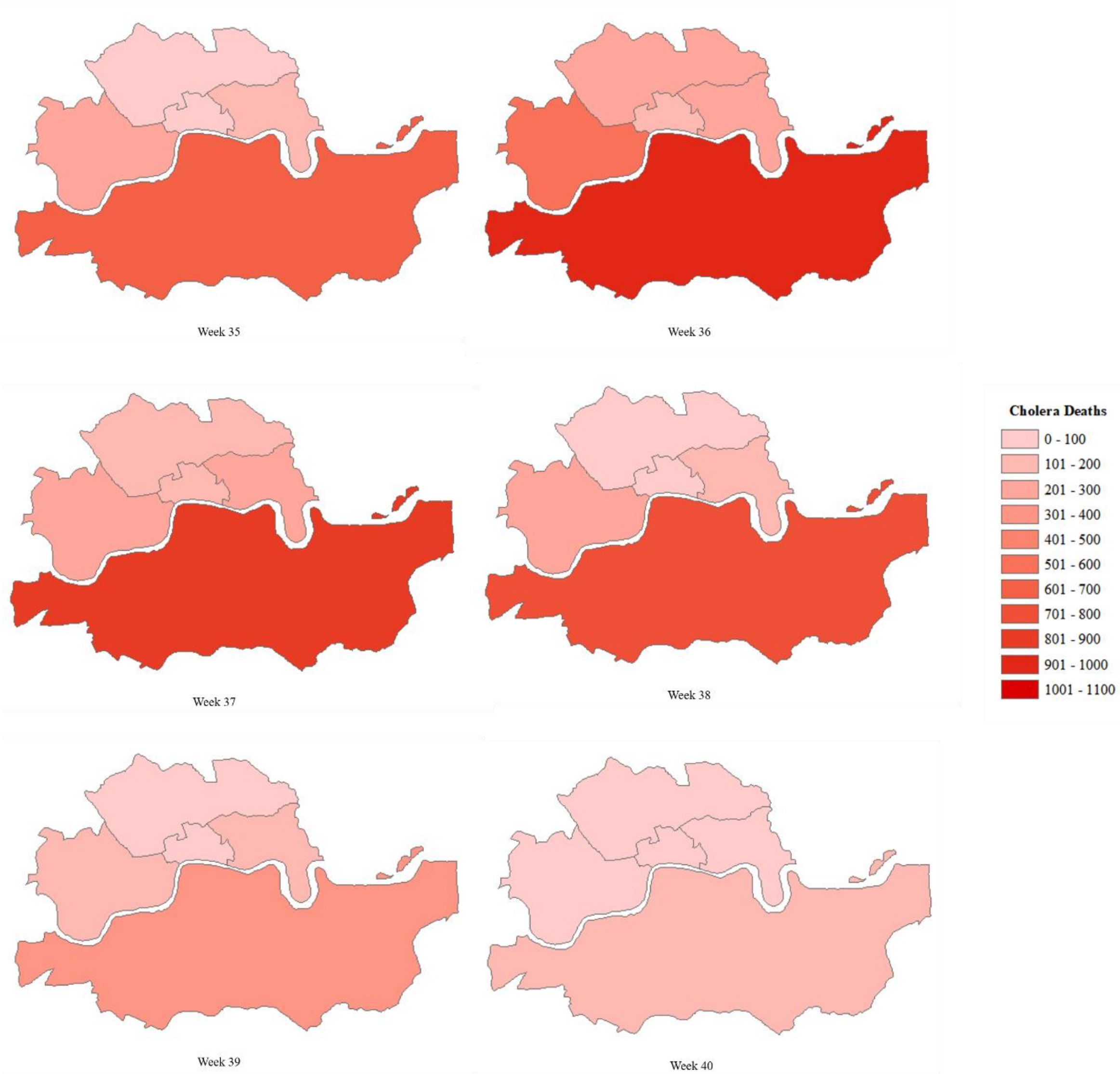

Figure 4.23 - Weekly district cholera deaths, Weeks 35-40, 1854

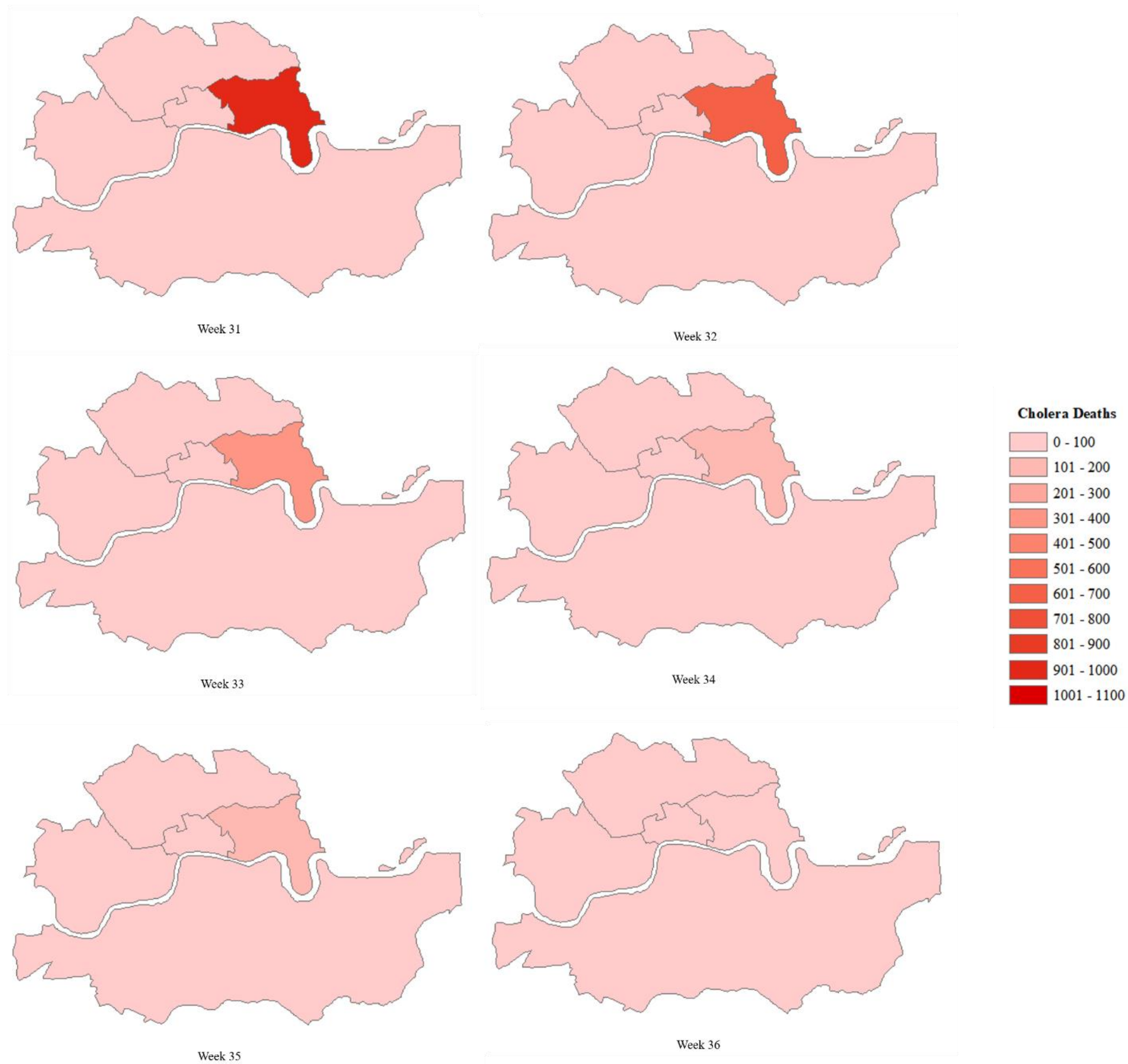

Figure 4.24 - Weekly district cholera deaths, Weeks 31-36, 1866

Conclusion

Cholera was a feared disease because, apart from being painful, there was no effective cure upon which the medical profession agreed. While rehydration was deemed important, the methods of replacing liquid in the body were fraught with danger and had a low success rate. The inability of the medical profession to agree on a cause or treatment led to a growing medical market, one in which numerous treatments – both preventative and responsive – for cholera were advertised. One thing that practitioners could agree on, however, was the importance of premonitory diarrhoea. This symptom was crucial for early identification of cholera patients, even though the disease often claimed its victims too quickly for early identification to make a difference in survival rates.

Diarrhoea, while a symptom of cholera, proved difficult to classify as it was both a symptom and its own disease. The life-tables that William Farr developed separated diagnoses of dysentery, diarrhoea, and cholera, and while dysentery was easily identified by the presence of blood in the stool, diarrhoea and cholera were not as easily distinguishable. The *Weekly Returns* provide crude mortality figures for each of these diseases, and when plotted on a weekly timeline, there is evidence to suggest that many diarrhoea deaths could have been, in fact, cholera cases which occurred at the very beginning of an epidemic.

The use of mortality statistics began to address the second research question: what was the cholera experience in London in 1849, 1854, and 1866? The final section of this chapter provided a brief overview of seasonal cholera mortality in the five districts of London, and the preceding discussion highlighted how population and geographic area had the potential to influence cholera mortality patterns. Chapters Five, Six, and Seven will address the 1849, 1854, and 1866 cholera experiences in London in much more detail. These chapters will examine the cholera mortality patterns in London's sub-districts and specific neighbourhoods, being mindful of population and geographic area, as well as investigate and evaluate the effectiveness of the public health responses which occurred in response to the cholera epidemics. The sections on the public health response will speak to the third and final research question of the thesis: were the public health initiatives successful in lowering cholera mortality?

Chapter Five

Cholera in 1848 and 1849

Cholera in 1849 gave the newly minted public health legislation a baptism by fire. The epidemic, though preceded by a smaller wave in late 1848, was swift and deadly. This chapter examines the cholera experience of 1849; it begins with a discussion of the “mini epidemic” of 1848. This mini epidemic, when studied and mapped using crude mortality figures, challenges both the seasonality of cholera as discussed in Chapter Four, but also highlights the need to be aware of institutions which had the potential to skew the mortality patterns, as a children’s residential school experienced a cholera outbreak which significantly contributed to the cholera mortality patterns. The chapter then shifts its focus to the 1849 epidemic proper. The first geographic cholera mortality patterns studied are London’s districts and sub-districts, which identify the broad mortality patterns. Using crude mortality and standardized death rates identifies the south as the deadliest district, and Lambeth as the deadliest sub-district. The chapter continues with a detailed investigation of cholera mortality in Lambeth, specifically the neighbourhood of Lambeth Church 2nd. This section includes an analysis of the mortality recorded in Princes Street workhouse, which housed all of Lambeth’s paupers. As with the mini epidemic in 1848, the presence of institutions in 1849 skewed the mortality patterns and using a standardized mortality ratio addresses this problem in Lambeth. Finally, the chapter concludes with a discussion about the public health response to the epidemic, drawing specifically on primary sources which reflect the actions taken (or not taken) in Lambeth.

This chapter addresses the second and third research questions of the thesis: it explores London’s cholera experience in 1849, and it evaluates the effectiveness of the public health response to the epidemic. However, this chapter also highlights what Amanda Thomas calls "a forgotten episode in London's history."[1] Recall the discussion from Chapter One: cholera is most often used as a way to examine the social and medical responses to epidemic diseases in the Victorian world. While the 1849 epidemic is included in these discussions, very little quantitative work has been done on this epidemic and it has rarely been the focus of any in-depth studies. The two exceptions are Gerard Kearns's *Urban Epidemics and Historical Geography: Cholera in London, 1848-9* and Amanda Thomas's *The Lambeth Cholera Outbreak of 1848-1849: The Setting, Causes, Course and Aftermath of an Epidemic in London*. While Kearns focuses on the broad mortality patterns of the 1849 epidemic, producing rough maps which highlight the mortality in the south district, Thomas focuses her studied exclusively on Lambeth, recognizing that the sub-district bore the brunt of London's cholera mortality. Both studies are valuable contributions to the historiography, and this chapter is a significant addition to the existing literature by consolidating the cholera experience in London with an in-depth look at cholera and the public health response in Lambeth. Further, the chapter uses the mortality records from the *Weekly Returns of Births and Deaths* which have yet to be explored and used in such a detailed study. Their use, which is the basis of the chapter's methodology, highlights how valuable these records are when examining a disease experience in Victorian London.

THE 1848 "MINI EPIDEMIC"

As discussed in Chapter Four, the cholera epidemic in 1849 was preceded by a "mini epidemic" in 1848, beginning around October 1848 and lasting until April 1849. During this time, the *Weekly Returns of Births and Deaths in London* reported 1,968 cholera deaths. Out of

[1] Amanda J. Thomas, *The Lambeth Cholera Outbreak of 1848-1849: The Setting, Causes, Course, and Afterman of an Epidemic in London* (Jefferson, N.C.: McFarland & Co., 2001), back cover.

35,734 total deaths during the same period, cholera accounted for 5.5 percent of them; out of 17,848 zymotic deaths, cholera made up 11 percent. However, considering the conclusions drawn in Chapter Four about the likelihood of misdiagnosis between diarrhoea and cholera, it is possible that the 1848 mini epidemic had a slightly higher mortality; 1,318 deaths were classified as deaths due to diarrhoea from October 1848 until April 1849. While the mini epidemic was modest in terms of mortality, the 1849 epidemic yielded a cholera mortality rate of 63 percent of all deaths in London. The relationship between these two cholera events challenged the notion of cholera's seasonality, as discussed in Chapter Four, but it also must be asked if this mini epidemic served as precursor for the much more deadly 1849 epidemic, and whether both epidemics followed the same geographical patterns?

Looking at the number of cholera deaths per week for the mini epidemic (Figure 5.1) shows that cholera mortality experienced several rises and declines over the course of the twenty-six weeks, with the deadliest Week 2 (January 7-13, 1849). That week there was a total of nearly one hundred deaths. The second deadliest week was Week 44 (October 29 - November 4), with sixty-four cholera deaths.

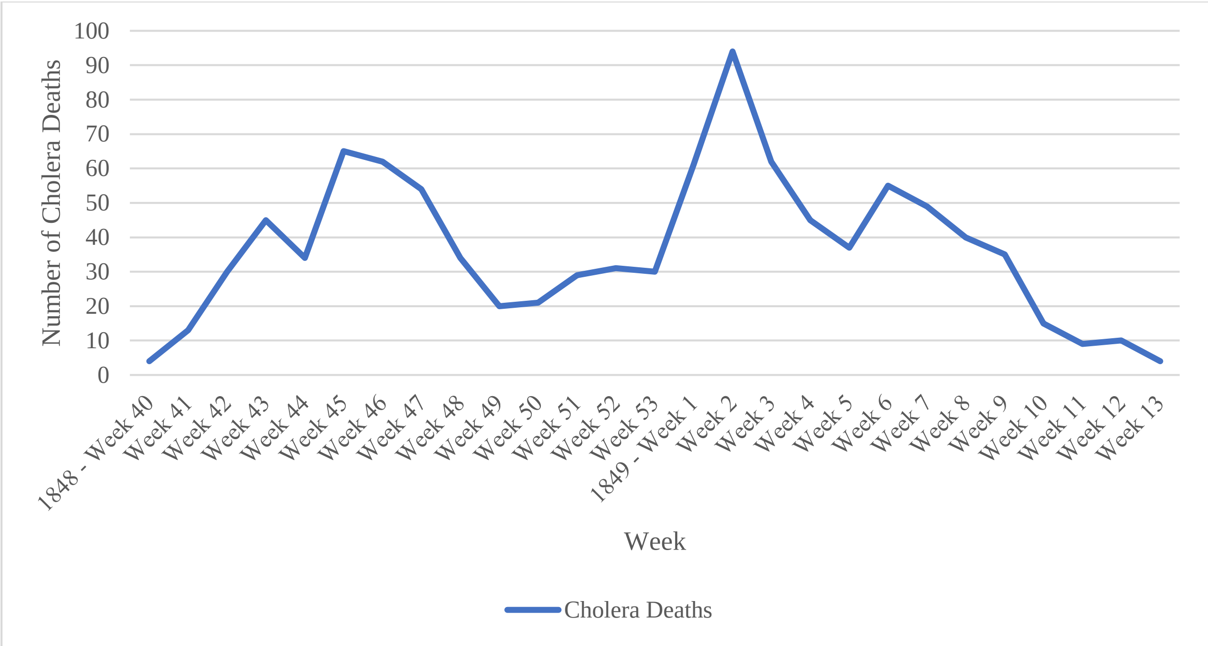

Figure 5.1 – 1848 "mini epidemic" weekly cholera deaths

Figure 5.2 below separates the weekly cholera deaths into districts. There is a noticeable rise in cholera deaths during Weeks 43 (1848) and 2 (1849), both in the south district. In Week 43, the deaths in the south district represented 92 percent of the cholera deaths for the week; in Week 2, the southern deaths were 87 percent of all the cholera deaths.

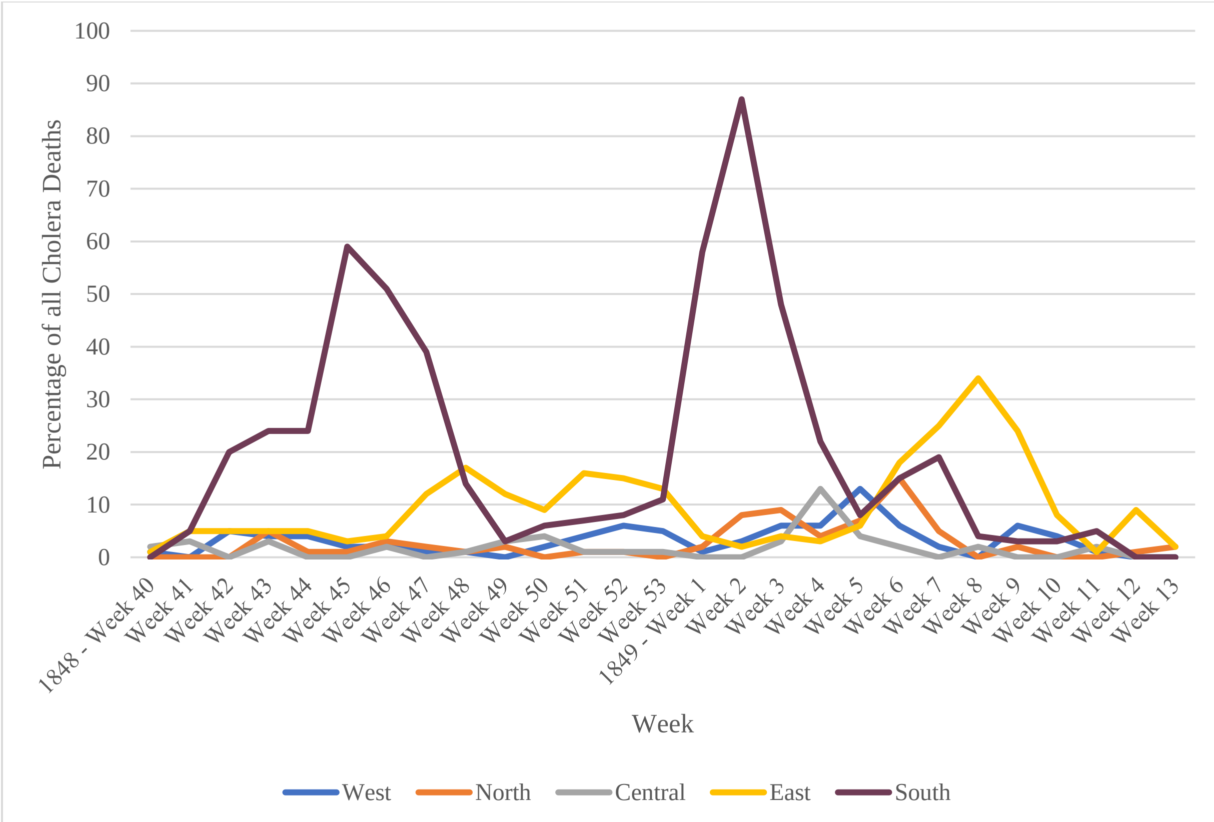

Figure 5.2 – 1848 "mini epidemic" weekly cholera deaths by sub-district

To contextualize the rapid rise of cholera deaths which occurred in Week 2, Figure 5.3 shows the number of cholera deaths in London's districts for the first three weeks of January 1849. These maps shows that while the west, north, east, and central districts remained relatively unaffected (no more than nine cholera deaths in any district over the three weeks), the south district showed a relatively significant rise and fall in cholera deaths – going from fifty-eight deaths in Week 1, to eighty-seven deaths in Week 2, back down to forty-eight deaths in Week 3.

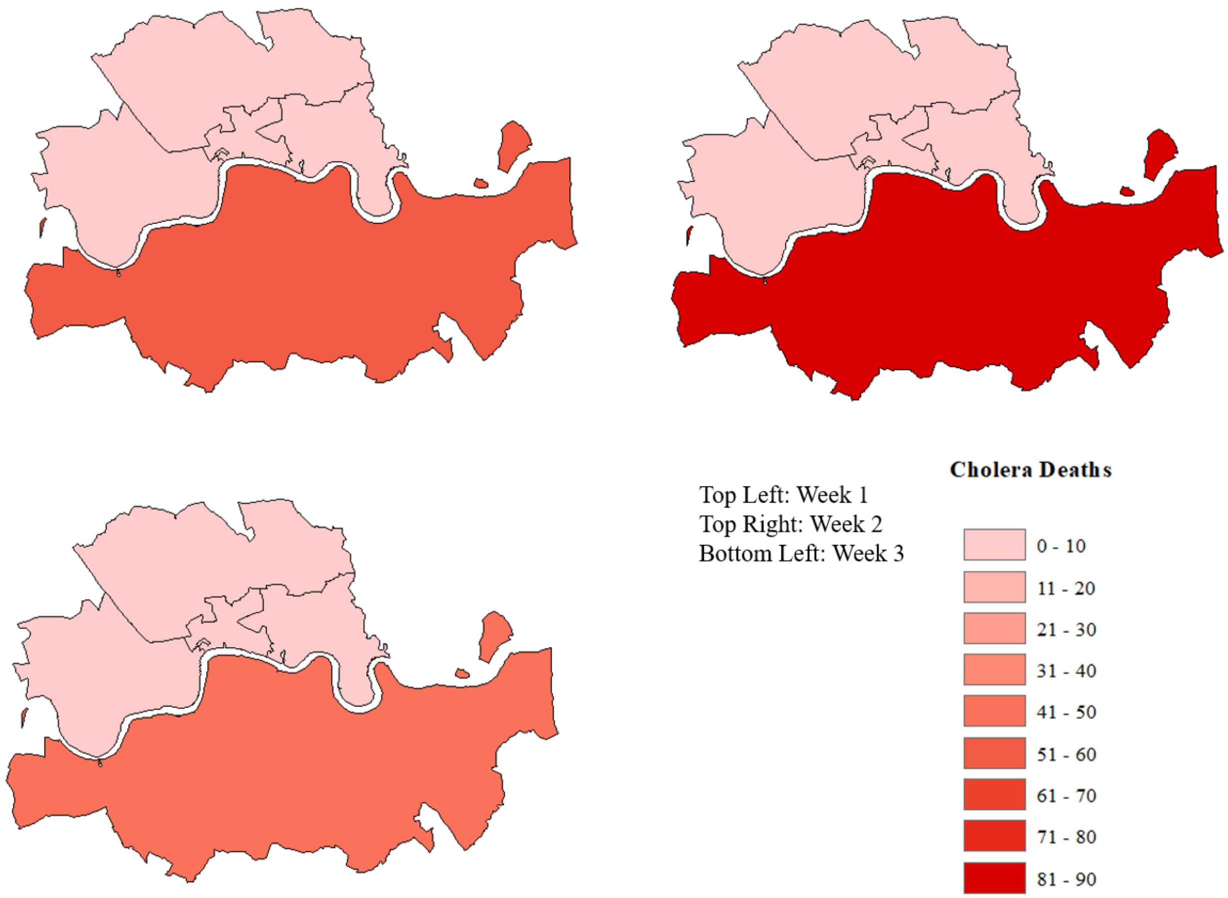

Figure 5.3 – Comparison of weekly district cholera deaths during Weeks 1, 2, and 3, 1849

A final consideration of the mini epidemic geographic patterns is the specific sub-districts which experienced cholera mortality. Figure 5.4 shows the mortality per sub-district for Weeks 1, 2, and 3. While all the districts above the Thames recorded less than ten deaths per week, the sub-districts below the Thames present a telling pattern of increased cholera mortality.

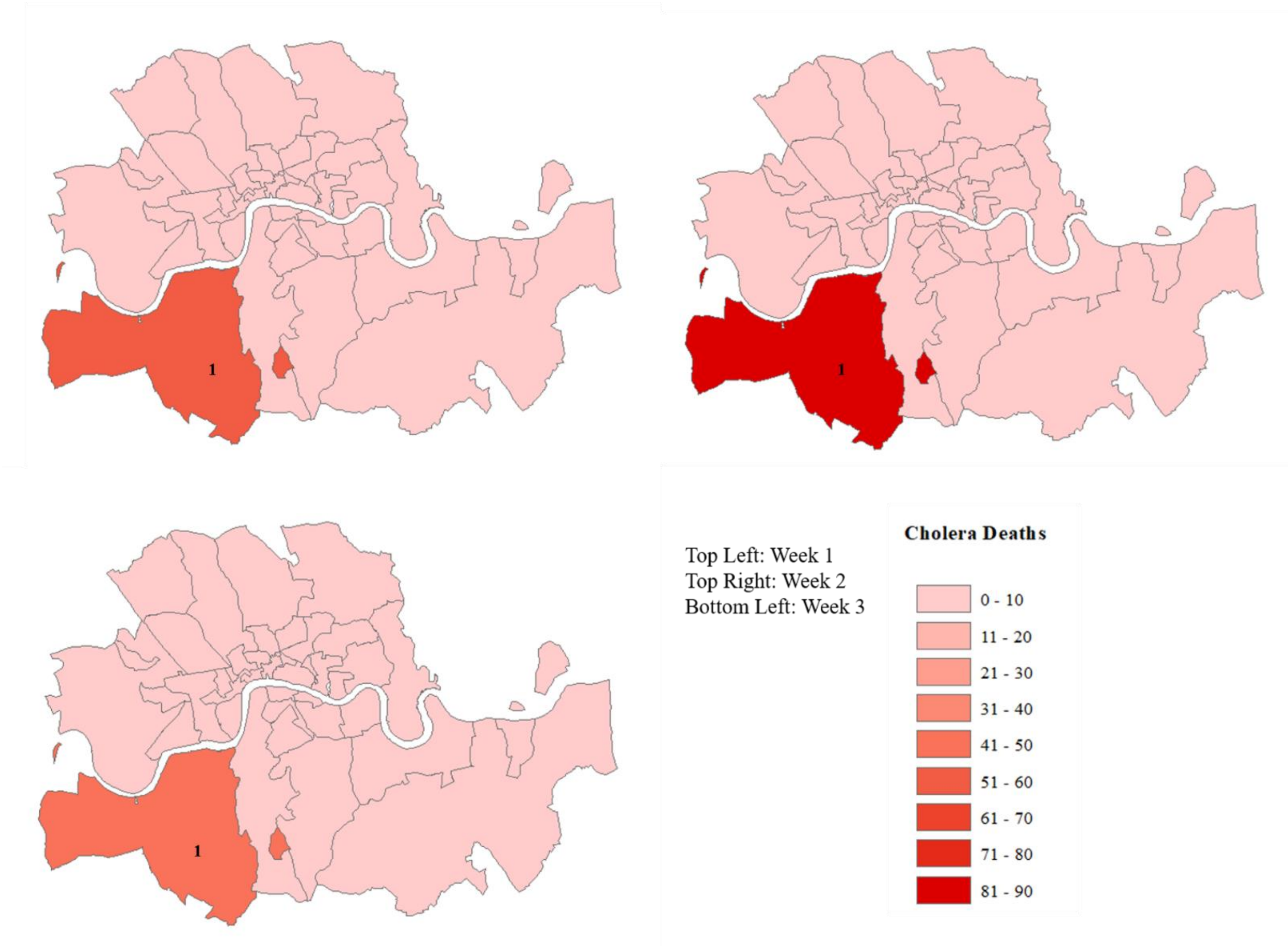

Figure 5.4 - Comparison of weekly sub-district deaths during Weeks 1, 2, and 3, 1849

Every sub-district apart from Wandsworth (1) experienced a mortality of less than ten cholera deaths per week, and Wandsworth experiencing the highest number of cholera deaths in the southern district during the 1848 mini epidemic.[2]

While the 1848 mini epidemic, which really experienced its peak mortality in the early weeks of 1849, did not yield a significant number of cholera deaths in comparison to the 1849 epidemic, it does provide a baseline against which 1849's epidemic can be measured. 1848's

[2] Apart from Wandsworth, Bermondsey is the district with the second-highest mortality, reporting thirteen cholera deaths in Week 43.

mini epidemic returned its deadliest week with one-hundred deaths; out of that one-hundred, eighty-seven of them were in the south district, and from that eighty-seven, eighty-two of them occurred in the sub-district of Wandsworth. A small note made in the *Weekly Returns* provides an explanation for this mortality pattern: the recorded mortalities, which were presented with sex, age, and diagnosis, was made up of deaths “which occurred in Mr. Drouet’s Infant Poor Establishment, Surrey Hall.”[3]

Run by Bartholomew Peter Drouet, the residential school took in pauper children and “provided a modest degree of formal education but, outside of school hours, children were employed at menial tasks such as oakum picking.”[4] The cholera outbreak in the school, which accounted for nearly all the cholera deaths reported in Wandsworth, was the subject of many inquiries. Apart from Charles Dickens, who anonymously published four articles about the outbreak in *The Examiner*, the school was at the centre of an inquest following the outbreak, which was “initiated by Thomas Wakley, editor of the medical journal *The Lancet* and coroner for the county of Middlesex within whose jurisdiction some of the dead children came.”[5] The inquest was based in concerns about the living conditions which contributed to the cholera outbreak, and the ramifications were far greater than anyone expected. The inquest revealed the poor sanitary conditions of the school: inadequate food and water, shared sleeping spaces, humiliating and demoralizing punishments, and a lack of prompt medical care. Specifically, Drouet was accused of having delayed in providing care to cholera victims, which led to unnecessary deaths; this claim was supported by the recovery of over one hundred and fifty

[3] General Register Office, *Weekly Returns of Births and Deaths in London* X:2 (1849), pg. 3.
[4] Peter Higginbotham, “Mr. Drouet’s Establishment for Pauper Children, Tooting,” *The Workhouse: The Story of an Institution*, available online at: https://www.workhouses.org.uk/Drouet/.
[5] For a detailed review of Dickens’s letters and commentary on the outbreak, see A.W.C. Brice and K.J. Fielding, “Dickens and the Tooting Disaster,” *Victorian Studies* 12:2 (December 1968), pgs. 227-244; Higginbotham, “Mr. Drouet’s Establishment for Pauper Children, Tooting.”

children who had been removed from the school and taken to the Royal Free Hospital.[6] Drouet was convicted of manslaughter for his actions, though a jury rendered him not guilty on April 16, 1849.[7]

The story of the Establishment for Pauper Children in Wandsworth challenges the current narrative of the 1848 mini epidemic. Though cholera was present in London in the autumn of 1848, the real rise of deaths, which occurred in the early weeks of 1849, were all registered in Wandsworth. Peter Higginbotham suggests that the total number of deaths recorded at the Establishment over the early weeks of 1849 was 180, but the *Weekly Returns* for Weeks 1-4 of 1849 confirm only 146 deaths at the Establishment.[8] It is possible that reallocation proves a real issue, given that many of the children were removed from the Establishment about a week into the cholera outbreak; any mortality after removal would have been registered elsewhere. Regardless, the approximately 150 cholera deaths in the first four weeks of 1849 that we know occurred in the Establishment are nearly 75 percent of all recorded cholera deaths during those weeks. This suggests that while there were cases of cholera elsewhere in London, this wave of cholera cannot so much be considered a mini epidemic, but rather a localized – albeit severe – cholera outbreak.

While some of the 1848-49 mini epidemic can be explained with the outbreak at Mr. Drouet's Establishment for Pauper Children, there was still a mini outbreak throughout London in the late autumn which preceded the 1849 outbreak. In a few months after the mini epidemic, cholera reappeared in the summer, this time taking a much greater toll on the city. Amid this

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[6] The Board of Health had ordered the school evacuated by mid-January, suggesting that children be returned to their home parishes. Brice and Fielding, "Dickens and the Tooting Disaster," pg. 231.
[7] Higginbotham, "Mr. Drouet's Establishment for Pauper Children, Tooting."
[8] Higginbotham, "Mr. Drouet's Establishment for Pauper Children, Tooting."

deadly wave, did the bulk of mortality remain in the south districts? Or did 1849's epidemic have its own unique geographical spread?

THE CHOLERA EPIDEMIC OF 1849

The cholera epidemic of 1849 was the longest of the three epidemics considered in this thesis. It lasted approximately twenty-five weeks – beginning Week 21 and ending in Week 46. While it is possible that this cholera epidemic lasted so long because of the mini epidemic which preceded it, it is unlikely given that the mini epidemic was so localized to Wandsworth, and specifically Mr. Douet's Establishment for Pauper Children.

To begin analyzing the geographic patterns of cholera in 1849, it is important to first get a sense of the scale of this epidemic. Figure 5 shows the number of cholera deaths per week, from Week 22 to Week 46.

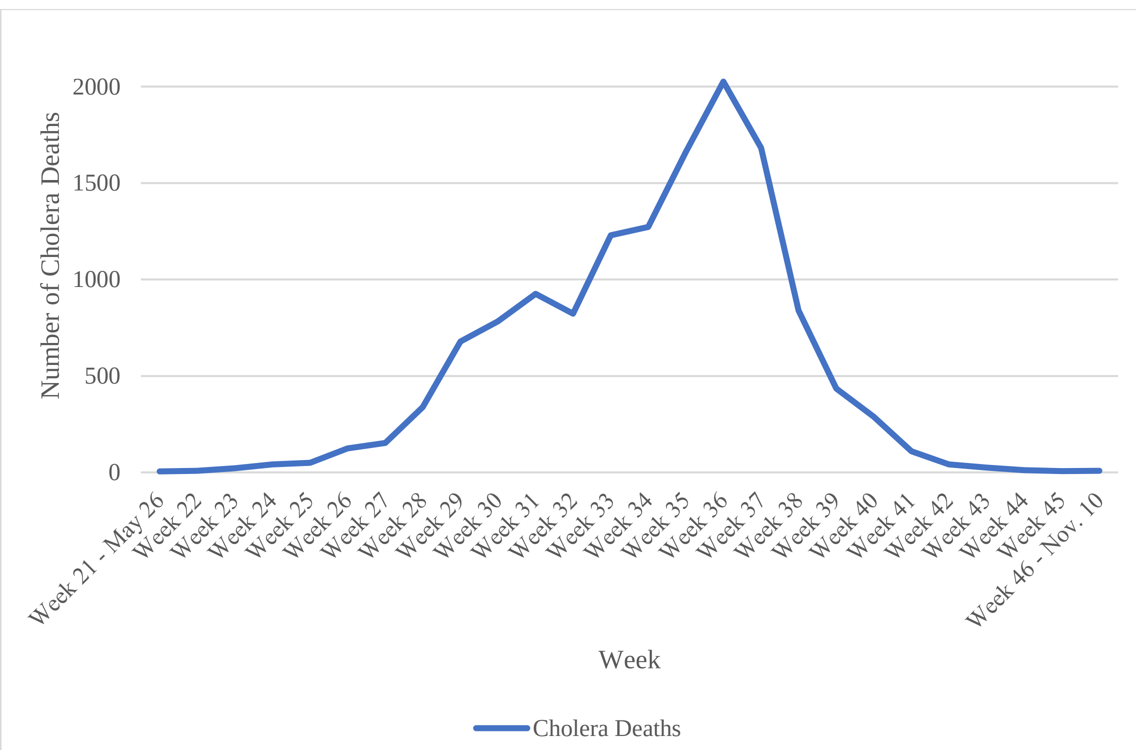

Figure 5.5 – 1849 weekly cholera deaths, Weeks 22-46, 1849

The mortality curve is straightforward, with only two slight dips in mortality before the peak in Week 36, which yielded 2,026 deaths.[9] The decline following Week 36 was rapid, with the number of deaths approximately reducing by half each week. This mortality curve shows the total number of cholera deaths registered each week. The following discussion will begin with geographic patterns at the district level before narrowing in on sub-district patterns. From sub-district patterns it is possible to look at administrative regions within each sub-district to get the fullest understanding of where cholera was in London. It is also important to note that the following discussion will consider a sub-section of the mortality data. At the beginning, when looking at broad district patterns, the focus will be on data from the entire epidemic, Weeks 21 to 46; as the geographic patterns narrow, as will the weeks considered. This approach, which begins at a macro scale and slowly progresses to a micro scale, is intended to provide the best overview of geographic patterns and dismantles the big picture to show the more localized mortality patterns.

DISTRICT MORTALITY PATTERNS

Perhaps the easiest way to understand district mortality is to consider at the weekly mortality patterns for each district. Figure 5.6 shows the number of cholera deaths per district per week.

[9] The decreases were minor – 103 deaths between Weeks 31 and 32, and 365 deaths between Weeks 33 and 34.

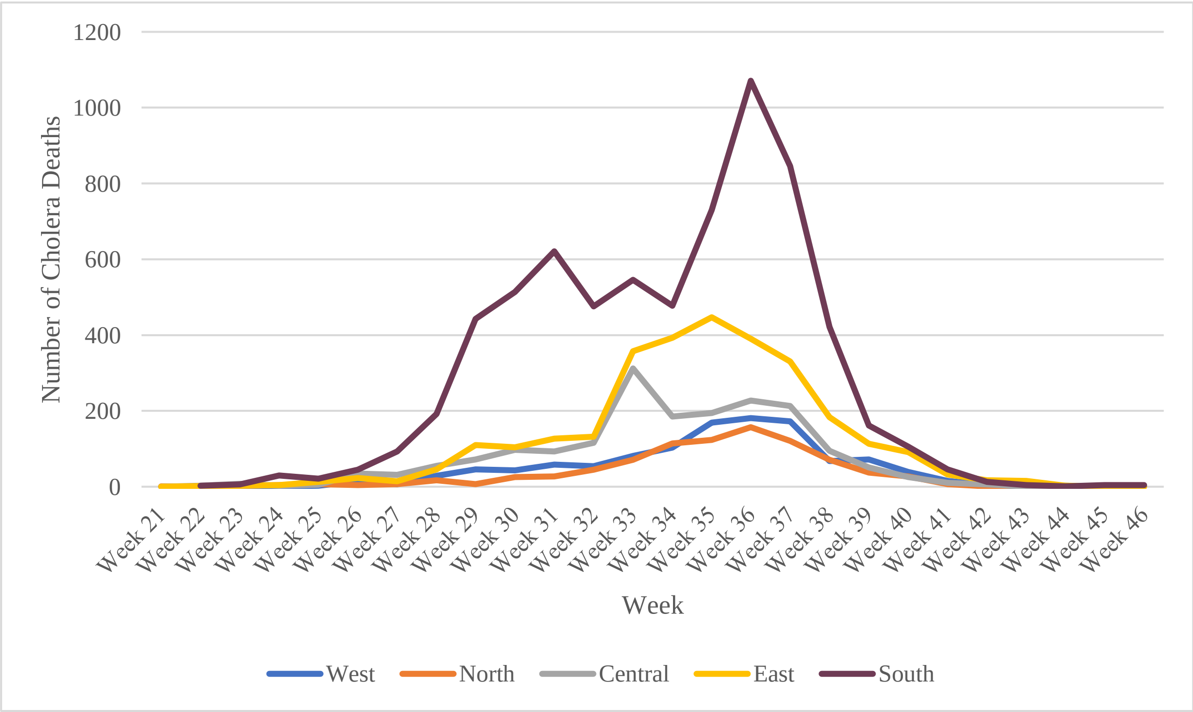

Figure 5.6 – 1849 weekly district cholera mortality, Weeks 21-46, 1849

Much like the 1848 mini epidemic, the south district contributed the highest number of cholera deaths during the 1849 epidemic. Consider Figure 5.7, which compares the total number of weekly cholera deaths from all districts to the weekly number of cholera deaths registered in the south district.

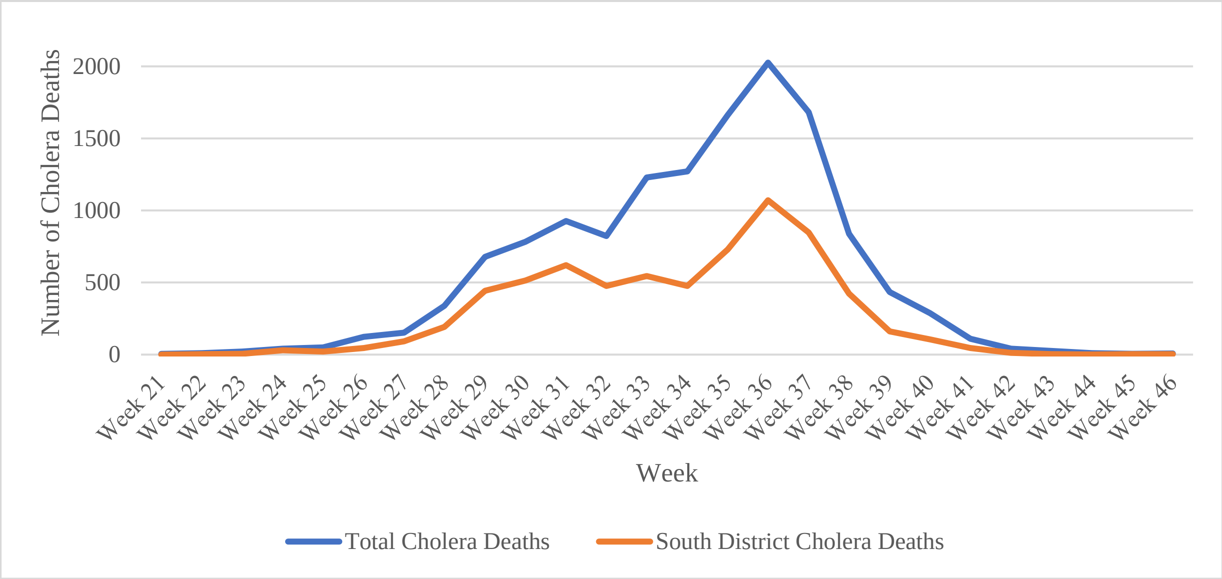

Figure 5.7 – 1849 weekly cholera deaths, Weeks 21-46, compared to all cholera deaths

The mortality curve for the entire cholera epidemic (in blue) and the line which shows cholera deaths in the south district (in orange) are almost identical; in the peak of the epidemic (Week 36), the south district contributed approximately half the number of all cholera deaths. While the discussion below will examine the south district's mortality patterns in greater detail, the mortality patterns outside the south district deserve further investigation. For example, consider what percentage of each week's cholera deaths occurred outside of the south district, shown in Figure 5.8.

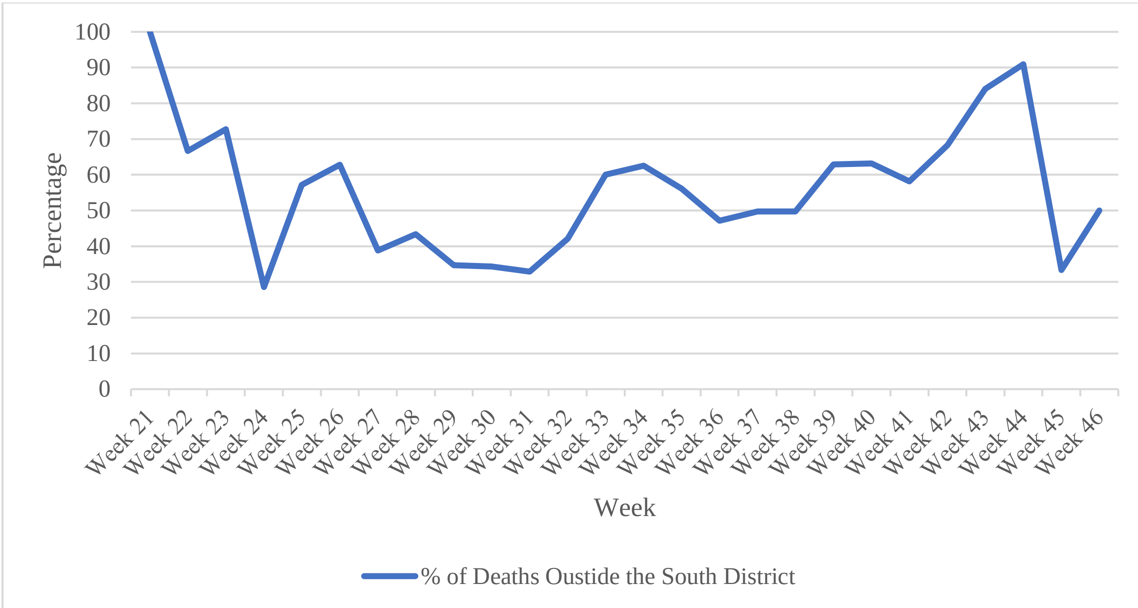

Figure 5.8 – Percent of cholera deaths outside the south district, Weeks 21-46, 1849. It is worth noting, however, that in many weeks, the total number of cholera deaths outside the south district was minimal. For example, while Week 21 had 100 percent of cholera deaths occurring outside the south district, the total number of cholera deaths was only five.

Figure 5.8 shows is that even though the south district experienced the highest number of cholera deaths, there were occasional weeks when the south had little bearing on cholera mortality figures at all. Out of the twenty-five weeks of the 1849 epidemic, thirteen of them had mortality patterns where at least 50 percent of the week's cholera deaths occurred *outside* the south district. For example, in Week 21, none of the cholera deaths registered occurred in the south district, while in Week 36, the height of the epidemic, only 53 percent of all cholera deaths took place in the south districts.

Did the south truly feel the brunt of this epidemic, or is the data skewed due to geographic area and its corresponding population? Using the *Weekly Returns of Births and Deaths in London*, it is possible to calculate the population density per district, which helps evaluate how evenly distributed the populations were across the districts. The west district had a population density of 17,511 people per square mile; the north, 18,369; central, 133,643; the east, 44,667;

and the south, 7,603. Despite its vast size and small population density, the south still contributed the highest number of cholera deaths during the 1849 epidemic, which raises its own questions – mainly, how did cholera claim so many people in the area they were supposedly had most space? Would people not be more at risk of cholera if they lived in the highly crowded central district? What was it about the area south of the Thames that made it so vulnerable to infectious cholera? These questions will be discussed later in the chapter when our focus shifts to the mortality patterns in the south district.

Looking beyond the south district, the mortality patterns within the other four districts still bears mention, even if briefly. Figure 5.9 shows a breakdown of district cholera mortality, excluding mortality figures from the south district.

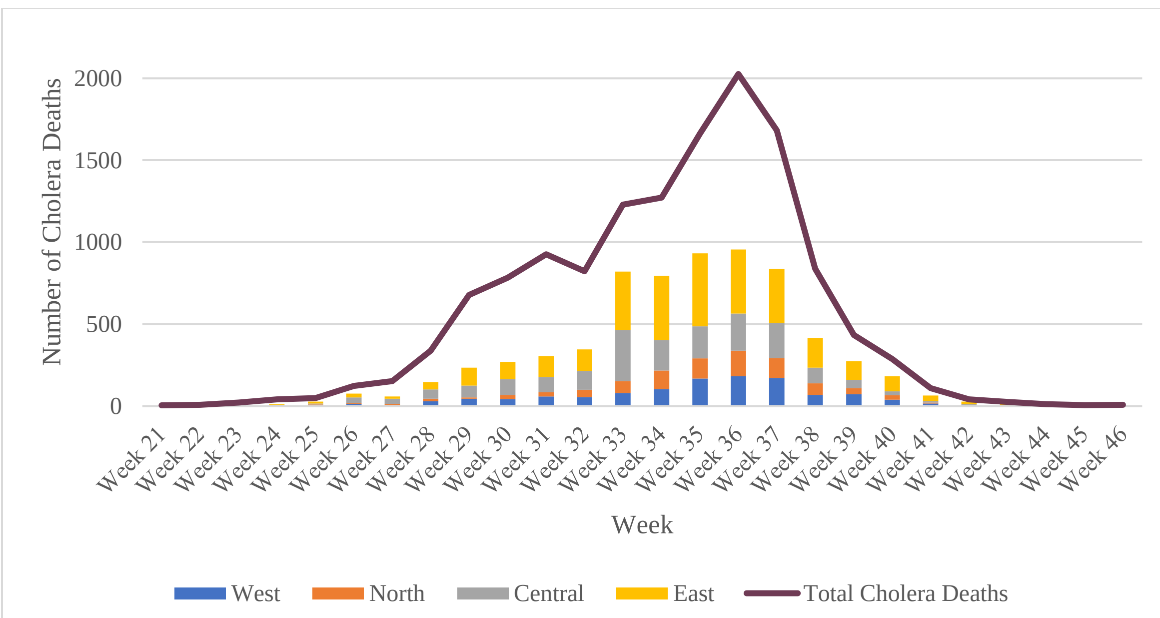

Figure 5.9 – 1849 Weekly comparison of west, north, central, and east district cholera mortality

From this graph, it appears that the east district was the second deadliest district int terms of cholera mortality, followed by the north and central districts. The west district, which was the wealthiest, tended to have the lowest number of cholera deaths.[10] The next section will further deconstruct the mortality patterns by focusing on sub-district mortality patterns.

SUB-DISTRICT MORTALITY PATTERNS

The discussion above clearly shows that the south district, even with its lower population density, experienced the highest number of cholera deaths during the 1849 epidemic. This section will look specifically at sub-district patterns across London to examine whether there were more localized cholera mortality patterns. In addition, this section explores if there was any singular sub-district in the south which bore the brunt of the mortality, or if the high mortality in the south was spread between multiple sub-districts.

Figure 5.10 shows the number of weekly deaths per sub-district for Weeks 21 to 46. The sub-districts with the highest mortality are Lambeth (South); Newington (South); St. George, Southwark (South); and Bermondsey (South). Not surprisingly, these are all in the south district and will be discussed in more detail later in the chapter. However, looking at the remaining sub-districts, the ones with the highest mortality are: Clerkenwell (central); Shoreditch (east); and Bethnal Green (east).[11]

[10] Of course, this was not always true, but the west, north, and central districts constantly competed for the title of least deadly district. The south and east districts almost always were the top two deadly districts for cholera.
[11] For a magnified version of these graphs, see Appendix B.

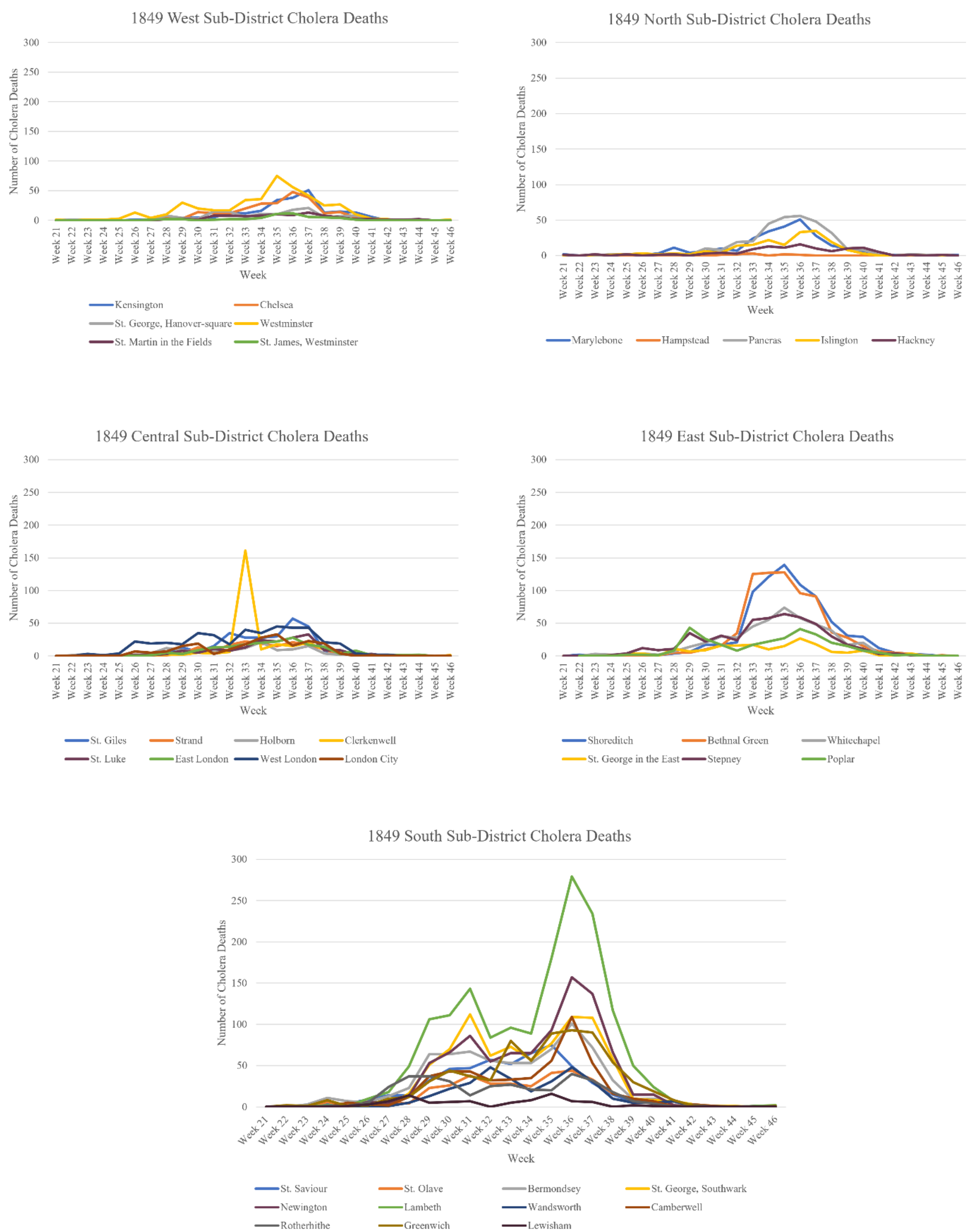

Figure 5.10 – Comparison of 1849 sub-district cholera deaths

Clerkenwell, Shoreditch, and Benthal Green were the only sub-districts outside of the south district which saw more than one-hundred deaths in any given week. There are a handful of sub-districts which had between fifty and seventy-five deaths (Westminster and Kensington in the west; Pancras and Marylebone in the north; St. Giles in central; Stepney and Whitechapel in the east), but most of the sub-districts north of the Thames experienced relatively low weekly mortality rates from cholera during the 1849 epidemic. Figure 5.11 shows a map of London's sub-districts with the total number of cholera deaths experienced by each sub-district from Weeks 21 to 46, inclusive.

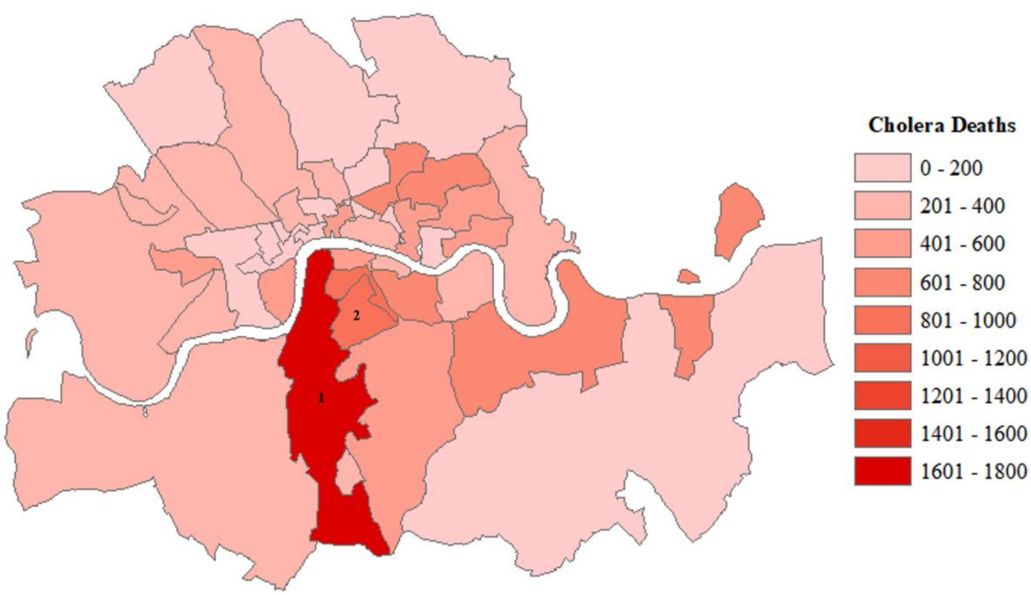

Figure 5.11 – Total number of cholera deaths in each sub-district, Weeks 21-46 inclusive, 1849

Lambeth (1) experienced the highest number of cholera deaths at 1,606. By comparison, the second highest sub-district was Newington (2), with 903 cholera deaths, which highlights how significant Lambeth's cholera mortality was compared to the rest of London.

Of course, looking at the crude number of cholera deaths is only one of two ways to evaluate cholera's mortality. The other way is to evaluate the number of cholera deaths per one thousand residents, which accounts for the varying population densities of the sub-districts. This comparison accounts for population differences, an important factor when evaluating a sub-district like Stepney, with its 107,000 residents, against a sub-district like Rotherhithe, with its 13,894 residents. Figure 5.12 below shows a comparison of population density per sub-district and the number of cholera deaths per one thousand residents per sub-district in Week 36, which was the height of the epidemic.

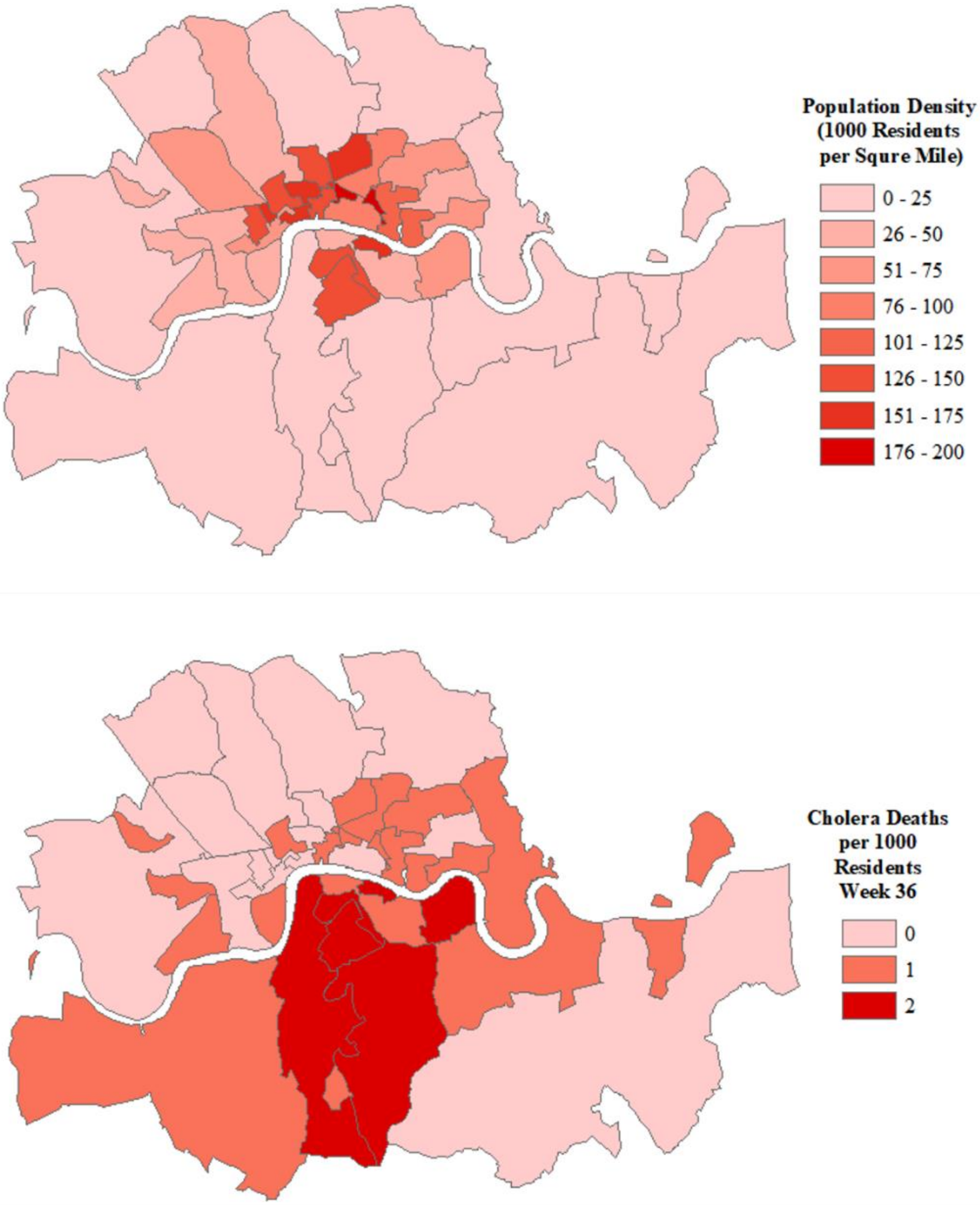

Figure 5.12 – Comparison of population density and cholera deaths per 1000 residents, Week 36, 1849. Note the change in what the different colours mean in each image. In the top image, the darker colours indicate a higher population density. In the bottom image, the darker colours represent more deaths per 1000 residents (a higher mortality rate). The lightest colour in the bottom image, which is 0, means that there were no cholera deaths in those sub-districts.

The map shows two patterns. First, it shows that the sub-districts in the centre of London – particularly those bordering the Thames – had the highest population density. This is not surprising, as the Thames was often considered the lifeline of London's economy. Second, this map shows that it was really the south sub-districts which experienced the highest number of cholera deaths per one thousand inhabitants. This is easily explainable – both sub-districts had relatively small populations (Bermondsey housed 39,672 and Rotherhithe 13,159) and a high number of cholera deaths.

Crude deaths provide misleading pictures of the impact of urban epidemics, since they may be influenced by the presence of public institutions such as hospital, asylums, and prisons. Institutions may have housed large numbers of people not native to that sub-district. Consequently, these institutions present a challenge when tallying mortality rates and geographic patterns because the deaths are recorded within the institutions. However, disease may well have been contracted elsewhere. This is particularly true in hospitals, as cholera patients were admitted after the disease presented itself. Institutions in each sub-district thus have the potential to drastically alter the mortality patterns, especially if there were several of them clustered in one region – and even more so if that region was already densely populated. The rest of the chapter will address the dichotomy between the total number of cholera deaths and the figures which account for social factors, beginning with the patterns in the south district.

The South District and Cholera

Having confirmed that the south district experienced the highest number of cholera deaths during the epidemic, it is necessarily to break down the mortality patterns further within the district and sub-districts. There are two ways of doing this: narrowing the timeframe considered and by looking at specific sub-districts and their individual neighbourhoods. To begin, let us consider Weeks 30 to 40, inclusive, and the sub-districts of Lambeth; Newington; St. George, Southwark; Camberwell; Bermondsey; and Greenwich.[12] These six sub-districts, for the ten-week period, made up approximately 87 percent of all cholera deaths in the south district, and nearly 40 percent of deaths from all causes in London.[13] These numbers show how much the south district contributed to the cholera mortality between Weeks 30 and 40, but also how concentrated the cholera deaths were within the district. Figure 5.13 shows two different aspects of this data set. First, it shows each sub-district as a percentage of the total number of cholera deaths within the six sub-districts for each week; second, the line shows the total number of cholera deaths in the six sub-districts during each week. This figure is particularly useful in understanding the movement of cholera; looking at how the percentages changes gives an indication if cholera was growing in a specific sub-district, or if the disease had spread somewhere else.

[12] These sub-districts were selected because Lambeth, Newington, St. George Southwark, Camberwell, Bermondsey, and Greenwich were the sub-districts with the highest mortality over the course of the entire epidemic.
[13] There were 4,878 cholera deaths in those six sub-districts; the south district had 6,287 cholera deaths; London had 12,477 cholera deaths.

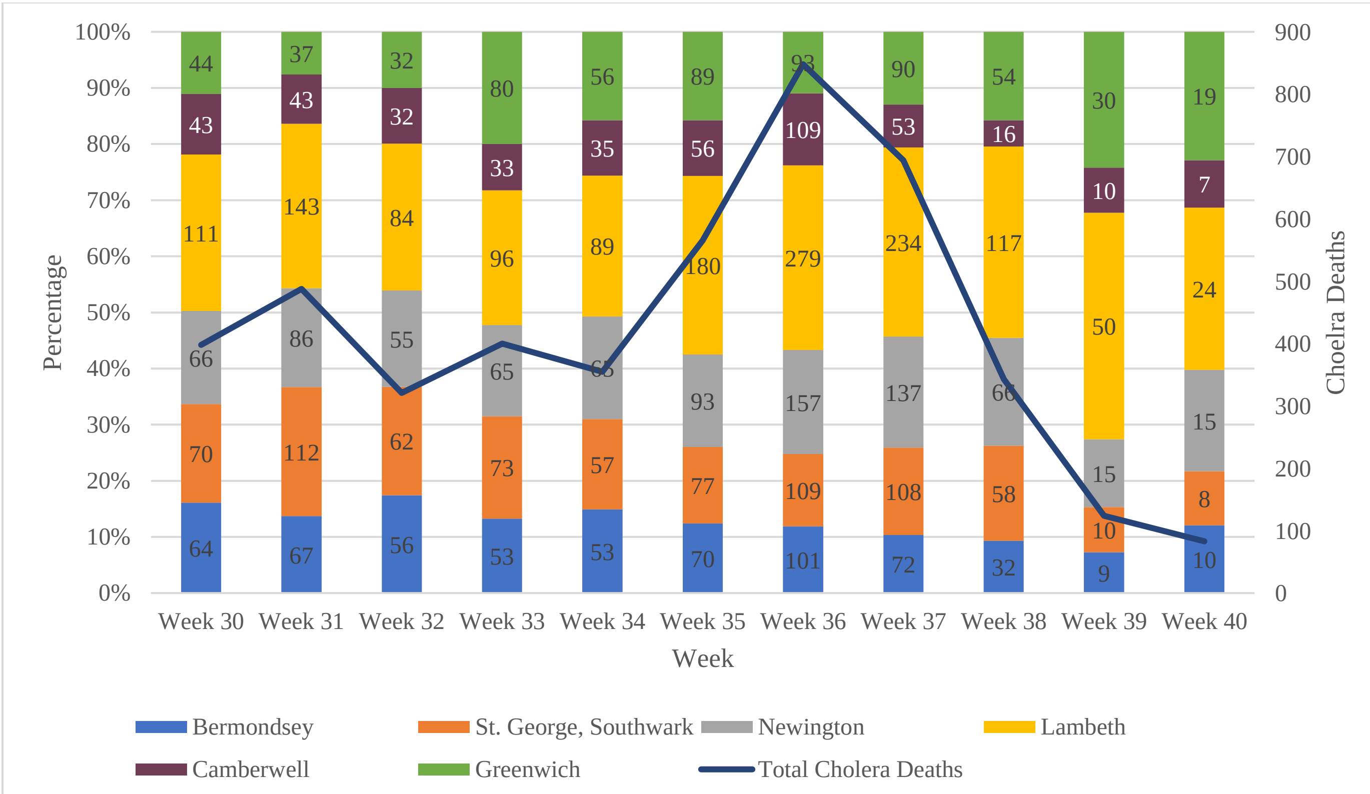

Figure 5.13 – South sub-district cholera deaths, Weeks 30-40, 1849

This figure shows several mortality patterns and the variations in the weekly percentage of each sub-district. However, even with these variations, there exists a similarity from week-to-week, with a few notable exceptions. Weeks 31, 33, and 36 onwards excluded, Greenwich and Camberwell offered the least number of deaths most weeks – usually between 9 and 11 percent; Newington and Bermondsey also had comparable numbers most weeks – between 13 and 18 percent; St. George, Southwark presented slightly higher percentages, but Lambeth consistently had the highest percentage of deaths per week.

Figure 5.14 shows the concentration of cholera deaths in Lambeth – upwards of one hundred deaths more than that occurred in Newington.

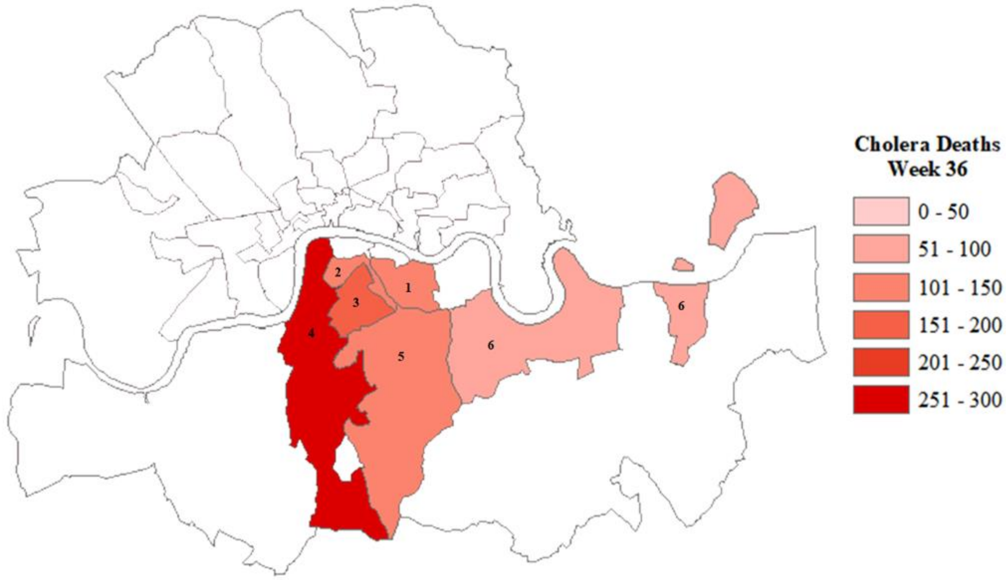

Figure 5.14 – Week 36 cholera deaths with a focus on Bermondsey (1), St. George, Southwark (2), Newington (3), Lambeth (4), Camberwell (5), Greenwich (6)

Figures 5.13 and 5.14 are useful for understanding the breakdown of cholera deaths, though they offer different information. While Figure 5.13 shows the breakdown of cholera mortality as a percentage between sub-districts, Figure 5.14 shows the crude number of cholera deaths. Together, they show that Lambeth was the deadliest sub-district over the course of 1849, and indeed, the most lethal sub-district throughout all of London during the entire epidemic in terms of number of cholera deaths.

Figure 5.13 also provides insight into the patterns of decline past Week 36. The two-week decline in Weeks 37 and 38 was more about a smaller total number of cholera deaths than any real geographic shift among the sub-districts. The patterns do change in Week 39, however. Drastic drops in mortality in Newington and St. George, Southwark were coupled with large increases in the number of deaths in Lambeth and Greenwich. It is important to remember that while the percentages may have increased, the overall number of cholera deaths was abating. So, while Lambeth's percentage jumped from thirty-four to forty, the crude number of deaths decreased from 117 to fifty. The same is true for St. George, Southwark, which saw a decrease from fifty-eight to ten.

The same question discussed at the district level must be also be asked for the sub-districts: does population density make a difference in evaluating the sub-district mortality rates? The 1848 *Weekly Return of Births and Deaths* reports the area of each sub-district in English Standard Acres. Table 5.1 below shows the area of each sub-district in acres, square miles, presents the population estimated in mid-1849, and the population density:

Sub-District	**Area (Acres)**	**Area (Square Miles)**	**Population (Estimated for mid-1849)**	**Population Density (1000s of residents per Square Mile)**	**Cholera Deaths in Week 36**	**Cholera Deaths per 1000 Residents, Week 36**
Bermondsey	688	1.08	45,500	42	101	2.2
St. George, Southwark[14]	282	.44	50,900	116	109	2.1
Newington	624	.98	63,075	64	157	2.5
Lambeth	4015	6.27	134,768	21	279	2.0
Camberwell	4342	6.78	51,704	8	109	2.1
Greenwich	5367	8.39	95,954	11	93	.97

Table 5.1 – Comparison of geographic area, population, population density, and cholera mortality in Week 36 for select south sub-districts. Note that the population density is presented as 1000s of residents per square mile, rounded up to the nearest whole number.

[14] The area reported in the *Weekly Report* for St. George, Southwark includes the area of St. Saviour, Southwark and St. Olave, Southwark. The area of St. George, Southwark was calculated using a ratio of the areas the sub-districts on the map from Figure 5.12.

Lambeth, despite having the highest number of cholera deaths overall, had one the lowest population densities and the second lowest death rate per one thousand residents. Greenwich had a very low number of cholera deaths per one thousand residents, which makes sense given its sheer size and relatively low population density. Interestingly, while Bermondsey had nearly twice the population density compared to Greenwich, the two sub-districts registered nearly the same number of cholera deaths. This suggests that population density may not have had a significant impact in preventing cholera deaths; with nearly eight times as much geographical space and half the population as Bermondsey, Greenwich did not have a correspondingly low number of cholera deaths.[15] Lambeth's cholera death rate per one thousand singles it out for further discussion.

CHOLERA IN LAMBETH

Lambeth was divided into eight neighbourhoods: Waterloo Road 1st Part; Waterloo Road 2nd Part; Lambeth Church 1st Part; Lambeth Church 2nd Part; Kennington 1st Part; Kennington 2nd Part; Brixton; and Norwood. As Figure 5.15 indicates, the population density of each neighbourhood varied considerably:

[15] This is where it is important to look at neighbourhood mortality patterns, as it is possible that Greenwich's cholera outbreak was very localized, thus suggesting the impact of a highly populated, albeit local, neighbourhood. Much like the Establishment for Poor Children, one institution or street could increase the cholera mortality figures for the entire sub-district even if the majority of the sub-district experienced few to no cholera cases.

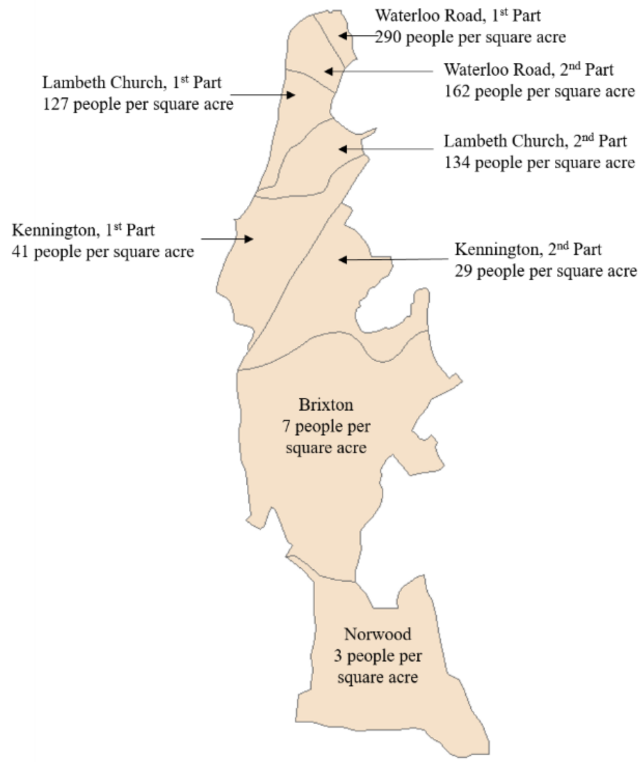

Figure 5.15 – Lambeth neighbourhoods

The population density patterns in Lambeth correspond with the general population density patterns for London at the time. As the neighbourhoods were farther away from the Thames, the population density decreased due to a smaller population in a larger, more rural area. The closer to the Thames a neighbourhood was, the more densely populated it was. The same was true for how close to the center of London a neighbourhood was. For example, Waterloo Road 1st and 2nd, Lambeth Church 1st and 2nd, and Kennington 1st all bordered the Thames, but Waterloo Road 1st was opposite to Westminster, arguably one of the most important neighbourhoods in London in terms of government and commerce. Despite being along the Thames, neighbourhoods which were further out from London's centre had a lower population density; however, even with the lower population density, these neighbourhoods were still relatively developed and urban as the Thames provided the opportunity for commercial and industrial activity.

We already know that Lambeth was one of the hardest hit sub-districts in London during the summer of 1849, but what about within the sub-district? Which neighbourhoods experienced the real strain of cholera, and which were lucky enough to escape relatively unaffected, registering minimal, if any, cholera deaths? What could explain the patterns of mortality between these neighbouring regions?

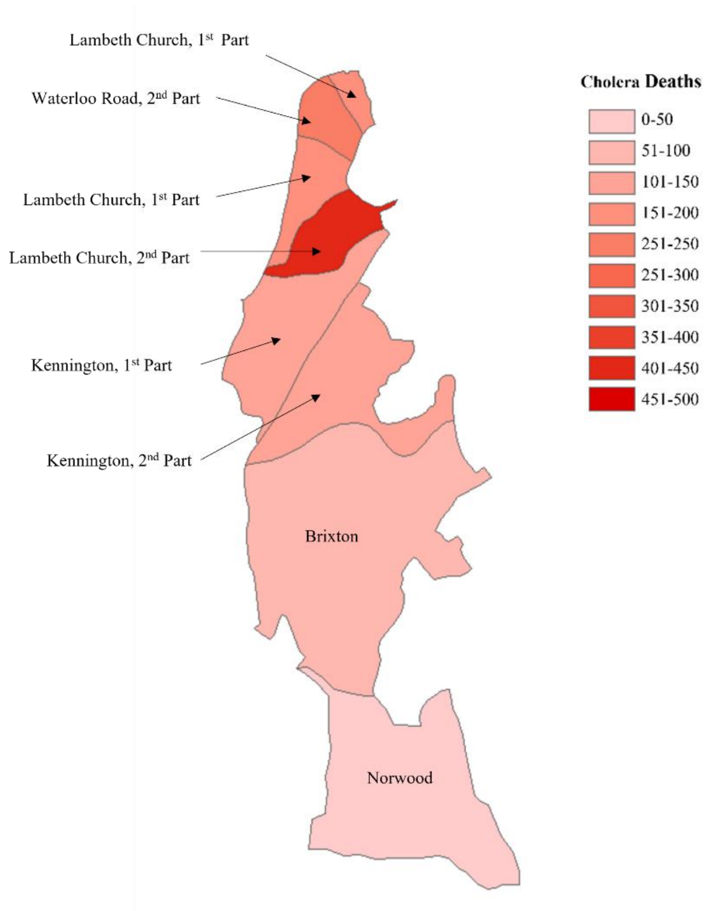

Figure 5.16 – Cholera deaths in Lambeth neighbourhoods, Weeks 30-40, 1849

Figure 5.16 shows the total number of cholera deaths in each neighbourhood in Lambeth between Weeks 30 and 40, inclusive. Because of their lower population density, Brixton and Norwood had a relatively low number of cholera deaths. This is not surprising, given these neighbourhoods offered more space per person, as well as distance from the Thames.[16] In Norwood, there were two cholera deaths, while Brixton totaled seventy-two. Kennington 1st and 2nd were similar, both between one hundred and twenty and one hundred and fifty cholera deaths. The three northern-most neighbourhoods, Waterloo Road 1st and 2nd, plus Lambeth Church 1st, were also similar, ranging from one hundred and eighty to just over two hundred cholera deaths. By far the neighbourhood with the most deaths was Lambeth Church 2nd, with an extraordinary 439 cholera deaths over the ten-week period, and 544 cholera deaths over the entire year. Interestingly, this neighbourhood had very little contact with the Thames, bordering it only along Vauxhall Bridge.[17]

The figure below breaks down cholera deaths into a comparison between Weeks 35, 36, and 37 – the week before the peak, the peak itself, and the beginning of the decline.

[16] While difficult for commerce and employability, distance from the Thames was often a blessing in disguise when it came to cholera and other water-borne diseases.

[17] It is worth noting that when the number of cholera deaths in the Lambeth neighbourhoods is adjusted to be per 1,000 residents, the mortality pattern does not change. Waterloo Road, 1st Part had 13 cholera deaths per 1,000 residents; Waterloo Road, 2nd Part had 12; Lambeth Church, 1st Part, 10; Lambeth Church, 2nd Part, 19; Kennington, 1st Part, 9; Kennington 2nd Part, 9; Brixton, 7; and Norwood, 1. This suggests that during the 1849 cholera epidemic in Lambeth, neither the distance from the Thames nor the population density made an impact in the mortality patterns, and that Lambeth Church 2nd was the deadliest neighbourhood despite its proximity to the river or its population density.

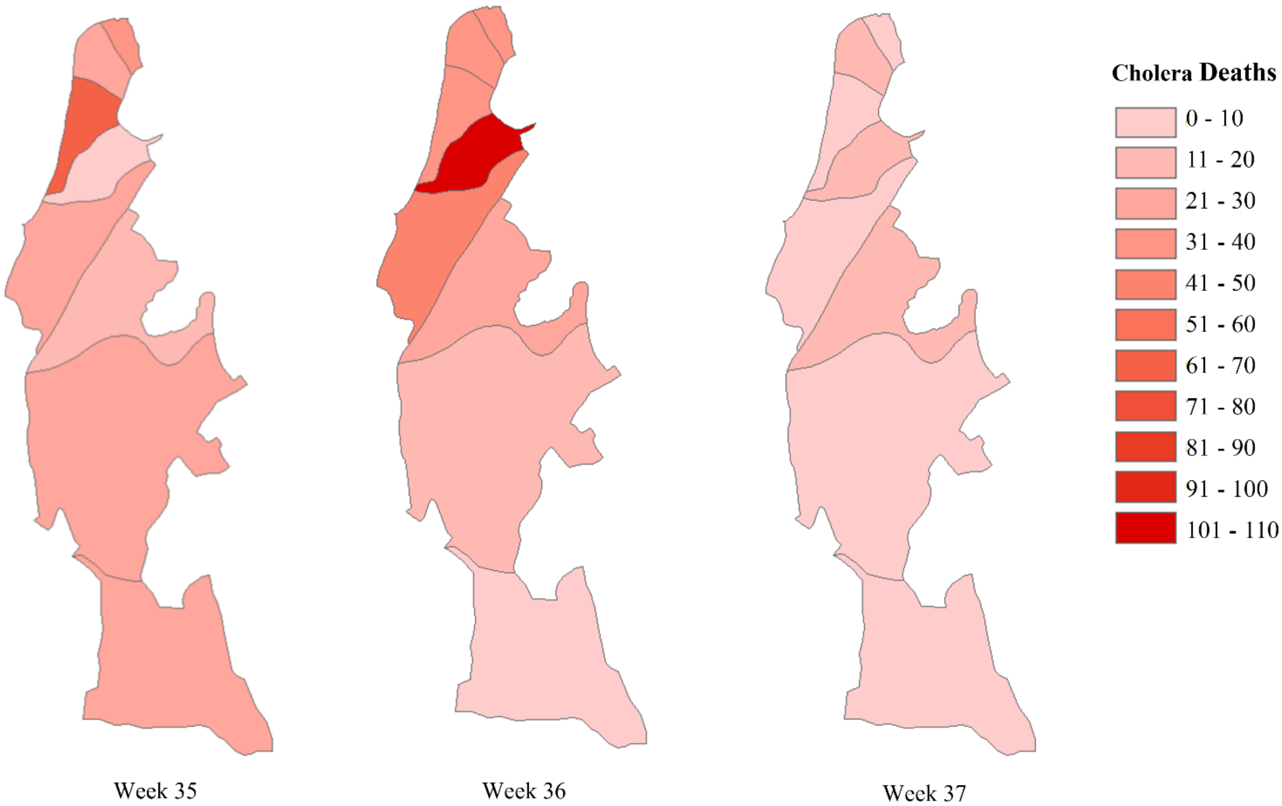

Figure 5.17 – Comparison of cholera deaths in Lambeth's neighbourhoods, Weeks 35, 36, and 37, 1849

From a weekly perspective, the patterns of mortality remain consistent: Lambeth Church 2nd continually had the highest mortality numbers, usually more than double the next highest neighbourhood.[18]

[18] Interestingly, the neighbourhood with the second highest mortality figures changed each week. In Week 36, it was Kennington 1st; Week 37, Kennington 2nd; and Week 38, Lambeth 1st.

Figure 5.18 – Lambeth Church 2nd began at Vauxhall Bridge and continued along Upper and Lower Kennington Lane, and onto Newington Butts until Pleasant Place. Pleasant Place ran east to west and became Brook Street just below Bethlehem Lunatic Hospital (sic). The boundary line crossed Kennington Road onto the end of St. Alban's street, crossing China Walk to Lambeth Walk. Lambeth Walk ran down Prince Street, and the boundary line continued South along Vauxhall Walk, curving around to join High Street. High Street went South back to Vauxhall Bridge.

Before considering a breakdown of cholera deaths by street, it is important to identify any institutions which existed in neighbourhoods which might account for the high mortality figures. Lambeth Church 2nd was home to the Lambeth Union Workhouse. Situated on Princes Road, it was first opened in 1726, and after the New Poor Law of 1834, became the main workhouse for the Lambeth Poor Law Parish, which served the parishes of St. Mary, Lambeth, as well as St.

John, Waterloo; Kennington; Brixton; and Norwood.[19] There are two ways to approach the deaths reported within the workhouse: first, by using the available data to paint at least a partial picture of the mortality patterns as they existed. Second, using a standardized mortality ratio [SMR] as discussed in the Introduction provides a better understanding of just the number of cholera deaths in an institution compared to the overall mortality patterns of the district. It is fortunate that Lambeth Church 2nd has adequate records for both of these calculations.

First, consider the specific numbers as reported in the *Weekly Returns* and the *Report on the Mortality of Cholera in England*. The latter states that Lambeth Church 2nd saw 544 cholera deaths, and, of that number, 161 cholera deaths occurred in the Lambeth Union workhouse. The Lambeth Union workhouse was "formed [from] 8 Registrars' districts … [and] each contributed more or less to the 161 deaths in the workhouse."[20] So while the workhouse reported 161 cholera deaths, there is already an understanding that not all these victims originated in Lambeth Church 2nd. According to the *Report on the Mortality of Cholera in England*, Lambeth Church 2nd saw 383 local cases of cholera deaths, meaning they were not brought into the neighbourhood from another neighbourhood. This implies that nearly 30 percent of Lambeth Church 2nd's cholera mortality came from the workhouse over the course of the 1849 epidemic. However, consider that Lambeth Church 2nd registered 439 cholera deaths between Weeks 30 and 40; if we remove the 30 percent we know occurred in the workhouse, Lambeth Church 2nd still experienced 307 cholera deaths, which is one hundred and one deaths more than the next deadly neighbourhood, Waterloo Road 2nd. This suggests that even though the presence of an institution inflated the

[19] Peter Higginbotham, "Lambeth (Parish of St. Mary), Surrey, London," *The Workhouse: The Story of an Institution*, available online at: http://www.workhouses.org.uk/Lambeth/.
[20] *Report on the Mortality of Cholera in England, 1848-1849* (London, 1852), pg. 214.

number of cholera deaths in the neighbourhood, Lambeth Church 2nd experienced cholera to a higher degree than the surrounding neighbourhoods.

Week	**Total Cholera Deaths**	**Cholera Deaths in the Workhouse**	**Percentage of Total Cholera Deaths that Occurred in the Workhouse**
35	65	15	23%
36	103	27	26%
37	17	9	53%
Total	185	51	27%

Table 5.2 – A comparison of cholera deaths in the neighbourhood of Lambeth Church 2nd during Weeks 35, 36, and 37, including those that occurred in the Union workhouse located in that same neighbourhood. These are the numbers reported in the Weekly Returns of Births and Deaths *for these weeks. However, it is important to note that these reports are not complete, as the total number of cases reported both in and out of the workhouse total 291, which is only about 65 percent of all the deaths tallied during these weeks.*

As shown in Table 5.2, there is a discrepancy in the number of cholera deaths in the workhouse compared to the percentage of total cholera deaths which occurred in the workhouse. The reason the percentage of cholera deaths originating in the workhouse was so high in Week 37 was not because there was an extraordinary number of cholera deaths in the workhouse; the number is, relative to the week before, overwhelmingly low. The high percentage reflects the low number of recorded deaths in the rest of the neighbourhood. The total number of deaths between Weeks 35 and 37 inclusive was 185, and the number of reported cholera deaths in the workhouse was fifty-one, meaning *at minimum*, 28 percent of the cholera deaths registered in Lambeth Church 2nd came from within the workhouse. This minimum 28 percent for Weeks 35 through 37 is very close to the 30 percent figure which represents the known and confirmed percentage of cholera deaths which took place in the workhouse over the course of the entire epidemic, suggesting that these mortality figures, while not exhaustive, still provide a relatively good insight into mortality patterns within the workhouse.

Using the crude numbers and simple percentages provides an understanding of the relationship between workhouse cholera deaths and the cholera mortality patterns in Lambeth Church 2^{nd}, but how do these numbers and percentages compare with the SMR? The standardized mortality ratio is calculated as follows:

Observed deaths = the number of deaths in the institution

Expected deaths = (the number of deaths in the neighbourhood ÷ the population of neighbourhood) * the population of the institution

Applying this formula to Lambeth Church 2^{nd} produces the following figures.

Observed deaths = 161 deaths in Lambeth Union workhouse

Expected deaths = (544 cholera deaths in the neighbourhood ÷ 22,931 people in the neighbourhood based on the 1841 census) * 1,000, which was the population of the institution

SMR = (Observed / Expected) * 100

= (161 / 23.7) * 100

= 679

The SMR for the Lambeth Union workhouse is 679 percent, implying an excess of deaths due to the presence of an institution. To clarify, while the workhouse deaths made up approximately 30 percent of all cholera deaths in Lambeth Church 2^{nd}, comparatively, the workhouse experienced 679 percent more cholera deaths per person than the population of Lambeth Church 2^{nd}. The

SMR does not provide a lot of insight into the nature of the relationship between cholera mortality patterns in the workhouse compared to the neighbourhood, but it does imply that the institution contributed in a significant way to the mortality pattern of Lambeth Church 2nd. Recognizing that the workhouse on Princes-road greatly inflated the number of cholera deaths in the neighbourhood, street-level data allows for a closer look at the mortality patterns which originated in Lambeth Church 2nd. The image below shows a comparison of the street mortality for Weeks 35, 36, and 37.[21]

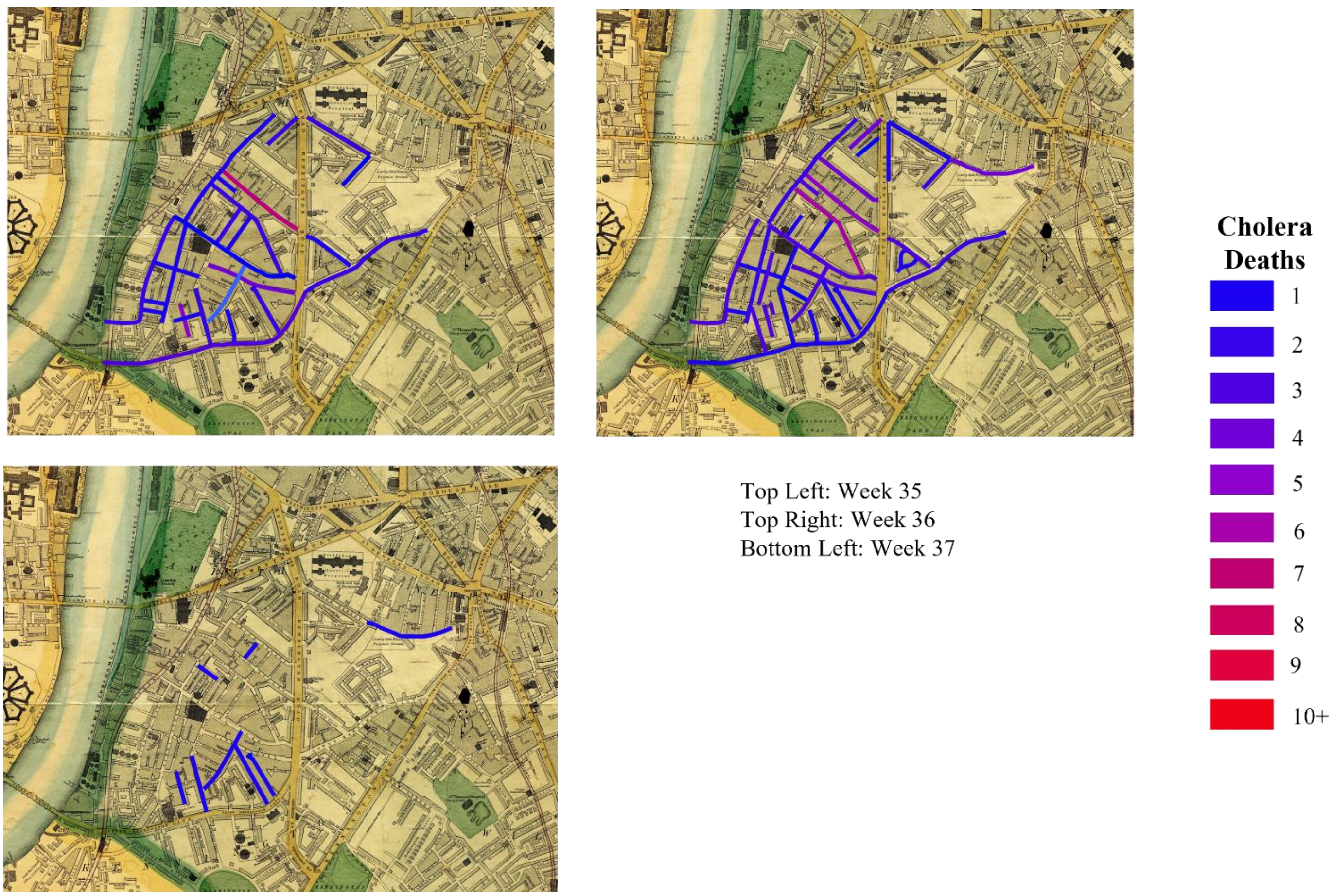

Figure 5.19 – Comparison of street-level mortality in Lambeth Church 2nd, Weeks 35, 36, and 37, 1849

[21] For a magnified version of these maps, see Appendix B.

Out of the three images above, Week 36 provides the most detailed break-down of street-level mortality. Regent Street registered the most deaths, six, followed by Pleasant Place and East Street with five cholera deaths. There were two streets which registered four deaths, five which recorded three deaths, ten with two deaths, and fifteen streets which registered only one cholera death. Looking at the breakdown in this light, it suggests that cholera in Lambeth Church 2nd was rarely concentrated on one street. Rather, the total number of deaths were spread over the entire neighbourhood. The same pattern was true a week before, in Week 35. Apart from East Street, Neville Street, Park Street, and New Street, all the streets registered only one or two cholera deaths.

Looking at the total number of cholera deaths between Week 35 and 37, there was one street which had most of cholera deaths, while the remaining deaths were widely spread over multiple streets. Figure 5.20 below shows the total number of cholera deaths over Lambeth Church 2nd's streets.

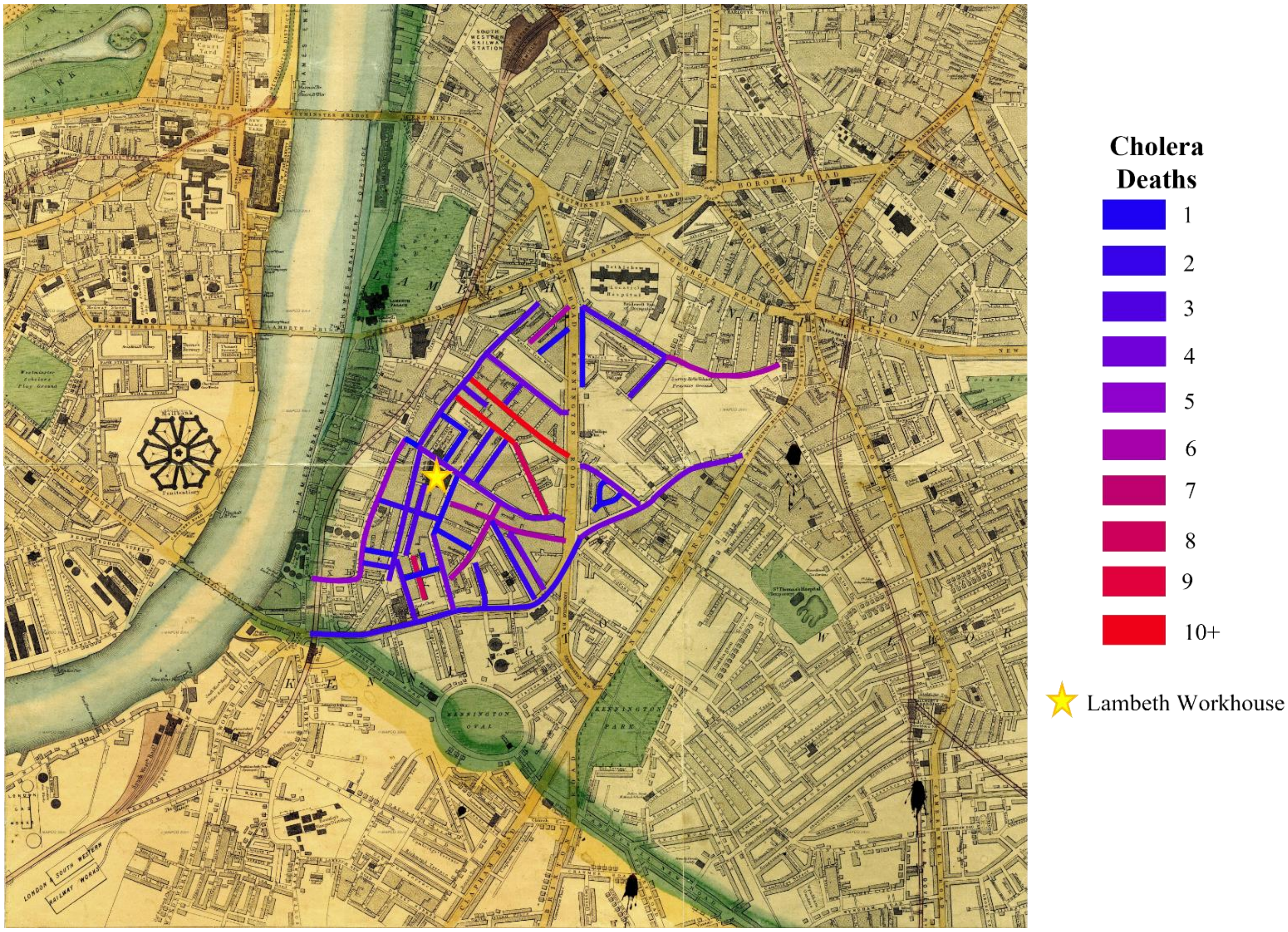

Figure 5.20 – Total cholera deaths in Lambeth Church 2nd from Weeks 35-37, 1849

East Street had the most cholera deaths collectively from Weeks 35 to 37, with twelve deaths. Neville Street and Regent Street each registered eight cholera deaths. East Street's deaths were all registered in Weeks 35 and 36; the same is true for Regent Street. Neville Street, however, registered cholera deaths in all three weeks. In fact, most streets were made up of a combination of two- or three-weeks worth of deaths. Out of the forty-one streets which registered cholera deaths in Lambeth Church 2nd, eleven of them only registered one cholera death, and sixteen of them had cholera deaths of which two or more deaths occurred in one single week. The rest of the streets' total number of cholera deaths were made up of at least two out of the three weeks.[22] This suggests that rather than being overrun by the epidemic, Lambeth Church 2nd's cholera experience in Weeks 36, 37, and 38 of 1849 was defined by a far-reaching but less intense spread of cholera deaths, which once again suggests that population density may have not posed as big a threat as initially believed.

Of course, this is only a brief cross-section of the entire epidemic. Looking at Weeks 30 to 40 inclusive, offers similar mortality patterns albeit on different streets. While Pleasant Place, Regent Street, and East Street were wrought with cholera over the ten weeks, the deadliest street was Wickham Street, with a total of nineteen deaths. East Street had seventeen, Regent Street had fifteen, New Street had fourteen, Princes Road had thirteen, Tyer and Park Streets both had twelve, Chester Place had eleven, Union Street had ten, and Pleasant Place had nine. However, these higher numbers must be contrasted with the total number of streets in Lambeth Church 2nd which registered cholera deaths. In the fifty-seven streets registered, thirty-five of them reported five or less cholera deaths over the ten-week period, and out of that thirty-five, only seven of them reported more than one cholera death in any given week. In other words, even streets which reported five cholera deaths over the ten weeks, most of those streets reported one cholera death per week for a total of five weeks. This again suggests that while cholera lingered, its potency as an epidemic disease was minimal.

The same pattern exists for streets with higher mortality figures. Wickham Street's nineteen cholera deaths were split over eight weeks, as were Princes Road's thirteen deaths and

[22] Union Street (four deaths in Week 36), St. Oswald's Place (three deaths in Week 36), Wickham Street (three deaths in Week 36), George Street (two deaths in Week 35), Hampshire Street (two deaths in Week 36), and Upper Kennington Lane (two deaths in Week 35) are the six streets whose total number of cholera deaths were more than one but still only occurred in one week. Barrett Street, Bolwell Terrace, Broad Street, Edward Street, Francis Street, George Street Vauxhall, Golden's place, Richmond Street, Tyer's Terrace, Walcot Place, and Wood Street all registered only one cholera death between Weeks 35 and 37.

Chester Place's eleven. East Street (seventeen deaths), Regent Street (fifteen deaths), New Street (fourteen deaths), Park Street (twelve deaths), Tyer Street (twelve deaths) were spread over seven weeks, Union Street (ten deaths) over six weeks, and Pleasant Place (nine deaths) over five weeks. Vauxhall Walk, which also registered a total of nine deaths was spread over four weeks. The higher the number of weeks which recorded cholera deaths, the more spaced-out cholera deaths were on any given street, and often there are groupings of mortality within these weeks. For example, Wickham Street experienced ten of its nineteen deaths in Weeks 30 and 31 (five each), and then a combination of weeks with one, two, or three deaths contributed to its total figure. The same is true for East Street, which totaled twelve deaths between Weeks 35 and 36 (seven and five respectively) and the other five weeks contributed one death each.

PUBLIC HEALTH IN LAMBETH

To fully assess the impact of public health efforts in Lambeth, it is important to recognize that while cholera was a concern for the local vestry boards (also called the Board of Guardians), the cholera epidemic did very little to instigate any significant change.[23] That is not to say that observations and reports were not made. However, the inability to properly respond to the public health threats cholera presented were largely due to a combination of a weak governing structure, which was not suited to such a large task, and a lack of statutory powers. London was excluded from the 1848 *Public Health Act*, which gave local boards the power and authority to implement changes concerning public health concerns, and the legal precedent for London's response to cholera was the 1846 *Nuisance Removal and Disease Prevention Act* (renewed in 1848), which relied on a hierarchical structure overseen by the General Board of Health. At the outset, this was

[23] Janet Roebuck, *Urban Development in 19th Century London: Lambeth, Battersea and Wandsworth, 1838-1888* (London: Phillimore, 1979), pg. 48.

a problem, given the *Act* required an order from the Privy Council to be effective. However, even with an order from the Privy Council, most local boards simply did not have the manpower to carry out the directions put forth by the General Board of Health.[24]

In response to the rising numbers of cholera, the General Board of Health issued several comprehensive measures to all the medical officers in London, who were overseen by the local Boards of Guardians. The *Nuisances and Contagious Diseases Act* gave the General Board of Health the authority to remove nuisances through cleaning streets and houses, as well as addressing any drainage issues and provide medical officers to respond the already-existing cases of disease.[25] These were heavily reflected in the two main responses by the General Board of Health, which were to implement sanitary inspections, including house-to-house visitations, and to require that the medical officers attend every suspected case of cholera to provide early treatment.

<u>Sanitary Inspections</u>

Sanitary inspections, which was mainly house-to-house visitation, were primarily a preventative tactic to identify local nuisances. Because cholera could usually be tracked across Europe before arriving in England, the emergence of cholera in 1848 was not entirely unexpected, which gave credence to this preventative approach. No systematic house-to-house visitation had ever been attempted in England, or even Europe, and the General Board of Health envisioned a system which ensured a comprehensive review of each district in London. Relying on a hierarchical structure, “the various districts of the metropolis ought to have been regarded as

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[24] Roebuck, *Urban Development in 19th Century London*, pgs. 49-50; Richard Grainger, *Appendix B: Sanitary Report on Epidemic Cholera as it Prevailed in London in 1848-1849* in *Report of the General Board of Health on the Epidemic Cholera of 1848 & 1849* (London, 1850), pg. 119.
[25] Grainger, *Appendix B*, pg. 122.

so many smaller towns," and each of these, ideally, were provided with "a medical superintendent, medical visitors, nurses, dispensaries open day and night, houses of refuge, and a limited number of hospitals judiciously placed in different parts of the metropolis."[26] Sanitary inspectors had six primary goals as set out by the General Board of Health: identify the regions most affected by cholera using the weekly returns of the Registrar General; list the precise addresses of cholera patients with intent to visit; visit the infected areas to ensure accuracy in the returns; receive reports of nuisances and ensure they are appropriated to the proper authorities and dealt with in a timely manner; submit daily reports to the General Board of Health; and identify any institutions (mostly large-scale employers) and evaluate their treatment plan in case of illness among their workers.[27] Ultimately, however, this system never came to fruition. Either the local boards ignored the advice of the General Board of Health altogether or there were so many delays in implementing a coherent system that cholera had already taken hold and therefore house-to-house visitation proved largely ineffective and was therefore not worth the time and effort to implement.

In Lambeth specifically, the orders issued by the General Board of Health were implemented to an unknown degree, but it is also worth noting that visitation to the different parts of the sub-district had, in theory, occurred about six months prior under a different government initiative. In 1847, Edwin Chadwick became the Royal Commissioner on London Sanitation and ordered a series of investigative reports about the sanitary conditions across London. It is likely that Chadwick saw this as an opportunity to further the argument that his 1842 *Report on the Sanitary Condition of the Labouring Population of Great Britain* proposed: a connection between health and sanitary living conditions. The reports commissioned by

[26] Grainger, *Appendix B*, pg. 146.
[27] Grainger, *Appendix B*, pgs. 147-149.

Chadwick took place during the first few months of 1848, and they were supposedly based on in-person visits and observations, though it is likely that some of the reports were falsified or plagiarized due to an overwhelming desire to avoid visiting certain areas of Lambeth.[28] The official title of the committee was the District Sanitary Sub Committees for Lambeth's Central Sanitary Committee, and Lambeth was broken into multiple regions to allow for sub-committees to investigate. While there does not exist a complete copy of these reports, there are surviving excerpts. These excerpts, along with reports of medical inspectors appointed by the General Board of Health, paint a picture of the sanitary state of Lambeth in 1848 and 1849.[29]

The process of sanitary inspection was ongoing and lasted well into 1849. The longer cholera lingered, the more people began paying attention to the state of affairs of their neighbourhood streets. One of the most compelling reports for Lambeth is an article that was printed in the *Times* on July 24, 1849. It began by stating that there had recently been a sanitary inspection within the neighbourhood, and that "unless some speedy means be adopted for removing the pestilential smells occasion by the various obnoxious works carried on, the spread of the disease will be most fearful."[30] Throughout the reports and *Time* articles, there are two concerns which were continually discussed. First is the odour given off by the industries present in Lambeth. Vauxhall Gas Company had its main workhouse near Vauxhall Bridge and leading up to it was Upper and Lower Fore Street (see Figure 5.21 below).

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[28] Thomas, *The Lambeth Cholera Outbreak of 1848-1849*, pg. 131.
[29] Thomas, *The Lambeth Cholera Outbreak of 1848-1849*, pgs. 131-133.
[30] "The Cholera," *Times*, 24 July 1849, pg. 5.

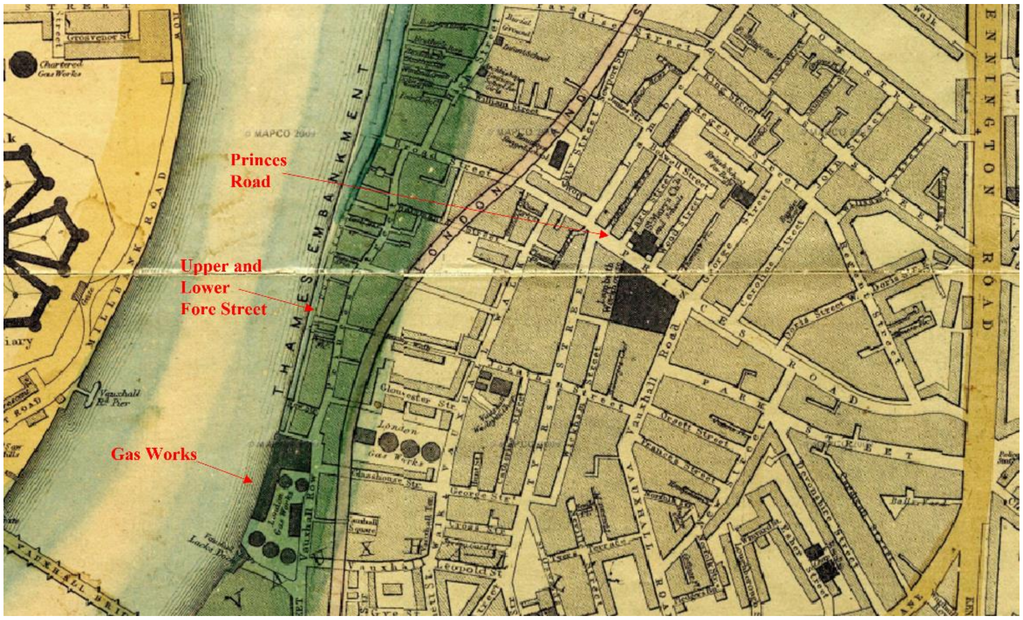

Figure 5.21 – A map showing the location of Upper and Lower Fore Street, the gas works, and Princes Road.

This street was notorious for its noxious smells coming from "bone-boilers, soap-makers, tallow-melters, oil-finera [*sic*], and other equally unwholesome trades."[31] Similarly, Princes Road was filled with noxious odours, including those from Jared Hunt and John Hunt, who were bone-boilers, plus Hick's patent grease-works. The smell from these trades was observed not only along the lanes nearby, but also "thousands who pass along the river in steam-boats, as well as passengers by the South Western Railway," which had its main station just south of Vauxhall Bridge.[32] Residents of Lambeth complained heartily about this particular nuisance, stating that "when the bone-boilers are at work, which is almost every day, it is next to impossible for a stranger to pass through the streets without being compelled to vomit, such an effect the effluvium."[33] Those who tried to escape the stench using the steam-boats had little success: "there seems no escape from the nuisance, for whenever the wind sets across the river the stench

[31] "The Cholera," *Times*, 24 July 1849.
[32] A Working Man, "The State of Lambeth," *Times*, 3 September 1849, pg. 3.
[33] "The Cholera," *Times*, 24 July 1849.

is most abominable. On Friday afternoon last it was so bad that almost every person on board the steam-boat involuntarily put their handkerchiefs to their noses, and many complained bitterly that such a nuisance should be allowed."[34] It was not only the trades which filled Lambeth's streets which caused odours, though many believed these to be the worst. A noxious odour also stemmed from what the local residents called the River Effra, which was an uncovered drainage ditch. The particular ditch in question had been semi-covered by the old Commissioners of Sewers, but the portion of Lambeth remained untouched, causing residents to wonder why "Mr. Chadwick and the Court of Commissioners of Sewers are to be allowed to sacrifice the lives of the neighbourhood of South Lambeth either by their obstinacy or folly?"[35] As far as public nuisances were concerned, the residents of Lambeth had plenty about which to complain.

It was not only smells that were a problem in Lambeth; housing conditions were abysmal, there were no public washhouses, and the parochial burial ground became so busy with rise of cholera deaths that it had standing piles of corpses waiting for internment. The housing situation was arguably one of the worst in London, with many of the houses built hastily for the rapidly growing population. The houses were close to the Thames and lacked a solid foundation; worse, the street was built up in front of these buildings.[36] Not only did these houses have to contend with street runoff, but they were often in the Thames's tidal plain: "the tide from the Thames flows up to the doors, and when it recedes it leaves all the filth from its banks opposite the houses, the stench from which when it dries is fearful."[37] The housing situation was dire, with many homes housing multiple families. There were common privies, no public cisterns, few houses with drains, and in Princes Road, one house's cellar served as the "receptacle for dust,

[34] T.A., "The State of Lambeth," *Times*, 4 September 1849, pg. 5.
[35] An Inhabitant of South Lambeth, "Cholera," *Times*, 11 August 1849, pg. 8.
[36] Thomas, *The Lambeth Cholera Outbreak of 1848-1849*, pg. 133.
[37] "The Cholera," *Times*, July 24, 1849.

rotten vegetables, and the human excrement."[38] Compounding the housing situation was the fact there were no public washhouses. Some districts in London "had been made to erect baths and washhouses, and these establishments have been of incalculable benefit," and it was proposed by that because "there are very many dry arches unoccupied" from the South-Western railway, "could not some of these be procured and fitted up with troughs, &c., for washing, and the adjoining ones with the necessary apparatus for drying?" It was even suggested to select arches near the distilleries so the washhouses "might possibly be able to supply a considerable quantity of warm water."[39] In addition to overcrowded housing, the lack of water resources, and the overwhelming stench, was the concern of what to do with cholera's victims after they had died. The parochial burial ground in Lambeth was small, and yet "20, 30, or 40 bodies have been daily brought for internment in it."[40] These bodies spurred outcry not only about the sanctity of human life, but the consequences of the lack of ability to deal with the threat they posed: "A day, an hour, is of importance, for the consumption of human life is really fearful. How can we expect Almighty God to work a miracle in arresting this plague in answer to prayer if we do not fully do our duty in removing known causes of disease and death?"[41]

Citizens understood that "cleanliness" was the "best preservative against cholera, an indeed every disease of an epidemic or contagious kind" and did not hesitate to call out the vestry boards in Lambeth for their lack of action.[42] Pleas were made anonymously by, for example, "an inhabitant of South Lambeth," "conservator," and "a working man," as well as by known community figures. Robert Taylor was the one of the churchwardens in Lambeth, and he wrote a

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[38] The neighbourhood around this particular house consisted of about 800 people. "The Cholera," *Times*, 24 July 1849.
[39] T.A. "State of Lambeth," *Times*, 8 September 1849, pg. 7.
[40] Conservator, "Cholera in Lambeth," *Times*, 14 September 1849, pg. 3.
[41] Conservator, "Cholera in Lambeth," *Times*, 14 September 1849.
[42] T.A. "State of Lambeth," *Times*, 8 September 1849.

petition to the *Times* asking for donations to help the parish. September 19, 1849 had been declared a "day of prayer and humiliation [*sic*]" for the parish by the Bishop of Winchester. Similarly, Rev. C.B. Daiton, the rector of Lambeth, was humbly requesting financial donations to accompany prayer to aid their plight. The plea was well answered; Robert Taylor wrote another letter to the *Times* on September 21, saying that his letter from September 17 "has been attended with the most gratifying success."[43] The copious outcry by anonymous leaders and recognized community leaders reflected that the citizens of Lambeth were concerned about the havoc cholera was inflicting on their parish. In the midst of the terrible environment, what was the General Board of Health doing to address these concerns? As discussed above, the General Board of Health had laid out a house-to-house visitation scheme, as well as outlined a hierarchy of medical inspectors and visitors to inspect for, and address, public nuisances. These attempts were one of two primary goals for the General Board of Health: the other was to ensure prompt medical care for those suffering from cholera in attempts to curb the epidemic.

<u>Medical Care</u>

Apart from sanitary concerns, house-to-house visitations served another important purpose: to identify any potential cholera patients with early symptoms. As discussed in Chapter Four, cholera was a progressive disease that usually began with premonitory diarrhoea before progressing to rice-water stools and vomiting. It was hoped that by identifying early cases of cholera, that these patients could be cured with swift medical intervention. As part of its hierarchy of medical officials, the General Board of Health had appointed medical visitors, who had a set list of responsibilities: visit each house identified by the medical inspector at least once

[43] Robert Taylor, "Parish of Lambeth," *Times*, 18 September 1849, pg. 5; Robert Taylor, "Special Cholera Fund for Lambeth Parish," *Times*, 21 September 1849, pg. 8.

a day; provide medications to be immediately administered; reassure people that cholera had warning signs and with proper care and advanced treatment, severe cases could be avoided; report any nuisances observed; make a daily report to the medical inspector.[44] These medical visitors were all qualified practitioners, and many were employed as emergency medical relief. Each parish had its existing medical personnel – the medical officers who reported to the guardians of the poor and vestry boards, as well as any private practitioners which served the region – but the General Board of Health hired additional practitioners to help serve the communities experiencing cholera outbreaks. The costs of these additional medical services were, in theory, to be borne by the General Board of Health though lack of renumeration was a common complaint among practitioners.[45] The medical visitors had the ability to dispense medications while visiting the houses, another attempt to speed up treatment when cholera was suspected. In fact, the General Board of Health was so committed to identifying early cases that the medical "aid is not simply to be provided for persons actually afflicted or attacked; but likewise, for those who might be '*threatene* with such epidemic, endemic, or contagious disease.'"[46] This entire goal of the General Board of Health can be summarized in the following excerpt:

> In this passage, thus promulgated when scarcely a single case had been reported as having arisen in this county, is enunciated what may be emphatically denominated the one principle for the successful management of cholera; namely, that the disease is, as to the rule, preceded by diarrhoea, as this diarrhoea is, if seen early, most manageable, all the efforts of the local authorities should be directed to seeking out and promptly treating through proper medical agency all persons affected with the first or incipient stage.[47]

[44] Grainger, *Appendix B*, pgs. 147-149.
[45] The payment for one week of services was 4*l*. 4*s*. per week. *Grainger*, *Appendix B*, pg. 147.
[46] Grainger, *Appendix B*, pg. 129.
[47] Grainger, *Appendix B*, pg. 130.

The report submitted to the General Board of Health by Dr. Richard Grainger, from which many of the above passages are taken, included a tabulation of results from house-to-house visitations of the medical visitors which triumphed the acts of the preventative approach over a one-month period, from September 21, 1849 until October 20, 1849.

————	Diarrhœa.	Rice-water Purging.	Cholera.	Passed into Cholera after Treatment.
September 21, 1849 - -	835	21	13	3
„ 22, „ - -	942	12	10	0
„ 24, „ two days -	1,685	25	8	0
„ 25, „ - -	1,186	19	7	1
„ 26, „ - -	982	10	15	1
„ 27, „ - -	1,071	10	9	2
„ 28, „ - -	992	16	7	1
„ 29, „ - -	1,135	12	2	0
October 1, „ two days -	1,877	20	5	0
„ 2, „ - -	1,633	17	11	0
„ 3, „ - -	1,379	22	6	0
„ 4, „ - -	1,010	11	8	1
„ 5, „ - -	1,119	11	8	0
„ 6, „ - -	986	10	5	0
„ 8, „ two days -	1,751	15	12	0
„ 9, „ - -	901	5	1	0
„ 10, „ - -	1,135	14	1	0
„ 11, „ - -	839	2	3	0
„ 12, „ - -	794	2	3	0
„ 13, „ - -	657	1	1	0
„ 15, „ two days -	1,191	9	1	0
„ 16, „ - -	527	2	0	1
„ 17, „ - -	605	5	1	1
„ 19, „ two days -	1,155	6	0	0
„ 20, „ - -	416	5	0	0
Total - - - - -	26,803	282	137	11

Figure 5.22 – Daily cholera deaths from September 21, 1849 until October 20, 1849. These figures are a collation of all house-to-house visits across London, though the number of visits and how many parishes that participated varied day-to-day.

As Figure 5.22 demonstrates, the method was considerably effective, with only a handful of cholera cases, and even fewer cases of cholera after treatment for diarrhoea and rice-water purging.[48] These results, however, are a stark contrast not only to the complaints lodged by the citizens of Lambeth, but also by the numbers reported in the sections above, which decidedly do

[48] Rice water purging was how bowel movements of cholera patients were described; after evacuating the bowels frequently, there was often nothing left to be expelled apart from mucus, which had the appearance of rice water. Rice water purging was often observed in the later stages of cholera. Grainger, *Appendix B*, pg. 152.

not show this type of mortality pattern. Even considering that the *Annual Reports* only reported mortality from cholera, and that morbidity is not reported, it is highly unlikely that this type of decreasing pattern of sickness was present in Lambeth given the number of deaths each day. If the two patterns did co-exist, it would suggest that a huge number of people experienced illness and sought treatment that worked, which resulted in a comparably much “smaller” number of cholera deaths. This raises the question: what went wrong in Lambeth?

What happened in Lambeth is not a unique story, and the success heralded by Dr. Grainger’s report undoubtedly reported specific numbers to appease political and medical pressures on a system that was under intense strain. It is also important to note that Dr. Grainger himself admits that several of the order given by the General Board of Health were not successful – not because they were flawed, but because they simply were not obeyed.[49] Perhaps one of the biggest oversights of the General Board of Health was that they did not consult local medical officers on what was practically needed to address the concerns cholera brought with it. In reality, the answer to the question was simple: what was needed was more medical officers and better access to quality care.

The parochial medical systems buckled underneath the orders from the General Board of Health; the expectation that every house containing an ill person be visited at minimum daily, but ideally multiple times a day, was simply too unrealistic for the medical personnel in any given parish, particularly at a time of year when other diseases were common.[50] It was not only a lack of physicians, be they medical officers of the parish or appointed medical visitors from the

[49] Grainger includes an entire section entitled “On the Execution of the Regulations of the General Board of Health by the Local Authorities” which details how and why the steps laid out by the General Board were not executed by the local boards. Grainger, *Appendix B*, pgs. 134-140.
[50] Much like disease patterns today, the fall season brought the usual colds, coughs, and fevers which also required visitation even though they were not official cholera cases. Grainger, *Appendix B*, pg. 124.

General Board of Health, there was also a distinct absence of hospital accommodation, nurses, and houses of refuge.[51] The General Board of Health had put in some provisions to provide houses of refuge – again, highly theoretical and rarely acted upon, as these institutions cost a lot of money to establish and run – and hospitals were intent on keeping infectious disease patients out as much as possible. This, combined with a lack of nurses to go into homes and care for the sick, left many cholera patients depending on the visitations of the medical men of the parish and General Board of Health to provide them with advice and treatment on how to best respond to cholera symptoms.[52] The result of all of this was medical officers being stretched far too thinly to be thoroughly effective, and the people of London suffered greatly because of it.

The medical profession felt the enormous burden of caring for thousands of patients on a daily basis. Dr. J. T. Mitchell was the parochial medical officer in Lambeth for eighteen years before he resigned in August of 1849. He wrote several letters to the Board of Guardians, who were under the authority of the General Board of Health, petitioning not only for more medical men to be employed, but for fair renumerations for the assistants he already had. The Board of Guardians continued to ignore his letters, forcing him to submit his resignation. During the week ending July 31, Dr. Mitchell reported that he had "attended 322 cases of illness among the poor of my district, No. 5, requiring 1,028 attendances to be given at the houses of the poor, and at my own surgery."[53] This number of visitations over a few days is but one example of how stretched the medical profession found themselves in light of the cholera epidemic and the orders from the General Board of Health. Mitchell cited the "sake of my own health and the interests of my

[51] Grainger, *Appendix B*, pgs. 140-141.
[52] Grainger states that he only recalls two or three houses of refuge being opened across all of London, which is a far cry from the hierarchical plan laid out by the General Board of Health, which envisioned a house of refuge in each parish. Grainger, *Appendix B*, pg. 141.
[53] J.T. Mitchell, "Cholera and the Board of Guardians of Lambeth," *Times*, 4 August 1849, pg. 7.

family" as the reasons for his resignation, as well as noting that one of his assistants had quit the day before due to exhaustion.[54]

Most of the public responses to cholera were aimed at the General Board of Health and its local representatives, such as Boards of Guardians. Mr. Grainger is himself named in one letter to the editor of the *Times* on September 4, 1849:

> Mr. Grainger, the inspector of the Board of Health, has, I believe, with others, inspected these places, but nothing has been done to remedy the evil. The proprietor of one of these premises resides on the spot, and may, perhaps, have represented to the officers that he and his family enjoy good health, and that consequently it cannot be injurious; but the public think differently, and complaints are very numerous.[55]

Similar statements echoed across the pages of the *Times*, calling into question the transparency and effectiveness of the General Board of Health and local boards. In Lambeth, "Conservator" asked "why is not the nuisance – these slaughterhouses of humanity – at once stopped by the authority?"[56] "A Working Man" expressed his frustration that while "there is an inspector of nuisances appointed by the parish; but to expect anything from a parochial officer, who is, to a certain extent, the servant of the influential proprietors of the manufactories in question, is in vain." He continued, "The Board of Health may be doing great things in other quarters (although we do not hear where), but a more fruitful field for its staff to be 'up and doing,' can scarcely be found."[57] Even Dr. Mitchell called out the Board of Guardians by whom he was employed, questioning their "liberal conduct towards their medical officers."[58]

The General Board of Health had good intentions about staving off cholera in London, especially as they were tracking its progress across Europe in the summer and early autumn of

[54] J.T. Mitchell, "Cholera and the Board of Guardians of Lambeth," *Times*, 4 August 1849.
[55] T.A., "The State of Lambeth," *Times*, 4 September 1849.
[56] Conservator, "Cholera in Lambeth," *Times*, 14 September 1849.
[57] A Working Man, "The State of Lambeth," *Times*, 3 September 1849.
[58] J.T. Mitchell, "Cholera and the Board of Guardians of Lambeth," *Times*, 4 August 1849.

1848. It created a hierarchical system that had two main goals, one sanitary and one medical, but both preventative in nature. However, the General Board of Health operated far too theoretically for London's plight. Cholera came flowing in with the tide, leaving the metropolis vulnerable to an epidemic of a scope hardly experienced before, especially in Lambeth. The public health response to the epidemic was sorely lacking, not for want of effort, but because the local administrations simply did not have adequate networks in place to ensure swift sanitary improvements or comprehensive medical care.

Conclusion

This chapter has explored London's cholera experience in 1848 and 1849, identifying both broad and specific mortality patterns. The 1848 mini epidemic not only challenged the seasonality of cholera, but it suggests that many of the cholera deaths were not actually part of an epidemic but rather a highly localized outbreak in Mr. Drouet's Infant Poor Establishment. In 1849, cholera mortality was most prominent in the south district, and the chapter uses mortality data from the *Weekly Returns of Births and Deaths* to demonstrate how cholera moved through several sub-districts over a period of weeks. Population and geographic area were used to standardize the mortality rates, and there is overwhelming evidence that cholera was most deadly in Lambeth.

A more detailed analysis showed that the Lambeth Church 2nd neighbourhood was the deadliest area of Lambeth. While the workhouse on Princes Street experienced a much higher degree of cholera mortality than the neighbourhood, the mortality records indicate that the presence of this particular institution cannot wholly explain the increased number of cholera deaths in Lambeth Church 2nd. The street analysis suggests that while cholera was rampant in the neighbourhood, the mortality pattern was spread out rather than localized to a particular building or street. The complaints of Lambeth's residents to the *Times* highlight the inadequacy of the public health response. The lack of medical personnel and the overwhelming stench of industrial factories were the two main complaints. The General Board of Health was newly created, and while it offered step-by-step instructions to the local boards to address the outbreak, there was a lack of infrastructure and funds which meant Lambeth was left to deal with cholera's overwhelming presence.

This chapter has addressed research questions two and three: the experience of cholera in 1849, and the public health response to the epidemic. The chapter has also filled a gap in the historiography by providing a detailed, quantitative analysis of an epidemic which, up till now, has been examined almost exclusively within a social and medical framework. Chapter Six will conduct the same investigations and address the same research questions for the next cholera epidemic which ravaged London a mere five years later, in 1854.

Chapter Six

Cholera in 1854

The cholera epidemic of 1854 is the most studied of the cholera outbreaks in Victorian London. While not as deadly as the 1849 outbreak, the involvement of John Snow and the famed story of the Broad Street pump are what have caused this epidemic to be a well-known story in medical and popular history. This chapter challenges that narrative while continuing to address research questions two and three: what was the cholera experience in London in 1854 and what were, and how effective were, the public health responses?

Like Chapter Five, this chapter begins by discussing a mini epidemic which preceded the larger outbreak that occurred in the summer of 1854. While the seasonality of this mini epidemic mirrors the one which occurred in 1848, the number of deaths was far fewer. The chapter then shifts focus to the cholera outbreak of 1854, beginning with district mortality patterns which reflect both crude mortality figures as well as cholera mortality accounting for by population density. The discussion on sub-districts highlights that, once again, Lambeth was a deadly sub-district for cholera, and the neighbourhood patterns are considered, though there is no street-level data available for comparison. There is also a large focus throughout this chapter on the outbreak in St. James, Westminster – home to the famous Broad Street pump. While this adds to an already overwhelming body of literature, this chapter adds to it in a unique way by revisiting the street-level mortality and presents a map which shows mortality by street for the whole of the neighbourhood. Though this is similar to the approach taken by John Snow and uses the same records from the General Register Office, the maps found throughout the chapter present more than just Broad Street and situate this outbreak within the larger patterns of cholera mortality throughout the sub-district.

The chapter concludes by discussing the public health efforts to respond to cholera. Like in 1849, the response was guided by the actions of the General Board of Health. Many of the same steps were taken, though, once again, many of them were not followed. However, unlike 1849, the General Board of Health showed an increased interest in identifying the cause of cholera. There is also an in-depth discussion about the investigation into the outbreak in St. James, Westminster. Again, this is a well-studied aspect of cholera's history, but this chapter goes beyond heralding the removal of the Broad Street pump as a public health triumph and rather suggests that the fame garnered by this action is unfounded. Using the mortality patterns from earlier in the chapter, as well as anecdotal evidence from various reports, I suggest that the Broad Street pump was removed too late to be responsible for the decline of the cholera epidemic in St. James, Westminster. This challenge is contrary to much of the existing literature.[1] Throughout the chapter, there are comparisons which highlight the similarities and differences between 1849 and 1854, which also serves as a novel comparative study between the two epidemics.

THE 1853 "MINI EPIDEMIC"

Cholera appeared in London gradually throughout the autumn of 1853 and was contained to that year, unlike the mini epidemic of 1848 which carried over into the early months of 1849. Though the mini epidemic of 1848 was far more defined than the one in 1853, the arrival of

[1] While it is true much of the literature surrounding the 1854 Broad Street Outbreak – particularly popular history accounts – celebrate John Snow's success, there do exist studies which call into question the efficacy of his actions. For example, see Peter Vinten-Johansen et al., *Cholera, Chloroform, and the Science of Medicine: A Life of John Snow* (Oxford, UK: Oxford University Press, 2003) and Kari S. McLeod, "Our Sense of Snow: The Myth of John Snow in Medical Geography," *Social Science and Medicine* 50 (2000); pgs. 923-935.

cholera in 1853 still bears consideration as a precursor, and perhaps a foreshadowing, of what was to come the following year. The first cholera deaths registered in 1853 occurred during Week 29 (the week ending 16 July): three deaths were registered. It was not until Week 33 (the week ending 20 August) that the number of cholera deaths per week surpassed ten and remained over ten in subsequent weeks, though there were dips in cholera mortality before its climax in Week 45 (week ending 5 November). See Figure 6.1.

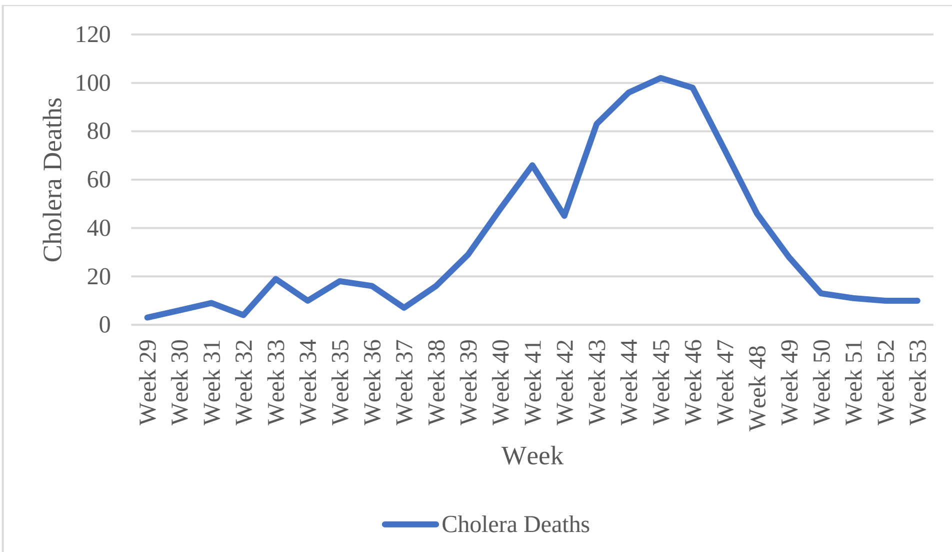


Figure 6.1 – Weekly cholera deaths, Week 29-Week 53, 1853

At the beginning of the mini epidemic, the number of cholera deaths were minimal. The first three weeks saw no more than nine deaths in any given week, and it was not until Week 33 that the number of deaths rose significantly to nineteen. The number of deaths remained in the teens until Week 37, when it dropped to a mere seven cholera deaths, before rising again. However, the increased number in Week 38 proved to be the beginning of a significant escalation in cholera deaths. Apart from a decrease in Week 42, the number of cholera deaths continued to escalate until Week 45, which saw the highest number of deaths registered in 1853: one hundred and two. Following this climax, the number of cholera deaths steadily declined for the following eight weeks, until the last week of December 1853, where ten cholera deaths recorded. Weeks 1, 2, and 3 of 1854 recorded no more than two cholera deaths each week, proving that the mini epidemic of 1853 was truly contained to only that year.

The number of cholera deaths in 1853 was minimal. Between Weeks 29 and 53, the total number of deaths attributed to cholera was 865 and accounted for only 3 percent of the total number of deaths which occurred in that year. Of all zymotic deaths during those weeks, cholera represented approximately 13 percent.[2] Figure 6.2 compares the pattern of deaths between the two mini epidemics of 1848 and 1853. Cholera accounted for more of the total number of zymotic deaths in 1853 than it did in 1848, but cholera made up a higher percentage of all deaths in 1848.

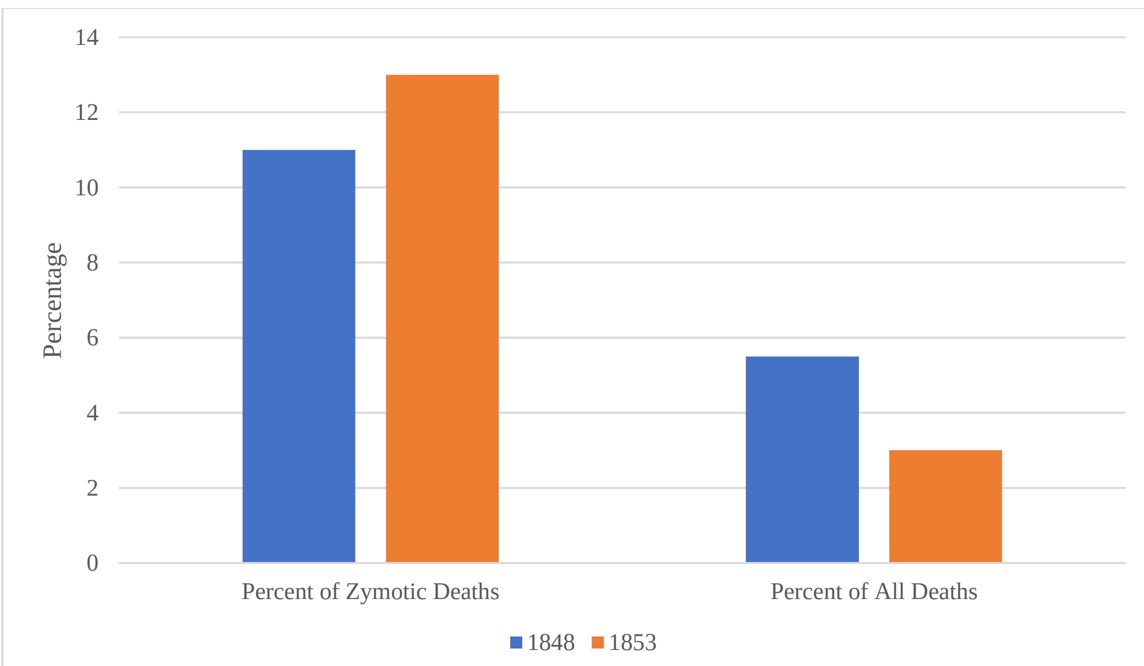


Figure 6.2 – Comparisons between the mini epidemics of 1848 and 1853, looking at the percentage of zymotic deaths and all deaths which cholera represented

[2] There were 6,745 zymotic deaths registered during these weeks.

One possible reason for this is that 1848's mini epidemic was much more severe in terms of the number of cholera deaths. Compared to the 865 cholera deaths reported in 1853, the mini epidemic of 1848 yielded 1,968 cholera deaths. The total number of deaths from all causes in the mini epidemic of 1848, which also lasted much longer, was 35,734 compared to the 28,280 deaths registered during the mini epidemic of 1853; this meant that cholera made up 5.5 percent of all deaths in 1848 compared to 3 percent in 1853. The higher number of crude cholera deaths, plus the higher percentage of deaths from all causes, suggest that the mini epidemic in 1848 was much more deadly than the one in 1853.

The zymotic patterns, in concurrence with this conclusion about the total mortality percentage, suggests that even though the crude number of zymotic and cholera deaths was lower in 1853, this mini epidemic contributed more cholera deaths to zymotic causes than in 1848. The total number of zymotic deaths in 1848 was much higher due to the presence of other infectious diseases. Indeed, while 1853's zymotic causes made up only 23 percent of all deaths, 1848's zymotic deaths represent 50 percent of all deaths. This implies that there were overall more zymotic deaths in 1848 from a variety of causes, and cholera made up only 3 percent of them. Overall, 1853's mini epidemic was inferior to that of 1848 in number of cholera deaths, as well as cholera's percentage in the overall number of deaths. However, 1853's cholera deaths made up a greater number of zymotic deaths, because 1848's zymotic death total was much higher due to a wide variety of infectious causes of death not present in 1853.

Even though the 1853 mini epidemic was much less severe than the mini epidemic of 1848, it is worth looking at the geographic pattern of mortality. Figure 6.3 shows the breakdown of district cholera deaths between Weeks 43 and 53.[3]

[3] Week 43 was when the *Weekly Returns of Births and Deaths* began tabulating cholera deaths weekly. Before then, the information about cholera deaths is only textual descriptions.

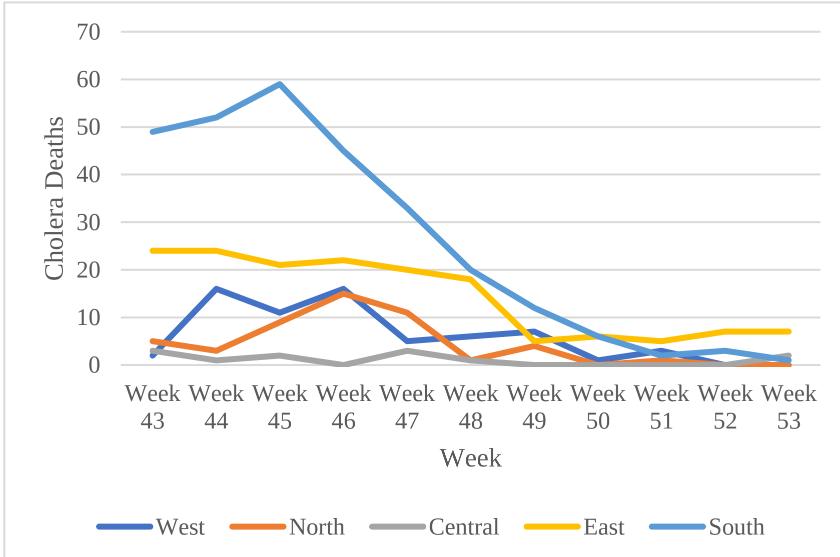


Figure 6.3 - A comparison of weekly district cholera deaths, Weeks 43-54, 1853

The south district experienced the highest number of cholera deaths each week until Week 50. The east district had the second highest number of cholera deaths each week, with the only exceptions being Week 49, when it was slightly eclipsed by the west district, and Weeks 51, 52, and 53, where it had the highest number of cholera deaths.

While Figure 6.3 provides an idea of the general mortality pattern, the *Weekly Returns of Births and Deaths* published a table which tallied the total number of cholera deaths in each sub-district between Weeks 35 and 51. Figure 6.4 shows this breakdown.

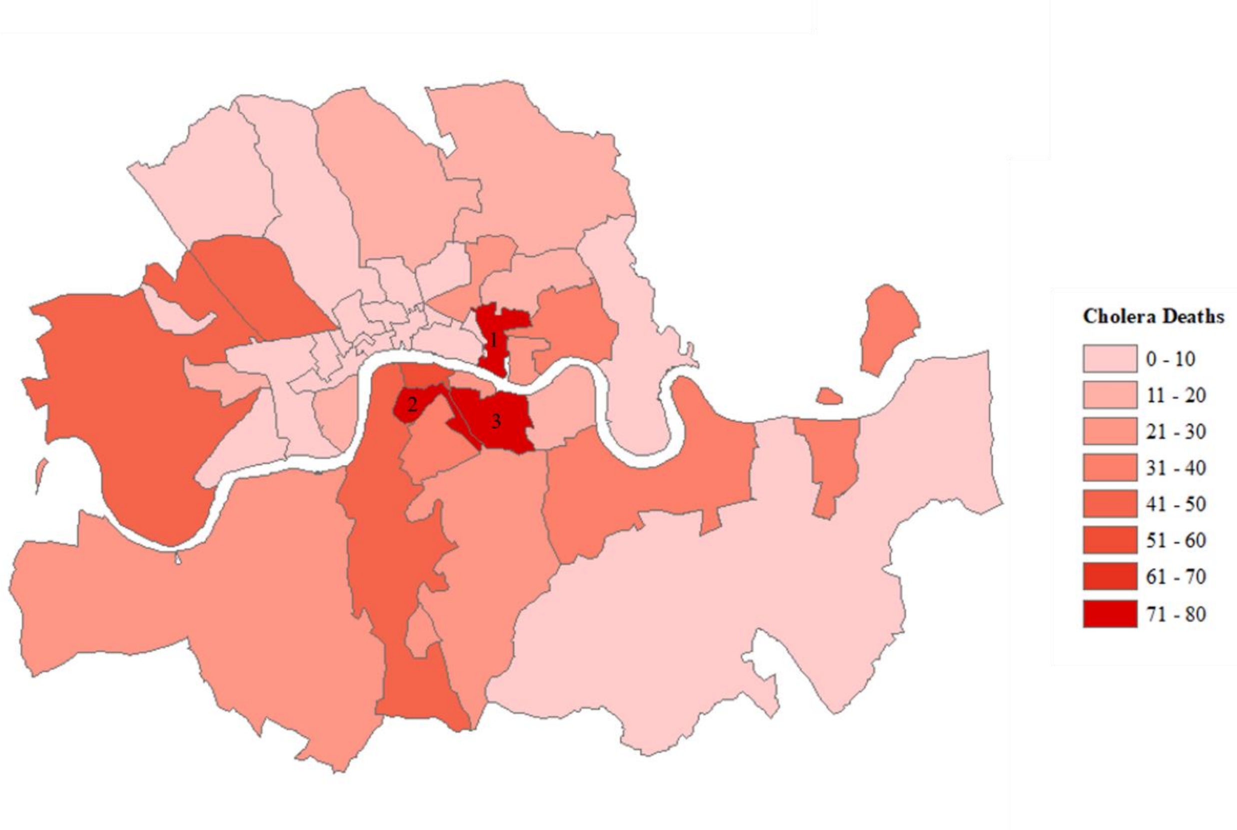


Figure 6.4 – Total number of cholera deaths between Weeks 35 and 51, 1853

This map shows that the three deadliest sub-districts were Whitechapel (1), Bermondsey (2), and St. George, Southwark (3). Whitechapel had the highest number of deaths, with seventy-eight, followed by St. George Southwark with seventy-four, and Bermondsey with seventy-three. Combined, these sub-districts accounted for 28 percent of all cholera deaths between Weeks 35 and 51. This pattern of mortality was similar to the mini epidemic of 1848, whose mortality pattern was heavily influenced by the outbreak of cholera at a children's residential school in the sub-district of Wandsworth in the south district. Rather than one sub-district responsible for the mortality in the mini epidemic of 1853, cholera was widespread over multiple regions, with twenty of the thirty-six sub-districts reporting more than ten cholera deaths over the course of the mini epidemic.

THE CHOLERA EPIDEMIC OF 1854

The cholera epidemic of 1854 spanned approximately sixteen weeks: cholera deaths first increased significantly in Week 30 (the week ending 29 July) and the last week to have more than ten cholera deaths was Week 46 (the week ending 18 November). Cholera deaths were recorded before Week 30 in minor numbers and, similarly, cholera deaths continued to be present after Week 46, albeit less than ten per week. Figure 6.5 shows the weekly recorded cholera deaths from Week 30 until Week 46.

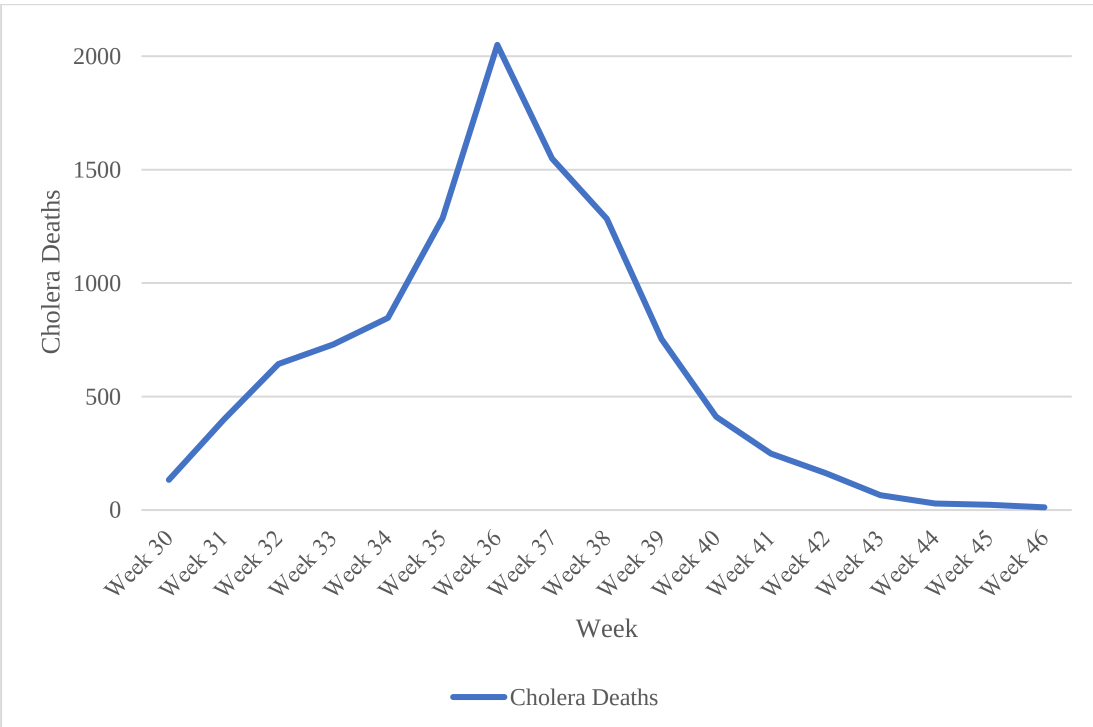


Figure 6.5 – Weekly cholera deaths from Weeks 30-46, 1854

Unlike the epidemic in 1849, which had a gradual increase with multiple drops in cholera deaths before its climax, the epidemic of 1854 was straightforward, with a clearly defined increase until Week 36, followed by a continual decrease until Week 46.

Week 30 recorded 133 deaths and Week 31, 399. The jump between Week 30 and Week 31 was the only week which saw a three-fold increase, and it was the biggest increase throughout the entire epidemic. What this suggests is that cholera, once it had taken hold in the city, lost no time in becoming a very deadly reality for London's citizens. The number of weekly cholera deaths beyond Week 31 increased by approximately 150 percent until Week 36. Week 36 was the deadliest week of the epidemic, reporting a staggering 2,050 cholera deaths. In comparison to the epidemic in 1849, the number of cholera deaths during this week are comparable; Week 36 in 1849 yielded 2,026 deaths.

The decrease in cholera deaths was gradual at the beginning – Week 37 reported 1,549 cholera deaths and Week 38 totaled 1,284 deaths. This worked out to a decrease of approximately 25 and 18 percent respectively. Following Week 38, however, the decline became much more pronounced with cholera deaths approximately halving each week until Week 44. There was a slight plateau in Weeks 44 and 45 before the number of cholera deaths diminished to below ten per week after Week 46. Having laid out the overall cholera mortality pattern during 1854, it is possible to begin constructing the mortality patterns which contributed to this mortality curve.

District Mortality Patterns

The district mortality patterns are best understood visually. Figure 6.6 shows the weekly breakdown of cholera deaths by district from Weeks 30 to 46.

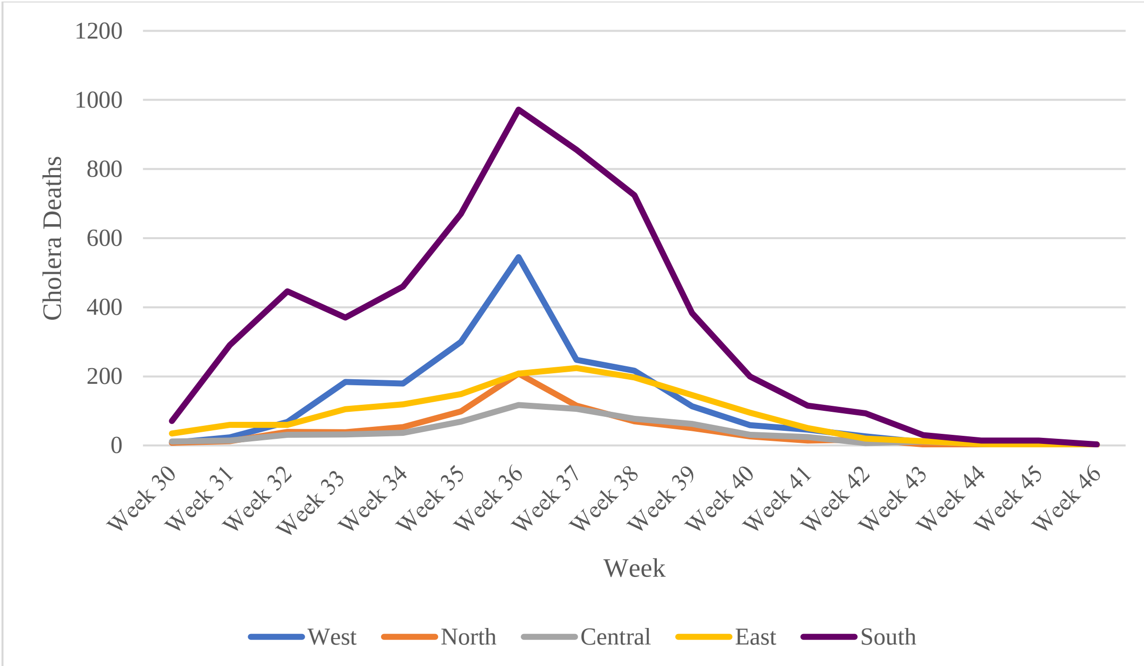


Figure 6.6 – Comparison of district cholera deaths from Week 30-46, 1854

Much like the epidemic of 1849, the south district experienced the most cholera deaths. However, unlike 1849, the west district experienced a high number of cholera deaths as well, making the geographic spread between the two epidemics distinct. The east district also experienced a slight rise in Weeks 38 and 39, which likely accounts for the still relatively high number of cholera deaths despite the sharp decrease in cholera deaths from the south and west districts.

Before looking more closely at the patterns of the south and west districts, it is important evaluate how much the deaths in these two districts contributed to the cholera epidemic across the city. Figure 6.7 shows the percentage of cholera deaths which occurred outside of the south and west districts.

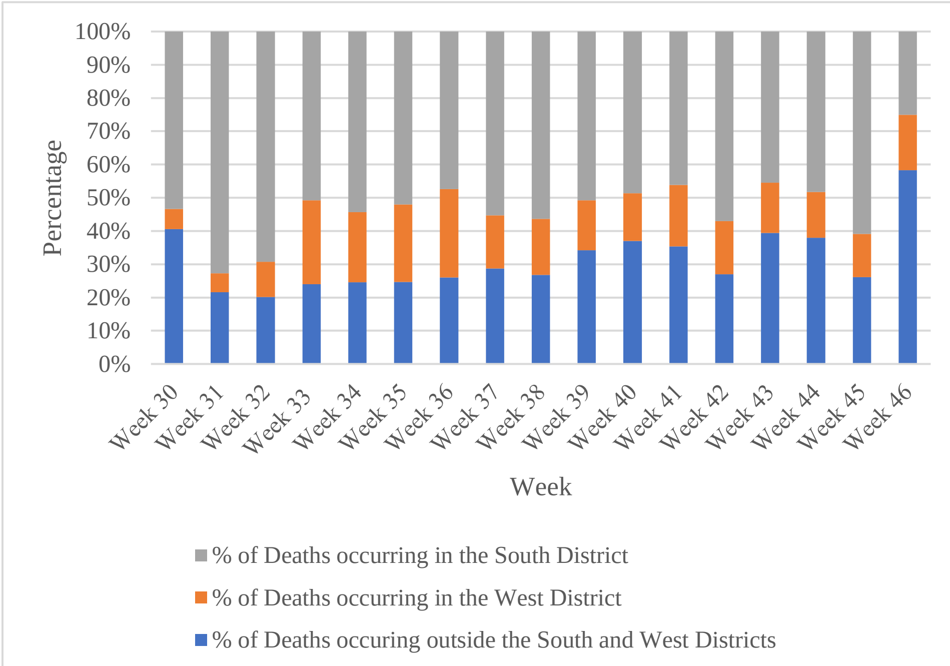


Figure 6.7 – Percentage of deaths which occurred in and outside the south and west districts in Weeks 30-46, 1854

This figure shows that cholera deaths in the south and west districts, often making up to at least 60 percent – though ranging to as much as 80 percent – of all cholera deaths. Again, unlike the epidemic of 1849, this pattern is unique to 1854; in the previous cholera epidemic, there were weeks when the south district had no bearing on cholera mortality, with 100 percent of the deaths taking place outside the south district.[4] This was never the case in 1854. Indeed, during Week 36, the height of the epidemic, 74 percent of all cholera deaths occurred in the south and west districts. Figure 6.8 shows the number of cholera deaths between the south and west districts during these weeks.

[4] Remembering, of course, that the instances where a high percentage of cholera deaths occurred outside the south sub-district were usually weeks with a low total number of cholera deaths.

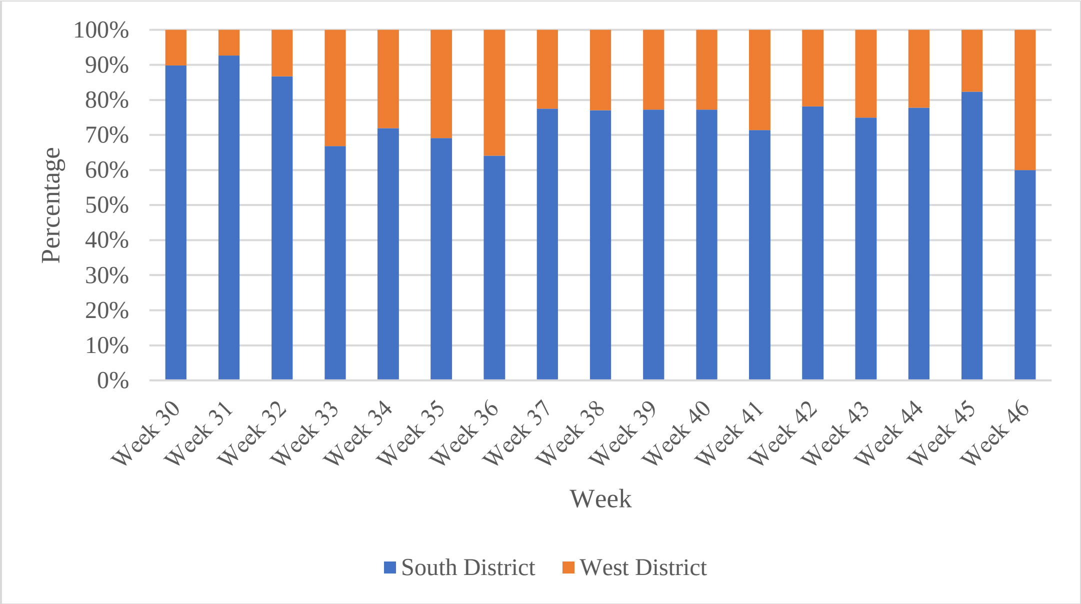


Figure 6.8 – A comparison of south versus west district cholera deaths, shown as a percentage of the total number of cholera deaths in the two districts

The west district did contribute as many cholera deaths over the course of the epidemic, and it is quite apparent that the south district had the worst cholera mortality in terms of crude numbers. Consider Week 36, which was the week when the west had the highest number of cholera deaths: while the west reported 545 deaths, the south recorded 972. So even though the west made up 36 percent of the deaths emanating from the west and south districts, the south clearly had the higher mortality rates. Further, Figure 6.7 showed that the south and west districts made up 74 percent of all cholera deaths in Week 36, but of that 74 percent, the south made up 47 percent of all cholera deaths.

As illustrated in previous chapters, the south district was by far the largest in terms of geographic area. Using population statistics from the *Weekly Returns of Births and Deaths*, it is possible to calculate the population density of each district, which allows for a standardized comparison when evaluating mortality between the districts.[5] The west district housed 22,340 people per square mile; the north, 23,187; central, 130,663; the east, 49,900; and the south, 8,670.[6] While the mortality patterns in the sub-districts will be discussed in the sections below, all the cholera mortality figures considered above point to the overall geographic mortality pattern of cholera in 1854 London: just like the epidemic five years earlier, most of the deaths in 1854 occurred south of the Thames.

Sub-District Mortality Patterns

The sub-districts of London in 1854 were the same as those in 1849, which makes comparison between the two epidemics relatively simple. To begin, we must look at the sub-district mortality across London, from Week 32 to Week 46. Figure 6.9 shows a breakdown of all the sub-district mortality, grouped within west, north, central, and south districts.[7]

[5] The *Weekly Returns* only provide population data from the 1851 census.
[6] General Register Office, *The Weekly Returns of Births and Deaths in London* XV:41 (1854), pg. 429.
[7] The reason this comparison begins at Week 32 rather than Week 30 as above is because the *Weekly Returns* did not provide a breakdown of deaths by sub-district before Week 32. For an enlarged version of these images, see Appendix B.

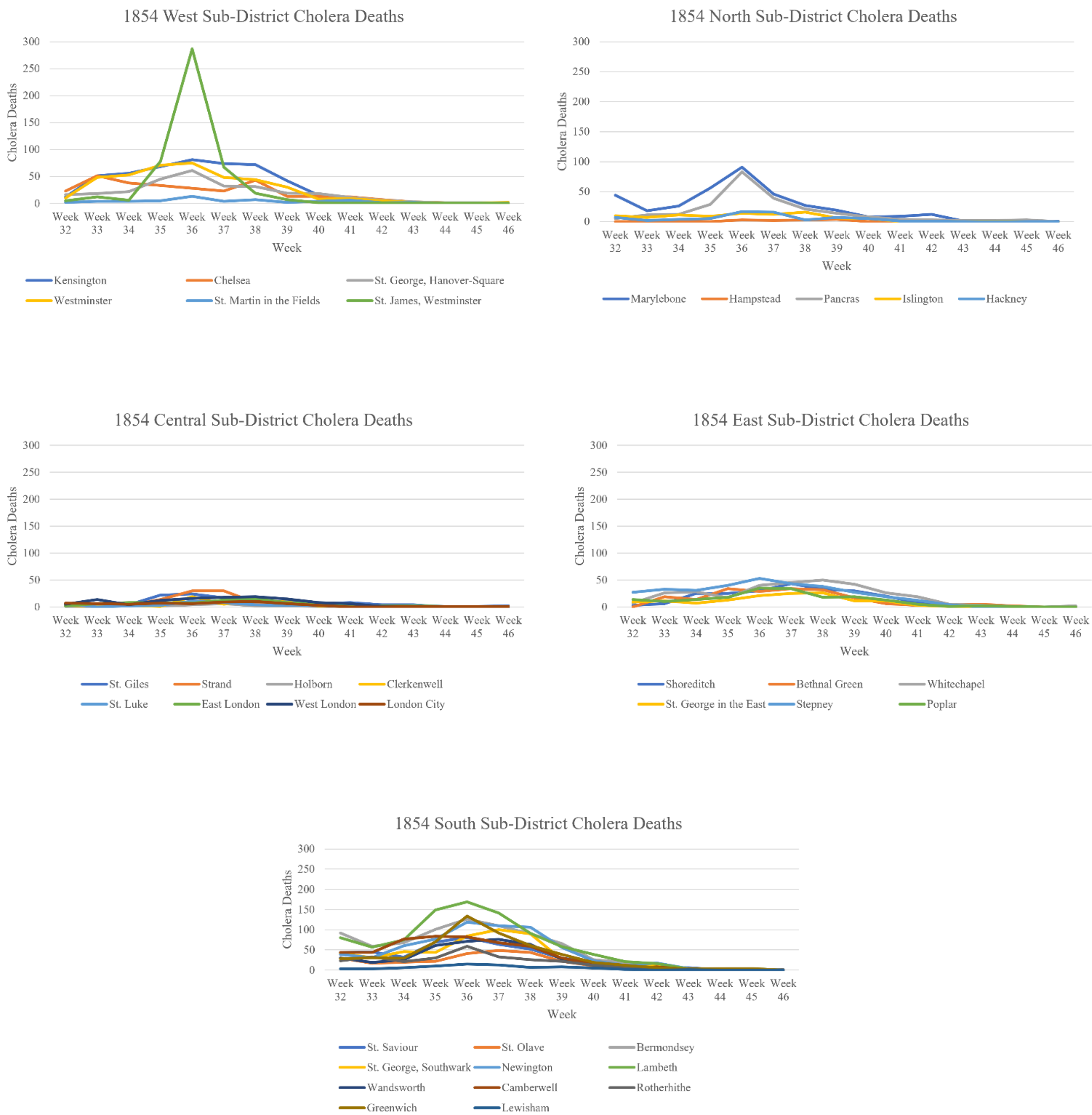


Figure 6.9 – Comparison of sub-district cholera deaths, divided into districts, Weeks 32-46, 1854

The patterns shown by sub-district data fall in line with the district patterns of cholera mortality. The north, central, and east districts experienced minimal cholera deaths, with a maximum of ninety-one, thirty, and fifty-three deaths in Marylebone, Strand, and Stepney respectively during

Week 36. The west and the south districts, however, reflect the large number of cholera deaths, though the mortality was divided between multiple sub-districts. In the west, the pattern is obvious: St. James, Westminster recorded the most cholera deaths in Week 36 by a significant margin. The 287 cholera deaths in Week 36 in St. James, Westminster is greater than all the cholera deaths in the other west sub-districts combined. Indeed, after St. James, Westminster, the second deadliest sub-district in Week 36 was Kensington, with a mere eighty-one deaths. Apart from St. James, Westminster, there was nothing extraordinary about the western sub-districts. The average number of cholera deaths for the sub-districts in the north, central, and east districts were forty-eight, fifteen, and thirty-five respectively. Not including St. James, Westminster, the average for the western sub-districts was forty-eight cholera deaths per sub-district. While higher than the other districts, the number is relatively low in terms of cholera mortality, suggesting that while there may have been a slight increase in the west sub-districts, the real culprit behind the high mortality in the west district was St. James, Westminster.

The south district shows a more even disbursement of cholera deaths between the sub-districts. Lambeth, much like the epidemic of 1849, showed a higher number of cholera deaths during the peak of the epidemic than any other sub-district. However, looking at the way the number of cholera deaths increased reveals an interesting pattern. Lambeth's increase from Week 35 into Week 36 was only 13 percent, while Rotherhithe, Greenwich, and St. George, Southwark experienced increases of 96, 91, and 90 percent respectively. This shows two things: first, that Lambeth recorded high number of cholera deaths before Week 35, which made the increase into Week 36 minimal, and second, that there were certain sub-districts which experienced a much greater increase into the height of the epidemic than others. Conversely, there was one sub-district which experienced a decrease in the number of deaths between Weeks

35 and 36 – Camberwell decreased by 2 percent, from eighty-four deaths down to eighty-two. Figure 6.10 compares the number of cholera deaths in the south sub-districts between Weeks 35, 36, and 37.

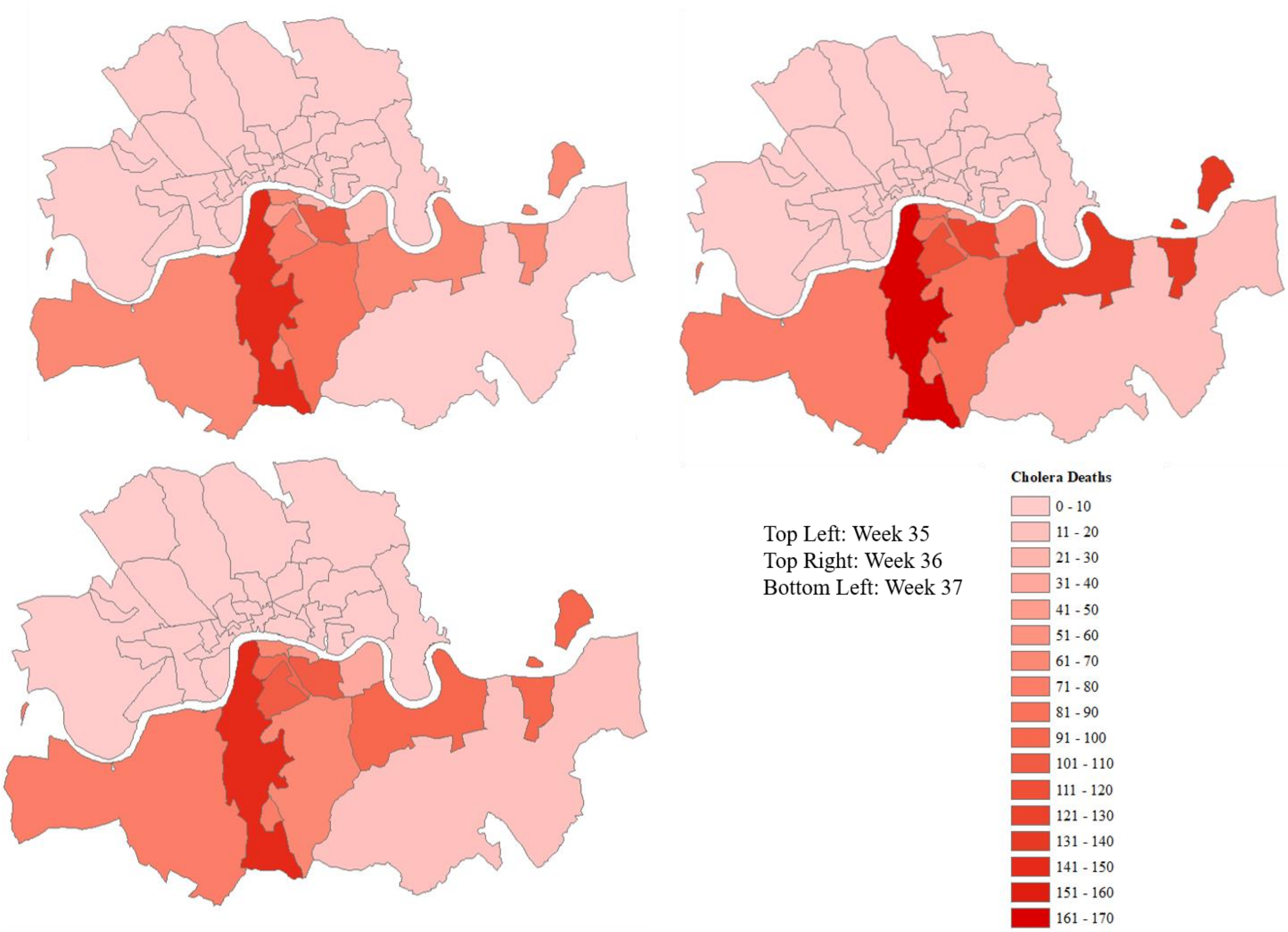
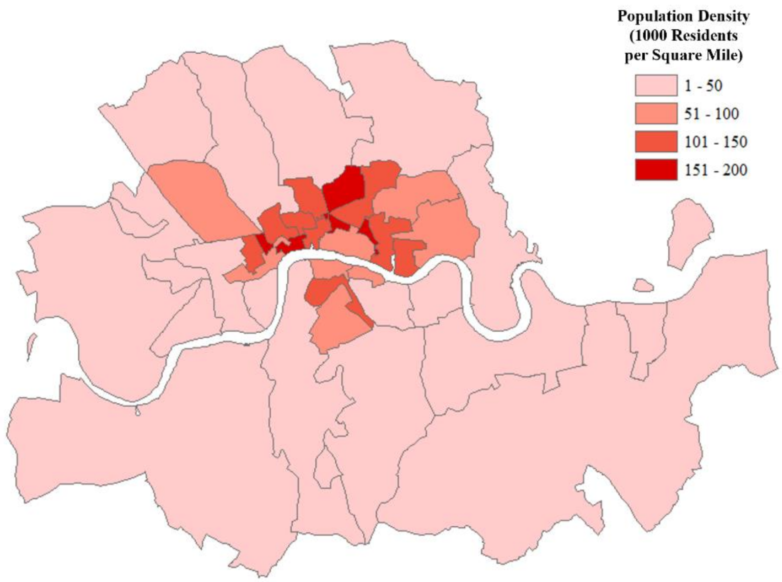


Figure 6.10 – A comparison of sub-district mortality in the South district, Weeks 35-37, 1854

What Figure 6.10 puts into perspective so effectively is the significance of the increases between Weeks 35 and 36. For example, even though Rotherhithe experienced the highest percentage increase (96 percent), the number of deaths increased from thirty to fifty-nine, which is the third lowest mortality figure among all the sub-districts in Week 36. Comparatively, Greenwich increased by a similar figure, 91 percent, but grew from seventy cholera deaths up to 134, which is much more visible in Figure 6.10 than in Figure 6.9. This suggests that the sub-districts which had a low number of cholera deaths early in the epidemic were much less likely to experience severe levels of mortality even if they experienced a high percentage increase of cholera deaths.

Most southern sub-districts experienced the beginning of the decline of cholera in Week 37, including Lambeth, Rotherhithe, and Greenwich. However, there were a few which increased – namely St. Olave, Southwark, St. George, Southwark, and Wandsworth. The greatest increase was in St. George, Southwark, which went from eighty-four to one hundred, or an increase of 19 percent. St. Olave, Southwark also increased 19 percent, but its crude number of deaths was much lower, and increased from forty-one up to forty-eight. Similarly, Wandsworth increased a mere seven deaths (seventy-one to seventy-six), and this made up only a 7 percent increase. The mortality patterns of the south sub-districts will be discussed further in the section below.

The final consideration when looking at the sub-district mortality patterns is that of population density and the number of cholera deaths per one thousand residents. Much like the discussion in Chapter Five, comparing the crude number of cholera deaths is useful for determining where the epidemic struck in terms of severity, but this number can be misleading, as it does not reflect the percent of the population in a specific region which contracted the disease. Figure 6.11 shows two maps: one which shows the population density of each sub-district and one which shows the number of cholera deaths per one thousand residents of each sub-district.



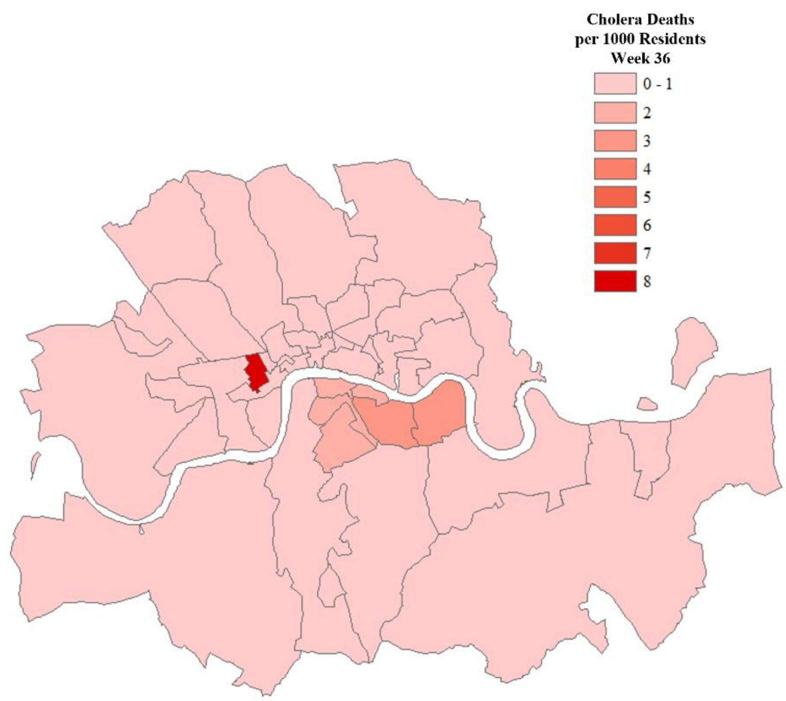


Figure 6.11 – A comparison of sub-district population density and the number of cholera deaths per 1000 residents in Week 36, 1854

These first of these two maps show a similar pattern to that in Chapter Five – that the sub-districts nearest to the centre of London had the largest population density. However, compared to the map in Chapter Five, this map shows the growth London had experienced, as there are significantly more sub-districts with higher population densities, particularly north of the Thames.

The second of these two maps show a very different pattern from Chapter Five. Unlike 1849, which showed Bermondsey and Rotherhithe with the highest cholera death rate per one thousand residents, this map shows a strikingly clear pattern: St. James, Westminster far outranked any other sub-district in terms of its cholera-to-population ratio, with a monstrous eight deaths per one thousand residents. This number can be explained not because of a low population with high cholera death figure, but rather this high number reflects the enormous number of cholera deaths recorded in this sub-district. Much like Figure 6.9 showed, St. James, Westminster was a major contributor to the number of cholera deaths experienced during this epidemic. This sub-district will be discussed in-depth later in the chapter.

THE SOUTH DISTRICT AND CHOLERA

To analyze mortality patterns in the south district, it is necessary to do two things: limit the timeframe under consideration and select specific sub-districts for a more detailed analysis. Regarding timeframe, this section will look specifically at the cholera deaths recorded between Weeks 32 and 42 inclusive. These ten weeks highlight the dramatic rise and fall of the epidemic and presents a data set against which it is possible to compare the 1854 epidemic. In terms of sub-district, the section will consider Lambeth, Bermondsey, Newington, Greenwich, Camberwell, and St. George, Southwark. These sub-districts were selected because they recorded the most cholera deaths over the course of the epidemic.

These six sub-districts made up a significant portion of all the cholera deaths in the south district, as well as all of London. Table 6.1 shows, for each sub-district, the crude number of cholera deaths, the percentage of all cholera deaths in the south district, and the percentage of all cholera deaths in London.

District	Crude Number of Cholera Deaths	Percentage of all Cholera Deaths in the South District	Percentage of all Cholera Deaths in London
Lambeth	896	17%	9%
Bermondsey	771	14%	8%
Newington	651	12%	6%
Greenwich	521	10%	5%
Camberwell	514	10%	5%
St. George, Southwark	499	9%	5%

Table 6.1 – Comparison of south sub-district cholera mortality

These six sub-districts represented 72 percent of all the cholera deaths in the south districts, and 38 percent of all cholera deaths in London between Weeks 32 and 42 inclusive.

It is interesting to note that these are the same six sub-districts that had the highest cholera deaths in Weeks 30 to 40 in 1849. However, during the ten-week period, the six sub-districts contributed 87 percent of all cholera deaths in the south district, and approximately 40 percent of all deaths in London. Comparing Figure 5.11 in Chapter 5 and Figure 6.11 above provides an indication of why the 1849 epidemic had a much higher percentage in the south district. While the 1849 map shows a relatively even, albeit lower, number of cholera deaths in all sub-districts, the 1854 map shows a much more varied number of cholera deaths in the sub-districts. However, despite the variance, it is clear to see that the 1854 numbers were much higher in specific sub-districts. This suggests that these sub-districts contributed to the total number of cholera deaths to a greater degree in 1854 than they did in 1849. The higher number of cholera deaths in each sub-district in 1854 suggests that cholera was more concentrated geographically in 1854 than in 1849.

It is possible to break down the cholera figures of the six southern sub-districts by week to show the movement of cholera between these districts over the ten weeks. Figure 6.12 below shows multiple data sets: it shows the percentage of each sub-district's cholera deaths for that week, the total number of cholera deaths being the sum of the six sub-district's cholera deaths, as well as a line which shows this weekly total. This figure is useful for tracking the movement of cholera among the sub-districts.

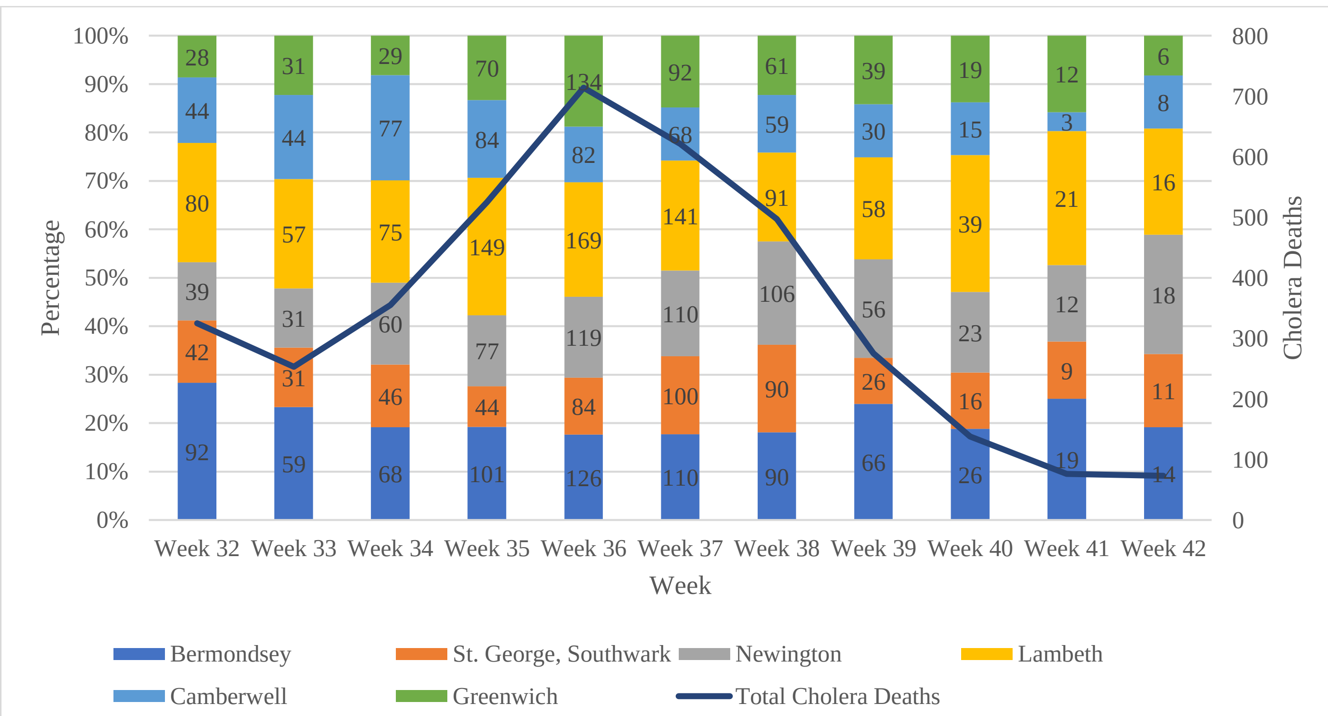


Figure 6.12 – South sub-district deaths, Weeks 32-42, 1854

Figure 12 allows for a week-to-week analysis of how cholera moved within the six southern sub-districts. In Week 32, Bermondsey had the highest number of cholera deaths (ninety-two), which also represents the highest percentage (28 percent). Lambeth was not far behind, with eighty cholera deaths, which represented 25 percent of the total number of cholera deaths. St. George, Southwark, Camberwell, and Newington represented similar percentages – 13, 14, and 12 percent respectively – and Greenwich had the lowest percentage, with its twenty-eight deaths representing 9 percent of all the cholera deaths. Week 33 had a very similar pattern, even though nearly ever sub-district experienced a decline in cholera deaths. Weeks 34 and 35 led up to the climax of the epidemic, and while the number of cholera deaths continued to increase, the percentage breakdowns were relatively comparable. Week 36 was the height of the epidemic, and the mortality patterns are undisputable. Lambeth had the highest number of cholera deaths (169) and the highest percentage, at 24 percent. Greenwich, Bermondsey, and Newington were all similar in percentage – 19, 18, and 17 respectively – and St. George, Southwark and Camberwell were at 12 and 11 percent respectively.

Cholera into Week 36 shows an interesting pattern. While St. George, Southwark, Newington, and Greenwich increased, Bermondsey, Newington, and Lambeth all decreased in the percentage of cholera deaths recorded in the sub-district. However, the only sub-district which experienced a decrease in crude cholera mortality was Camberwell, which recorded two less cholera deaths than the week previously. Given the increase in the total number of cholera deaths, the change in percentage shows that while cholera did increase across all the sub-districts, there were certain sub-districts which experienced a greater increase than others. Even though Lambeth still had the highest crude number of cholera deaths, the increase in St. George, Southwark, Newington, and Greenwich was more significant and their percentages rose more than Lambeth's. While Lambeth saw high number of cholera deaths in Weeks 35 and 36, the cholera experience in St. George, Southwark, Newington, and Greenwich was likely more traumatic given the rapid increase of cholera deaths between Weeks 35 and 36.

The decline of cholera after Week 36 shows patterns which suggest that the six southern sub-districts experienced the departure of cholera very differently. Even though each week showed an overall decrease of total number of cholera deaths (save Camberwell and Newington in Week 42), the rate of decrease varied widely. Figure 6.13 shows the percentage of cholera deaths in each sub-district from Weeks 37 to 42, again with the total number of cholera deaths being the sum of the six sub-districts.

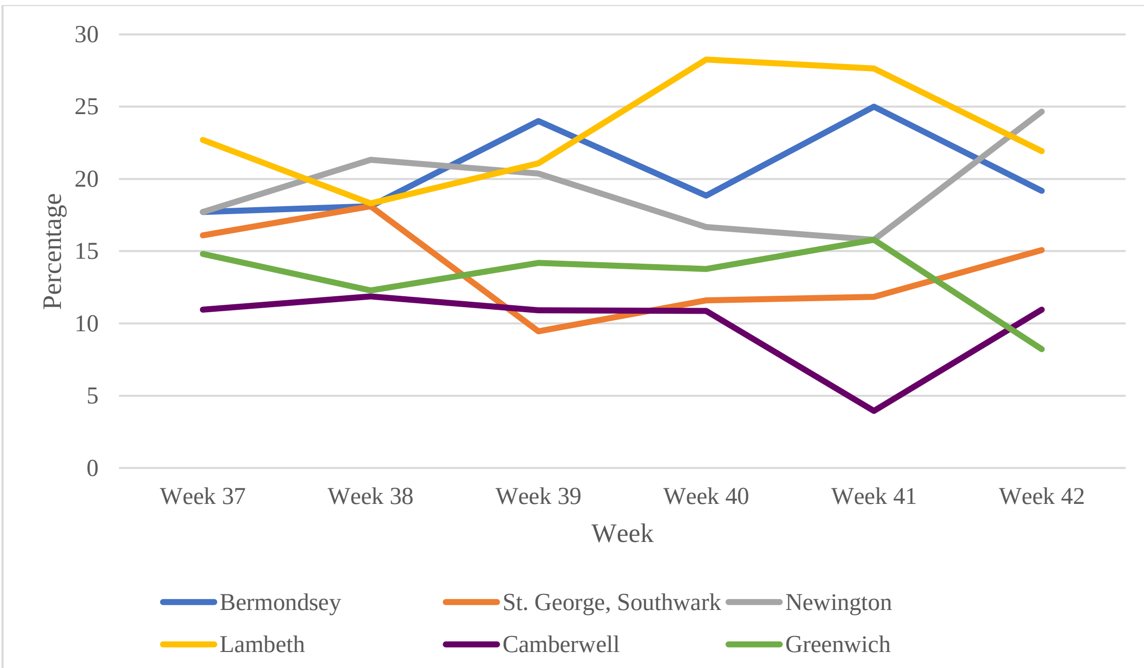


Figure 6.13 – Percent of cholera deaths, Weeks 37-42, 1854

Week 37 had the same percentage pattern as Week 36, suggesting a relatively uniform decrease of cholera deaths among the six sub-districts. Week 38 saw a definite decline in Lambeth and Greenwich, suggesting these sub-districts had a greater decrease in the number of cholera deaths compared to the other sub-districts. Week 39 shows that the number of cholera deaths in St. George, Southwark decreased significantly, while Bermondsey's decrease was much less severe and Lambeth's decline of cholera deaths past Week 38 slowed down. Based on Figure 6.13, St.

George, Southwark, Newington, and Greenwich experienced similar patterns of decline – each week, the number of cholera deaths decreased, albeit somewhat slowly – while Bermondsey had a drastic decline in Week 40 before the decline lessened in Week 41. The sudden up-turn in Camberwell and Newington in Week 42 reflected the minor increase in the number of cholera deaths the sub-districts experienced.

All of this shows the experiences of cholera throughout the sub-districts. For example, Lambeth's residents were faced with a long, slow departure of the disease as the number of deaths declined very gradually.[8] In contrast, sub-districts like Camberwell and Newington experienced rapid declines of the number of cholera deaths, and the disease did not linger nearly as much in these regions as it did in Lambeth. Understanding the disappearance of cholera gives rise to understanding how cholera moved throughout an urban environment and gives insight into how cholera was experienced in each region.

While the findings in Figures 6.12 and 6.13 conclusively point to Lambeth as the hardest-hit sub-district of the south district, it is necessary to consider one last factor which may influence the mortality patterns: population density. Table 6.2 shows the population density in each sub-district during 1854.

[8] Though the number of cholera deaths decreased each week, Lambeth's percentage increased because the total number of cholera deaths in the six sub-districts was decreasing faster than the number of cholera deaths in Lambeth, meaning that Lambeth had more cholera deaths than any other sub-district, even though the total number of cholera deaths was less than the week before.

Sub-District	Area (Acres)	Area (Square Miles)	Population (1851 Census)	Population Density (1000s of residents per Square Mile)	Cholera Deaths in Week 36	Cholera Deaths per 1000 Residents, Week 36
Bermondsey	688	1.08	48,128	45	126	2.6
St. George, Southwark	282	.44	51,824	118	84	1.6
Newington	642	.98	64,816	66	119	1.8
Lambeth	4015	6.72	139,325	21	169	1.2
Camberwell	4342	6.78	54,667	8	82	1.5
Greenwich	5367	8.39	99,365	12	134	1.3

Table 6.2 – Comparison of geographic area, population statistics, and cholera mortality in Week 36 in six south sub-districts. Note that the population density is presented as 1000s of residents per square mile, rounded up to the nearest whole number.

Table 6.2 reveals that St. George, Southwark had the highest population density by a wide margin. However, it was never once the sub-district with the highest number of cholera deaths or the sub-district which contributed the most to the total number of cholera deaths as seen in Table 6.1. This is curious, as it is easy to assume that the higher population density would imply an easier transmission between residents of the sub-district; after all, cholera was a disease spread through fecal-oral contamination, and the disease thrived in crowded, unsanitary environments. However, this was clearly not the case, as Figures 6.12 and 6.13 both show that it was Lambeth, despite its relatively conservative population density, which endured the cholera epidemic at its worst. Based on the conclusive findings throughout this section, St. James, Westminster and Lambeth will be examined in more detail in the sections below.

Cholera in St. James, Westminster

St. James, Westminster was a relatively small, but densely populated, sub-district. Its 163 acres was home to 36,406 residents in 1851, and the *Report on the Cholera Outbreak in the parish of St. James, Westminster, during the autumn of 1854* suggests that the population in the sub-district was relatively stable, meaning the population in 1854 was likely close to that in 1851.[9] The sub-district was divided into three neighbourhoods: Berwick Street, St. James's Square, and Golden Square (see Figure 6.14). While the neighbourhoods had relatively similar populations, the population density varied. Berwick Street housed 432 people per square acre; St. James's Square, 212; and Golden Square, 166.[10] The smallest neighbourhood, Berwick Street, was the most densely populated, which was certainly a contributing factor in its high cholera mortality rate. However, the least population-dense neighbourhood (Golden Square) reported a similar number of cholera deaths in Week 36. Interestingly, St. James's Square reported a mere

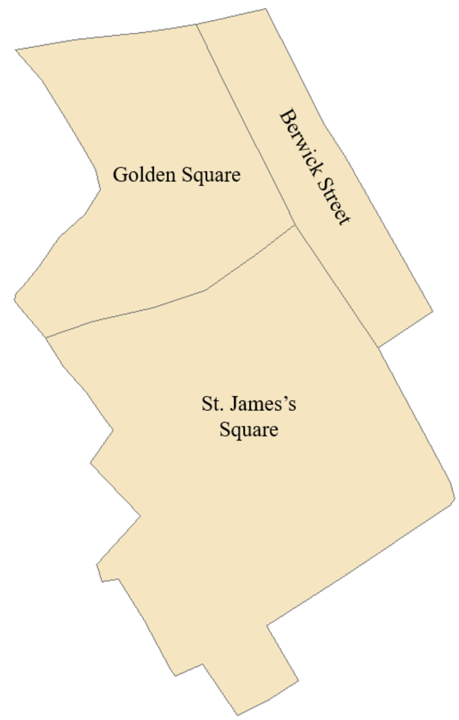


Figure 6.14 – St. James, Westminster neighbourhoods

[9] *Report on the Cholera Outbreak in the parish of St. James, Westminster, during the autumn of 1854* (London, 1855), pg. 9. This report was authored by several individuals, including the local revered, civil engineers, and medical personnel.
[10] Figure 6.14 is based on textual descriptions of the neighbourhood boundaries found in Farr's 1849 *Report on the Mortality of Cholera in England, 1848-1849*; the area figures from the 1854 *Weekly Records* suggest that Golden Square was much larger that St. James's Square (85 acres versus 54 acres). This disconnect reflects the possibility of boundary changes between 1849 and 1854, but also the challenge of geographic accuracy when digitizing old maps. For the purposes of the chapter, the figures from the *Weekly Return* are used and Figure 6.14 is included to give a sense of the geographical shape of each neighbourhood.

sixteen cholera deaths between Weeks 32 and 42, a stark comparison to the 199 and 267 cholera deaths recorded in Berwick Street and Golden Square respectively.

Given that Berwick Street and Golden Square both reported such high cholera mortality, the following discussion will consider both regions as one geographic area. As seen in Figure 6.15, there were three streets which made up the boundary line between the neighbourhoods: Poland Street, Broad Street, and Little Windmill Street. The mortality records reported cholera deaths in these streets under both Berwick Street and Golden Square, so it is easier to understand the significance of cholera mortality in St. James, Westminster by treating the two neighbourhoods as one.[11]

[11] According to the *Report*, the "cholera area" spread "out from the north-east angle of Golden Square, which is altogether excluded from it, it extends westward to King Street, north as far as Great Marlborough Street and Noel Street, east to the line of Wardour Street, and south to the Little Pulteney Street, from the west end of which its limits are expressed by a line crossing over Great Pulteney Street and Bridle Lane, returning to the north-east angle of Golden square." There was also included in the "cholera area" St. Anne's Court, Soho even though it was beyond the boundary of St. James, Westminster. The "cholera area" is described as an "irregular four-sided figure, the north and south angles of which are placed respectively near the middle of Poland Street and at the south end of Little Windmill Street, whilst the west and east points are at the north-west corner of King Street and at the east end of St. Anne's Court." *Report on the Cholera Outbreak in the parish of St. James, Westminster,* pgs. 16-17.

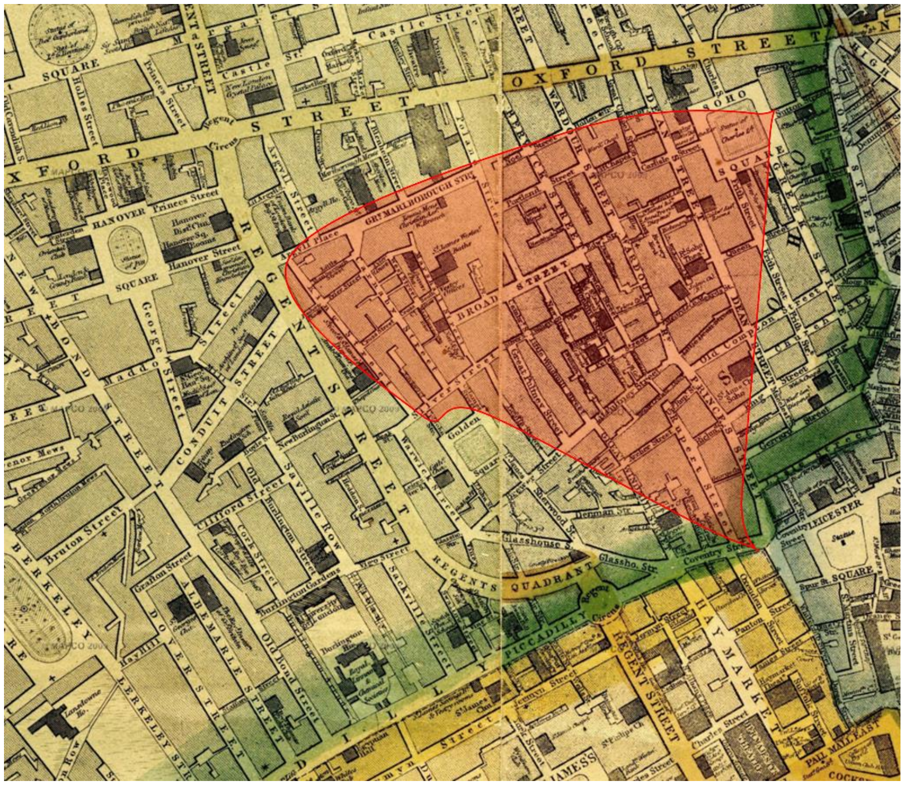


Figure 6.15 – Neighbourhoods of Berwick Street and Golden Square, with "cholera area" as defined in the Report on the Cholera Outbreak in the parish of St. James, Westminster, *during the autumn of 1854*

Within what the *Report on the Cholera Outbreak in the parish of St. James, Westminster, during the autumn of 1854* titled the "cholera area," there were "825 dwellings, St. Luke's Church, Craven Chapel, the Workhouse, a block of model lodging houses (unfinished in 1854), a brewery, and various factories and workshops."[12] The workhouse was home to approximately 500 inmates, and the population for the "cholera area" was estimated to be about 14,000 residents. Of the 825 houses, there were cholera deaths in 313 of them.[13]

The significance of cholera in Berwick Street and Golden Square is most seen in Week 36. Apart from the fact there is almost no street-level data for any other weeks other than Weeks 36 and 37, the weekly totals also suggest that Week 36 was really the only week which showed

[12] *Report on the Cholera Outbreak in the parish of St. James, Westminster*, pg. 18.
[13] *Report on the Cholera Outbreak in the parish of St. James, Westminster*, pg. 19.

considerable cholera deaths. This can be seen in Figure 6.16, which shows the sharp increase and decrease of cholera deaths in the St. James, Westminster neighbourhoods.

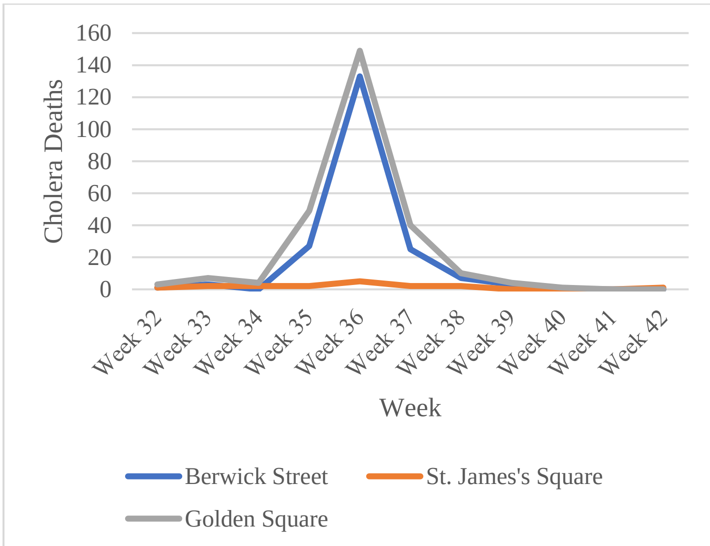


Figure 6.16 – Comparison of weekly deaths in St. James, Westminster neighbourhoods

Week 35 does show a slight rise, indicating the start of what turned out to be a significant spike in cholera deaths. Week 36 was the climax of the epidemic, and Week 37 reported numbers similar to Week 35, showing how swift the increase and decrease of cholera mortality was.

Looking at the street-level data for Weeks 36 and 37 reflect the sudden rise of cholera deaths, but also show the geographical concentration of cholera. Figure 6.17 is street-level mortality data for Week 36 in Berwick Street and Golden Square. There are three streets on the map which are coloured black: Broad Street, Berwick Street, and Marshall Street. These streets reported the most cholera deaths, with fifty-five, thirty-one, and thirty cholera deaths in Week 36, respectively. These 116 cholera deaths represent 32 percent of all cholera deaths in these neighbourhoods in Week 36. Great Pulteney Street, Poland Street, Carnaby Street, Little Windmill Street, New Street, and Silver Street are reported more than ten cholera deaths (eighteen, seventeen, fifteen, thirteen, twelve, and eleven respectively), and there were also twelve cholera deaths reported at the St. James Workhouse on Poland Street. There were thirty-seven streets which reported less than ten cholera deaths in Week 36. Of these thirty-seven, twenty-seven of them reported five or less cholera deaths.[14]

Figure 6.17 – Week 36 street-level mortality in Berwick Street and Golden Square

Week 37's mortality map (Figure 6.18) shows some interesting patterns compared to the map of Week 36. While the number of streets which reported cholera deaths decreased significantly, there were a few exceptions which suggest the spread of cholera within the neighbourhood.

[14] For a magnified version of Figures 6.17 and 6.18, see Appendix B.

Figure 6.18 – Week 37 street-level mortality in Berwick Street and Golden

While nearly all the streets showed a decrease in the number of cholera deaths between Weeks 36 and 37 – with some of them reporting no cholera deaths at all in Week 37 – there were four streets which either stayed the same or saw an increased number of cholera deaths, as well as three streets which reported cholera deaths for the first time in Week 37. Golden Square (the street) increased from three cholera deaths up to five; King Street increased from one to two; Heddon Street/Court reported one death each week; and Kemp's Court reported two deaths each week.[15] Conversely, Marlborough Court, Naylor's Yard, and Tyler's Court all reported cholera deaths for the first time in Week 37 – two, one, and one cholera deaths respectively.

[15] Heddon Street was connected to Regent Street via two small alleys. It has been called both Heddon Street and Heddon Court because of its arrangement.

Interestingly, there is no clear geographic pattern for the streets which saw an increase; Heddon Street is off Regent Street on the far west side of the Golden Square while Tyler's Court is off Wardour Street on the far east side of Berwick Square. The rest of the streets are equally interspersed throughout the two neighbourhoods. While cholera was declining, the increased number of deaths on seemingly random streets points to the contagious nature of the disease rather than a recurrence or a surge of cholera in new locations in Week 37.[16] These streets were simply unlucky, with cholera lingering slightly longer before clearing out and dropping the mortality rate of the street back to zero cholera deaths. Also "unlucky" was the Poland Street Workhouse, which reported twelve cholera deaths each week.

Of course, not every street dropped back to zero cholera deaths right away, but most streets saw a significant decline. The three heaviest hit streets, Broad Street, Berwick Street, and Marshall Street, experienced drastic declines of cholera deaths. Broad Street decreased from fifty-five deaths to a mere three, Berwick Street declined from thirty-one to seven, and Marshall Street went from thirty to three. In fact, Berwick Street reported the most cholera deaths in Week 37 with the seven deaths.

[16] Of course, it is easy for us today to understand that this disease was never "seemingly random" and that the disease was spread by water. But for nineteenth-century officials and citizens, the spread of cholera would have been perceived without a confirmed cause.

CHOLERA IN LAMBETH

The south sub-district of Lambeth did not change much between the epidemic of 1849 and 1854. Though still divided into eight neighbourhoods, the *Weekly Returns of Births and Deaths* of 1854 reports a population decrease from 143,557 to 139,325.[17] Between Weeks 32 and 42, Lambeth recorded 896 cholera deaths, which was approximately 12 percent of all the cholera deaths that occurred in the south district. This was a far cry from 1849, when cholera deaths in Lambeth made up 24 percent of all deaths in the south district. Interestingly, the south district made up approximately the same percentage of all cholera deaths in London in each epidemic – 49 versus 54 percent, which suggests that in 1849, Lambeth contributed more cholera deaths to the total number of cholera deaths in the south district than it did during the 1854 epidemic.

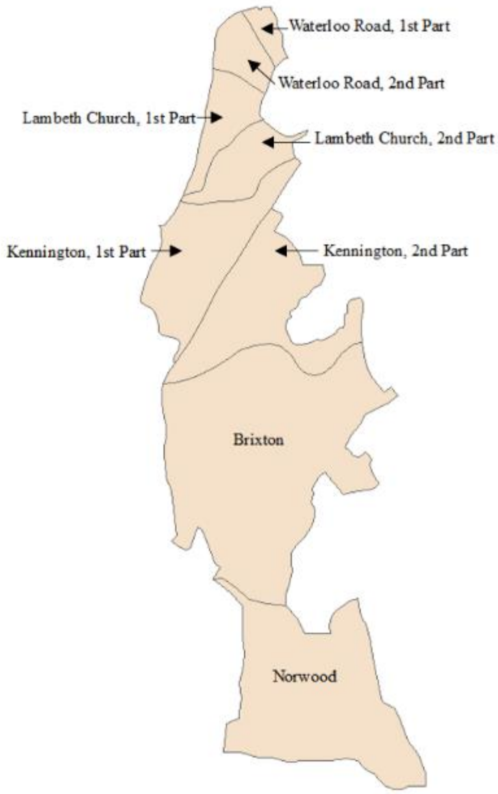


Figure 6.19 – Sub-district of Lambeth

Given that Lambeth's cholera mortality was much less in 1854, it raises the question of how cholera was distributed throughout the neighbourhood. For example, did cholera in 1854 affect Lambeth Church 2nd the most, as it did in 1849? Figure 6.20 shows the neighbourhood breakdown of cholera deaths in Lambeth for Weeks 35, 36, and 37.

[17] It must be noted that the 1849 population figure is an estimate, and the 1854 figure is the number reported in the 1851 census. Both numbers are taken directly from the *Weekly Returns of Births and Deaths*.

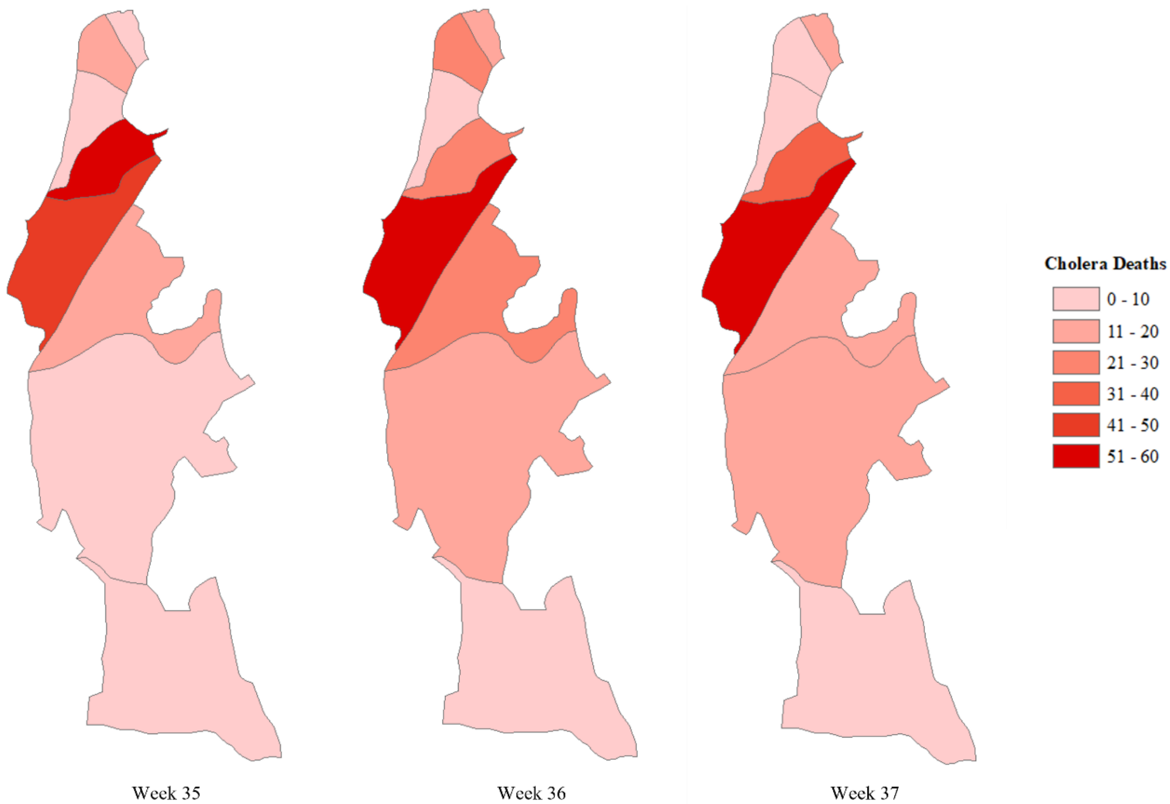


Figure 6.20 – A comparison of Lambeth neighbourhood cholera deaths, Weeks 36-37, 1854

The patterns which can be seen in Figure 6.20 are suggestive of the nature of cholera in Lambeth. Each week there is at least one neighbourhood with over fifty cholera deaths – but that neighbourhood is not consistent. Similarly, the number of cholera deaths is never consistent; apart from Norwood and Lambeth Church 1st, there is variation week-to-week in the number of cholera deaths reported – a variation that does not always follow the increase-decrease pattern that was normal for cholera mortality across Weeks 35, 36, and 37. Consider Figure 6.21.

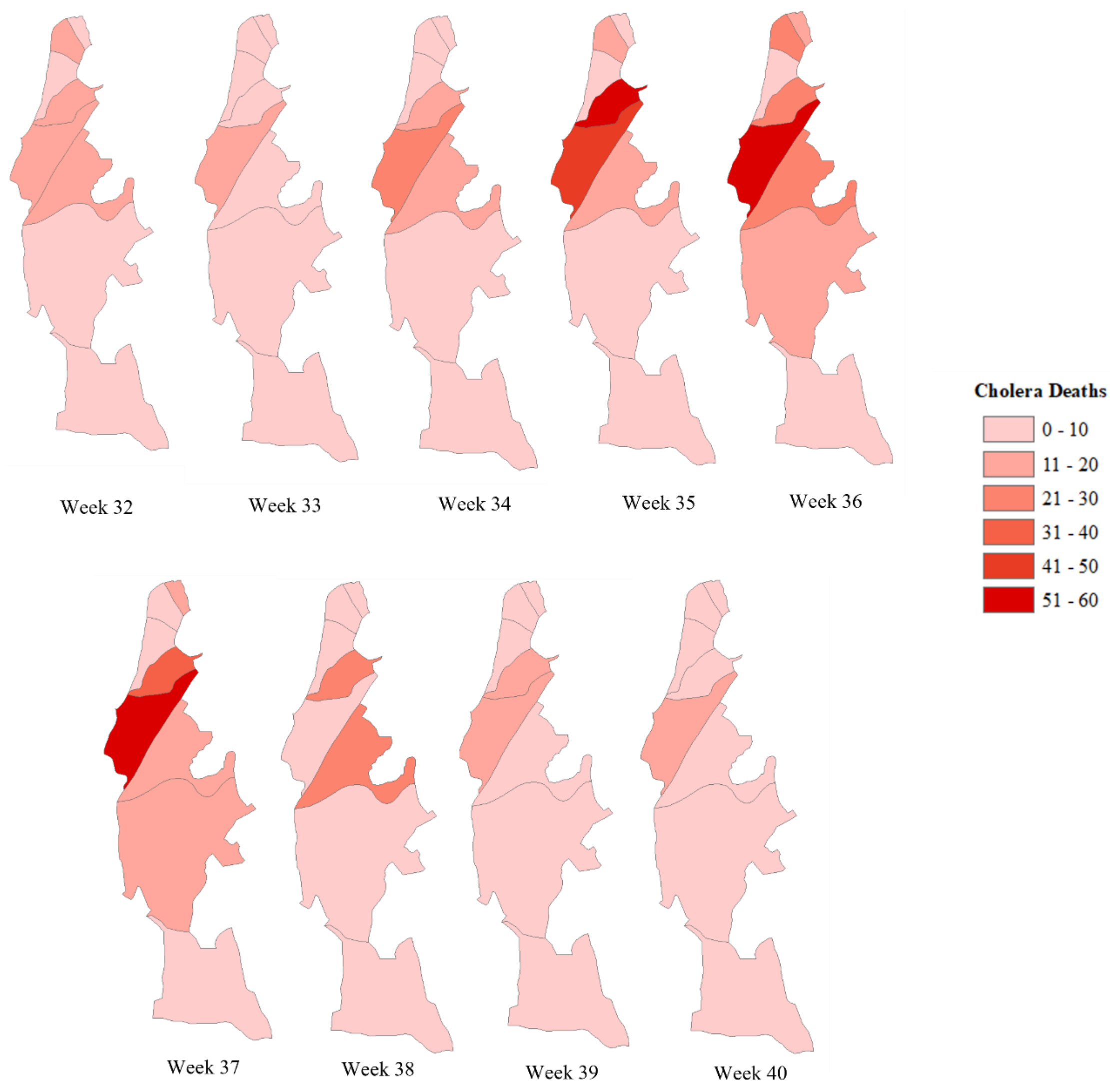


Figure 6.21 – A comparison of Lambeth neighbourhood cholera deaths, Weeks 32-40, 1854

Figure 6.21 provides context for the mortality pattern seen in Figure 6.20. It shows the increase, climax, and decrease of cholera mortality as the weeks progressed, but the change was gradual rather than occurring within Weeks 35, 36, and 37. There were many neighbourhoods which saw a slow increase in cholera deaths, and multiple weeks which registered between eleven and twenty cholera deaths. This is suggestive of a less deadly but longer lingering cholera experience in Lambeth. While there were only three weeks in which neighbourhoods registered more than fifty cholera deaths, there were several weeks when cholera deaths were more than ten in multiple neighbourhoods. So, while cholera was not a disease which struck quickly and the left the region, as was more the case in 1849, the 1854 cholera epidemic was less deadly each week but lasted much longer.

Figures 6.20 and 6.21 provide a glimpse at which regions of Lambeth experienced cholera the most significantly. In Week 35, Lambeth Church 2nd reported the most cholera deaths, with fifty-one cholera deaths. In Weeks 36 and 37, Kennington 1st reported the most, both weeks recording fifty-one cholera deaths as well. While Lambeth Church 2nd was the hardest-hit neighbourhood in 1849, Kennington 1st never experienced cholera to significant degree in 1849. Unfortunately, because the number of cholera deaths was so small in many of the neighbourhoods, the *Weekly Returns of Births and Deaths in London* included very few medical notes for any of the neighbourhoods of Lambeth in 1854, which makes it difficult to gauge how cholera spread throughout these neighbourhoods in 1854.

However, it is still worth noting the differences in cholera mortality patterns between the two epidemics. The total number of cholera deaths experienced in Lambeth decreased significantly; 1849 reported 1,407 cholera deaths in Lambeth between Weeks 30 and 40, while 1854 reported 869 cholera deaths between Weeks 32 and 42. Out of the southern sub-district, Lambeth went from contributing 24 percent to the total number of cholera deaths down to 12 percent even though the number of cholera deaths in the south district was nearly the same (5,650 versus 5,970). This suggests that even though Lambeth consistently recorded the highest number of cholera deaths, cholera in 1854 was much more spread out amongst the south sub-districts than it was in 1849, when Lambeth bore more cholera mortality than any other sub-district by a wide margin. There were changes in cholera mortality patterns within the sub-district as well. In 1849, cholera had a quick rise and decline which occurred almost exclusively in Lambeth Church 2nd. Unlike 1849, the 1854 cholera experience in Lambeth was much more drawn out, with a slow rise and decline which included multiple neighbourhoods reporting more than ten cholera deaths for weeks at a time. This is indicative of a much slower-moving cholera epidemic, with overall far fewer victims of the disease.

Public Health Response

The public health response in 1854 was similar to the response to cholera in 1849 in the way the General Board of Health approached the epidemic, with establishing committees and precepts to be followed. However, it was different because, unlike 1849, there was intense discussion surrounding the causes of cholera and water supply. The following discussion will cover both aspects, beginning with the actions of the General Board of Health and concluding with the in-depth investigations which occurred in St. James, Westminster.

The General Board of Health

The General Board of Health in 1854 was structured very similarly to what it had been in 1849. It was not until the 1855 *Metropolitan Management Act* that it experienced any great reorganization or change in authority, meaning that the actions taken by the General Board of Health in 1854 were still governed by the 1848 *Nuisances Removal and Disease Prevention Act*. Following the 1854 epidemic, Dr. John Sutherland, the Superintending Medical Inspector for the Metropolis, submitted a report to Sir Benjamin Hall, the newly appointed President of the

General Board of Health, which was presented to Parliament in 1855. The report summarized the actions taken by the General Board of Health.[18]

One of the first things Hall did upon coming into authority was to appoint nine medical inspectors to visit the infected areas of London, make mention of any nuisances, evaluate the medical attendance within a region, and ensure that provisions were in place for prompt medical care during house-to-house visitations. Their role was identical to the medical inspectors the General Board of Health appointed in 1849, and they served as one tier in the hierarchical approach the General Board of Health tried to adopt. According to the report, these nine medical inspectors submitted daily reports to Hall himself, who evaluated them daily and responded with plans of action. Apart from the medical inspectors, a medical council was created which dealt more with the scientific-based inquiries about cholera rather than the day-to-day administration of the legal powers of the General Board of Health.[19]

The dual initiatives of the General Board of Health, at least on paper, seemed much more effective than the attempts made in 1849, even though the same nuisances were often identified. Observations were made regarding open ditches and drains, insufficient and unstable housing, noxious smells and waste from trades, a lack of houses of refuge, and a lack of funds for supplementary medical attendants. Yet, despite the intricate reporting Hall required from his medical inspectors and the medical council, the General Board of Health struggled to create

[18] See John Sutherland, *Letter of the President of the General Board of Health to the Right Honourable the Viscount Palmerston: accompanying a report from DR. Sutherland on epidemic cholera in the metropolis in 1854* (London, 1855). For a brief overview of the cholera investigations of the Broad Street outbreak, see N. Paneth et al., "A Rivalry of Foulness: Official and Unofficial Investigations of the London Cholera Epidemic of 1854," *American Journal of Public Health* 88:10 (October 1998), pgs. 1545-1553; G.F.R. Barker, revised by H.C.G. Matthew, "Hall, Benjamin, Baron Llanover," *Oxford Dictionary of National Biography*, last modified 5 January 2012.
[19] "Review XII: Report on Epidemic Cholera in the Metropolis in 1854," *The British and Foreign Medico-Chirurgical Review* 13:31 (July 1855), pgs. 137-141.

effective policies to curb the spread of cholera. The downfall of the General Board of Health was found in its legal limitations. The report stated that:

> The object of the Board of Health in all the measures it undertook, was – 'To aid the local authorities, without interfering with their freedom of action, and to lead them to fulfil the obligations imposed on them by the statute, without resorting to any attempts at compulsion, by means of provision under which the President was advised that the directions could not be enforced.'[20]

While the General Board of Health had the legal authority to create policy and a structure through which to employ them, they lacked any ability to legally enforce their recommendations. This left the local boards to selectively act on the problems faced by their sub-districts, and "several Boards applied for advice, but in some instances did not act upon it; others declined assistance; and from some no answer was returned to the President's circular." Further,

> Of the few who accepted assistance, the majority were not parishes which suffered much from the epidemic. In some parishes, where inspectors of nuisances were appointed, they were so inadequately paid, that they did but little, and often resigned when their services were most required. Even the recommendations they did make were most imperfectly carried out.[21]

All of this points to why the General Board of Health's approach to epidemic cholera in 1854 was unsuccessful: it was not the General Board of Health who failed the metropolis, but rather the individual local boards who failed to act upon the recommendations given to them. The General Board of Health recognized this, as the Report concluded by stating that "more ample powers are required than now exist for the enforcement of sanitary improvements."[22] This power would come less than a year later, with the adoption of the 1855 *Metropolitan Management Act.*[23]

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[20] "Review XII: Report on Epidemic Cholera in the Metropolis in 1854," pg. 140.
[21] "Review XII: Report on Epidemic Cholera in the Metropolis in 1854," pg. 140.
[22] "Review XII: Report on Epidemic Cholera in the Metropolis in 1854," pg. 141.
[23] It was Sir Benjamin Hall who put this bill forth to Parliament on March 16, 1855. Barker, "Hall, Benjamin, Baron Llanover."

However, despite its lack of legal enforcement, the General Board of Health's Medical Committee for Scientific Inquiries demonstrated an important factor in the 1854 epidemic that was not present five years prior: the emphasis on understanding cholera's origin and transmission. The Medical Committee was divided into three separate committees, each of which focused on a different aspect of the epidemic. The Committee for Scientific Inquiries was driven by the desire to understand the causation of cholera; the Treatment Committee evaluated the effectiveness of different methods of treatment; and the Committee for Foreign Correspondence was intended to converse with other countries experiencing cholera and compare experiences, though ultimately this committee failed to produce any reports or valuable insight.[24] The *Report of the Committee for Scientific Inquiries* was published in 1855 and throughout its sixty-six pages are multiple observations about every aspect of the scientific aspect of cholera. The report is divided into three main sections: Statistics, Etiology, and Practical Pathology.[25] Of particular interest to the question of public health response is the second section, Etiology.

This section of the report was primarily written by Mr. Glaisher of the Royal Observatory in Greenwich, Dr. R.D. Thomson and Mr. Rainey, both employed by St. Thomas's Hospital, and Dr. Arthur Hill Hassall, a microscopist.[26] Mr. Glaisher's "inquiries have relative to the *pressure of the atmosphere*, total and aqueous; to its *temperature*, mean and extreme; to its *moisture*, absolute and relative; to its *density*; to the directions and amount of its *movements*; to the *chemical and electrical* influences that act in it; to *haze, fog, mist*, and *rain-fall*."[27] Alongside these detailed observations, complete with tabulated data, are comparisons made with

[24] *Report of the Medical Council to the Right Hon. Sir Benjamin Hall in Relation to the Cholera-Epidemic of 1854* (London, 1855), pg. 3.
[25] *Report of the Committee for Scientific Inquiries in Relation to the Cholera-Epidemic of 1854* (London, 1855), pg. 4.
[26] *Report of the Committee for Scientific Inquiries*, pgs. 24, 42.
[27] *Report of the Committee for Scientific Inquiries*, pg. 26.

meteorological and atmospheric data from 1832 and 1849. What Mr. Glaisher's studies revealed was an intense desire to understand the nature of cholera from a scientific perspective and the recognition that without a strong comprehension of its cause, public health initiatives were only one half of the fight against cholera.

Of particular note during the 1854 epidemic was the focus on water quality. Dr. Thomson and Dr. Hassall approached their investigations into the quality of water chemical and microscopical perspectives, both done concurrently. The primary approach of investigating the water quality was collecting water samples and testing for the presence of contaminants.[28] It was the presence of organic matter which really differentiated the water samples and provided an index of the quality of water from different water companies. The 1852 *Metropolitan Water Act* had laid out guidelines for the quality of acceptable water, which was mostly directed at company's intake source along the Thames, as the place of intake had a direct correlation with the number of grains per gallon. In 1855, the Lambeth Company was the only water company whose intake pipes met the requirements set out by the *Water Act*, though Dr. Hassall noted that "[while] it is the best … it is not good."[29] After the Lambeth Company, in descending order, were Kent Grand Junction, East London, West Middlesex, New River, Southwark and Vauxhall, and Chelsea companies. The Southwark and Vauxhall Company and the Chelsea Company "greatly surpass the others in badness" because "both draw from that part of the river, where the water is brackish from marine tides, and where an immense infusion of sewage proceeds

[28] The categories provided in their table of results were organic matter; silica; sesquioxide of iron, alumina and phosphates; carbonate of lime; sulphate of lime; chloride of calcium; nitrate of lime; carbonate of magnesia; carbonate of soda; sulphate of magnesia; chloride of magnesium; sulphate of potash; sulphate of soda; chloride of sodium; and carbonate of ammonia. *Report of the Committee for Scientific Inquiries*, pg. 40.
[29] Interestingly, the number of grains per gallon in water samples varied widely depending on when and where the sample was collected, regardless of which company supplied it. This implies that water quality was never constantly good or bad, but that it varied by location. However, it was still possible to provide a broad index of quality for each company. *Report of the Committee for Scientific Inquiries*, pgs. 41-45.

uninterruptedly."[30] Overall, Drs. Thompson and Hassall found that London's water companies provided impure water throughout the city.

The two doctors also considered water supply via superficial wells, of which there were hundreds throughout London, and deep-water wells, also numerous in heavily populated neighbourhoods. Unlike water companies, these wells drew water directly from the water table below the city. Superficial wells were "filtered through a porous soil, full of organic impurities, – that they contain sometimes evident sewage matter, sometimes an abundance of nitrates or of ammonia derived from the decomposition of animal substances, sometimes a variety of those animal and vegetable organisms which attest the progress of delay."[31] Deep-water wells, however, proved much purer than even water provided by water companies, though a note of caution was issued that an apparent absence of grains-per-gallon does not immediately qualify it as fit to drink.[32]

The section of the *Report of the Committee for Scientific Inquiries* on etiology concludes with an aside about the experience of cholera in Soho. As mentioned above, the focus on cholera in St. James, Westminster (one specific neighbourhood within Soho) is one of the things which makes the 1854 cholera epidemic unique and, indeed, it was the focus of several reports and investigations, many of which will be discussed below. However, the Committee for Scientific Inquiries paid little attention to what had happened in St. James, Westminster, instead focusing on broader patterns of cholera mortality, its treatment, and potential factors of causation across London as a whole. The only reference explicitly made to St. James, Westminster is a three-page supplement at the end of their discussion on water quality. They had conducted their own

[30] *Report of the Committee for Scientific Inquiries*, pg. 45.
[31] *Report of the Committee for Scientific Inquiries*, pg. 44.
[32] *Report of the Committee for Scientific Inquiries*, pg. 44.

investigation into the Broad Street Pump, which Dr. John Snow famously identified as the source of the severe outbreak experienced in St. James, Westminster. In an attempt to confirm Snow's theory about the Broad Street pump, the Committee considered the living conditions, population density, meteorological conditions, and water analysis and concluded "we see no reason to adopt this belief," as they did "not find it established that the water was contaminated in the manner alleged; nor is there before us any sufficient evidence to show, whether inhabitants of the district, drinking from that well, different in proportion more than other inhabitants of the district who drank from other sources."[33] Though they denounced Snow's theory about the origin of cholera in St. James, Westminster, the Committee did acknowledge that the water from that pump could have acted as a "vehicle of choleric infection" given that it was considerably impure.[34]

Overall, the Committee for Scientific Inquiries ended their report with the admission that while they had done vast investigations into the different potential causes of cholera, there was ample work left to do to fully understand the nature of the disease.[35] However, the fact that this committee existed within a Medical Council demonstrates that the General Board of Health was undertaking significant measures to address the threat of cholera, far more than had been done in 1849. While the hierarchical structure of the local boards and medical inspectors remained the same as five years earlier, the president of the General Board of Health in 1854, Sir Benjamin Hall, ensured that communication was much more transparent and consistent with the hopes of effectively understanding the epidemic as it progressed. Further, the establishment of the Medical Council was a new response, one which echoed the rising tide of scientific inquiry and

[33] *Report of the Committee for Scientific Inquiries*, pg. 52.
[34] *Report of the Committee for Scientific Inquiries*, pg. 52.
[35] Of course, it is prudent to remember that the Scientific Committee was only one of three committees which formed the Medical Council, and the summary provided above is just that: a summary of what was just a fraction of the work and investigations undertaken by the Medical Council in attempts to understand cholera. *Report of the Committee for Scientific Inquiries*, pgs. 65-66.

investigations into health, the human body, and the relationship of public health and epidemic disease.

St. James, Westminster

The epicenter of the 1854 cholera outbreak was, without question, the sub-district of St. James, Westminster. As detailed earlier in the chapter, St. James, Westminster was made up of three neighbourhoods and had a population of approximately 36,000 people in its 163 acres. The cholera experience in St. James, Westminster gained notoriety for two distinct reasons. First, cholera arrived quickly and was deadly, and the number of cases increased at an alarming rate. However, as quickly as it came, it left. The number of cases declined as rapidly as it had increased, all within the span of about six days.

The second reason St. James, Westminster is noteworthy during the epidemic was the work of Dr. John Snow, who produced one of the first ever epidemiological maps plotting mortality.[36] Using this map, he was able to pinpoint what he believed to be the cause of cholera in the sub-district: the Broad Street pump. He was so convinced that he petitioned the local board on September 7, 1854, and had it removed, thus seemingly ending the outbreak. His actions in early fall of 1854 have made him famous among epidemiologists and public health historians, and his work is heralded as one of the first major public health success stories.[37] These modern claims

[36] There is some debate in the literature about the accuracy of this claim which argues that Edmund Cooper, who was an engineer for the Metropolitan Commissioner of the Sewers, was the first to draw a map plotting mortality in Broad Street. Howard Brody et al., "Map-making and myth-making in Broad Street: the London Cholera Epidemic, 1854," *Lancet* 356 (2000), pgs. 64-68.

[37] There are dozens of books and articles which detail John Snow's work and life which span many disciplines – history, science, public health, medicine, and epidemiology. Many of the works focus on his cholera map and identifying the Broad Street pump as the source of cholera in Berwick Street. For example, Laura Ball, "Cholera and the Pump of Broad Street: The Life and Legacy of John Snow," *History Teacher* 431:1 (November 2009), pgs. 105-119; Peter Vinten-Johansen et al., *Cholera, Chloroform, and the Science of Medicine: A Life of John Snow* (Oxford, UK: Oxford University Press, 2003); Sandra Hempel, *The Medical Detective: John Snow and the Mystery of Cholera* (London: Granta, 2006); Steven Johnson, *The Ghost Map: A Street, an Epidemic and the Two Men who Battle to Save Victorian London* (London: Allen Lane, 2006); "The John Snow Archive and Research Companion,"

may be overstated, as they do not tell the whole story. The response to cholera in St. James, Westminster needs to be discussed when considering the impact of public health actions and epidemic cholera.

One of the foremost documents published which details the cholera experience in St. James, Westminster is the *Report on the Cholera Outbreak in the Parish of St. James, Westminster, during the Autumn of 1854*. It was published in 1855 "for the purpose of investigating the causes, arising out of the sanitary condition of the Parish, of the late outbreak of Cholera in the districts of Golden Square and Berwick Street."[38] The report was actually a collection of reports: a report by the Cholera Inquiry Committee that had been appointed by the vestry board of St. James, Westminster; a report by Dr. Snow; a report by Reverend H. Whitehead, who was the assistant curate of St. Luke's parish in Berwick Street; and a report written by Mr. York, which was ordered by the committee to investigate the sewage and drains of the sub-district. Together, these reports provide an in-depth view of what happened in St. James, Westminster.

The first thing to consider is the main report submitted by the vestry to the Cholera Inquiry Committee. The report has four headings: history of the outbreak; circumstances attending the outbreak; hypotheses concerning the outbreak; and recommendations of the committee to the parochial authorities.[39] The majority of this report is descriptive, providing a day-by-day account of cholera in the district as well investigations into many of the same things with which the Medical Council's Committee for Scientific Inquiry concerned themselves. There are sections

available online at: https://johnsnow.matrix.msu.edu/index.php; "John Snow Site," *UCLA Department of Epidemiology, Fielding School of Public Health*, available online at: https://www.ph.ucla.edu/epi/snow.html.

[38] *Report on the Cholera Outbreak in the Parish of St. James, Westminster*, pg. iii.

[39] *Report on the Cholera Outbreak in the Parish of St. James, Westminster*, pg. viii.

which address weather patterns, topographical studies, atmospheric conditions, and, of course, studies on sewers and water supply.

The "cholera area," as described above, was serviced by two water companies: the Grand Junction Company and the New River company. However, the report is quick to state that while it may seem obvious that these companies both contributed to the cholera outbreak, it "seems very unlikely when we consider the suddenness and limited extent of that outbreak … [the companies] had no share at all."[40] Given the apparent certainty that the piped water was not the issue, the investigations concerning water supply turned to the well water supply. The multitude of private and public wells were supplied by "abundant land springs which exist in the sand lying above the clay."[41] Many of them were lined with brick, through which the ground water, and rainwater in placed, seeped through. There were two wells in particular that were so well fed naturally that they could not be pumped dry; the report insinuates that this alone increased the risk of unwanted seepage into the water supply, a fact that would be become increasingly important as the investigations continued.[42] As part of the investigations, water samples were taken from several wells and analysed for their quality. See Figure 6.22 below.

[40] *Report on the Cholera Outbreak in the Parish of St. James, Westminster*, pg. 69.
[41] *Report on the Cholera Outbreak in the Parish of St. James, Westminster*, pg. 70.
[42] *Report on the Cholera Outbreak in the Parish of St. James, Westminster*, pg. 71.

Analysis of Waters from

	Spring at the Northern end of Kensington Gardens. — Collected 4th June, 1855.	Hyde Park, near the Serpentine. — Collected 1st June, 1855.	Marlborough Mews. — Collected 2nd June, 1855.	Private Well. — Collected 5th June, 1855.	Broad Street. No. 1. — Collected 9th June, 1855.	Broad Street. No. 2. — Taken after three pumpings out of the Well, 14th June, 1855.	The Thames at Kew; the source of supply of the Grand Junction Company.
Specific Gravity,	1000·454	1000·377	1000·438	1000·997	1000·998	1000·873	
	GRAINS IN IMPERIAL GALLON.						
Carbonic Acid,	8·214	9·170	14·299	13·888	26·374	24·644	5·39
Chlorine,	2·593	2·808	3·413	7·504	11·240	10·592	·84
Sulphuric Acid,	9·511	13·860	9·890	10·150	12·970	12·970	2·31
Lime,	6·051	11·765	10·280	17·542	23·998	23·347	7·42
Magnesia,	2·593	2·754	1·607	1·428	1·944	2·161	·56
Soda,	4·430	2·156	{ & Potassa about 6·500 }	7·580	16·861*	16·861	·84
Potassa,	0	0	See Soda.	0	0*	0	·56
Iron,	Trace.	Trace.	Trace.		Considerable.	Not quite so much.	(Peroxide) ·63
Phosphoric Acid,	Trace.	Trace.	Trace.	Trace.	Trace.	Trace.	(Silica).
Nitric Acid,	Trace.	Trace.	Considerable.	Considerable.	Much.	Very much.	Trace.
Ammonia,	0	0	Considerable.	Trace.	†	†	·42
Organic Matter,	5·404	3·080	·432	5·404	5·404	4·755	3·08
Total estimated	38.796	45·593	46·421	63·496	98·791	95·330	22·05
Residue after Evaporation, 212° Fh.	45·388	50·404	56·000	80·388	107·015	105·933	
Analysed by	W. J. Powell.	T. J. Smith.	P. Worsley.	J. Ormsby.	W. J. Powell.	W. J. Powell.	Graham and Hoffmann.

* This was not estimated, but inferred from Specimen No. 2.

† In Specimen No. 2, the process for detecting Ammonia was interrupted by an accident. Ammonia no doubt existed in both Specimens.

Figure 6.22 – An analysis of water from various water companies. Taken from Report on the Cholera Outbreak in the Parish of St. James, Westminster*, pg. 73.*

The water taken from Broad Street contained nearly one hundred grains per gallon, indicating its impurity was far above the other local wells. The report explains this: "the contamination of the water in the well in Broad Street by filtration from a cesspool during the time of the Cholera outbreak is rendered certain by the result of Mr. York's investigations made in April."[43] The report made by Mr. York, along with Dr. Snow's *On the Mode of Communication of Cholera*, are the next reports to be considered and discussed.

Dr. John Snow originally published *On the Mode of Communication of Cholera* in the wake of the 1849 cholera epidemic. He had already expressed his suspicion about the relationship between cholera outbreaks and contaminated water, suggesting a fecal-oral

[43] *Report on the Cholera Outbreak in the Parish of St. James, Westminster*, pg. 74.

transmission. However, it was accepted as one of many theories, and not much action came of it. His investigations on the 1854 epidemic changed that, and his work quickly turned the opinion of the local Board of Guardians, who acted in response to his investigations of the Broad Street Pump. His pamphlet, like so many studies on cholera at the time, considered many facets of the epidemic including transmission between people, the evolution of symptoms in its victims, and, of course, its causation. However, Snow did not focus exclusively on Broad Street; in fact, his investigations of Broad Street make up a mere fifteen pages in the one-hundred-and-thirty-seven-page document. However, it was in these fifteen pages that Snow became known as the father of modern epidemiology.

John Snow's famous cholera map (Figure 6.23) evolved following a basic process. Requesting the list of cholera deaths from the General Register Office, Snow began plotting the fatalities on a map and noted that "nearly all the deaths had taken place within a short distance of the pump," and those that were not within immediate vicinity had water delivered to their home from that pump, "as they preferred the water to that of the pump which was nearer."[44] Snow concluded that "the result of the inquiry then was, that there had been no particular outbreak or increase of cholera, in this part of London, except among the persons who were in the habit of drinking the water of the above-mentioned pump-well."[45]

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[44] John Snow, *On the Mode of Communication of Cholera*, 2nd edition (London, 1855), pgs. 39-40.
[45] Snow, *On the Mode of Communication of Cholera*, pg. 40.

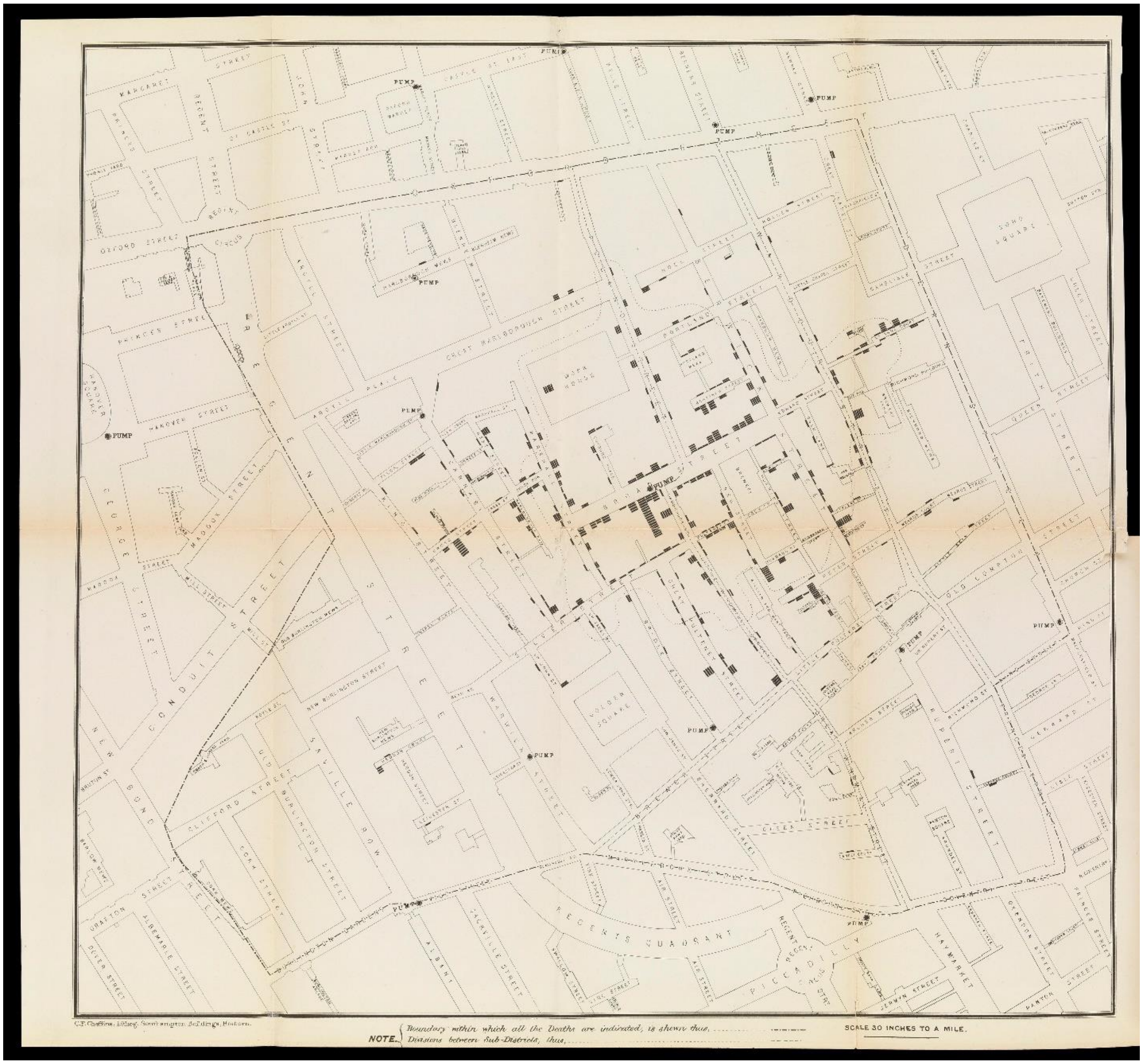

Figure 6.23 – "A map taken from a report by Dr. John Snow." Courtesy of Wellcome Images, available online at https://wellcomecollection.org/works/uxgfjt62.

Snow petitioned the Board of Guardians of St. James's parish on Thursday, September 7, 1854. Having been swayed by his evidence, they removed the pump hand on September 8.[46] When cholera deaths began to decline, it was assumed that the removal of the pump handle was the reason and was heralded a success.

[46] John Snow, "The Cholera Near Golden Square, and at Deptford," *Medical Times and Gazette* 9 (23 September 1854), pgs. 321-322.

Mr. York's report on the drainage, sewers, and water surrounding the Broad Street pump confirmed Snow's theory that cholera emanated from this source. The Broad Street pump was located just outside of No. 40 Broad Street. The drain of this house was small, brick-lined and covered with stone, and sloped towards the main sewer. Once the floor of the drain was cleared of about two inches of silt residue, the "mortar joints of the old stone bottom were found to be perished, as was also all the jointing of the brick sides, which brought the brick work into the condition of a sieve, and through which the house drainage water must have percolated for a considerable period."[47] The main drain contained a mis-constructed cesspool that served as a collection for a privy and "upon removing the brickwork of the cesspool was found to be in the same decayed condition as the drain." The cesspool was intended to prevent noxious smells and vermin from entering the house, but because of its misconstruction, did the opposite. The "fatal effect it would have in driving or forcing any deleterious fluid matter into the ground and parish well adjoining, by preventing its running direct into the current of the house drain" was obvious: cholera emanated from the Broad Street Pump which was diluted with sewage due to a mis-constructed cesspool outside of No. 40, Broad Street.[48] Figure 6.23 shows the layout of the drains and cesspool.

[47] J. York, *Mr. York's Report*, in *Report on the Cholera Outbreak in the Parish of St. James, Westminster* (London, 1855), pgs. 170-171.
[48]York, *Mr. York's Report*, pg. 171-172.

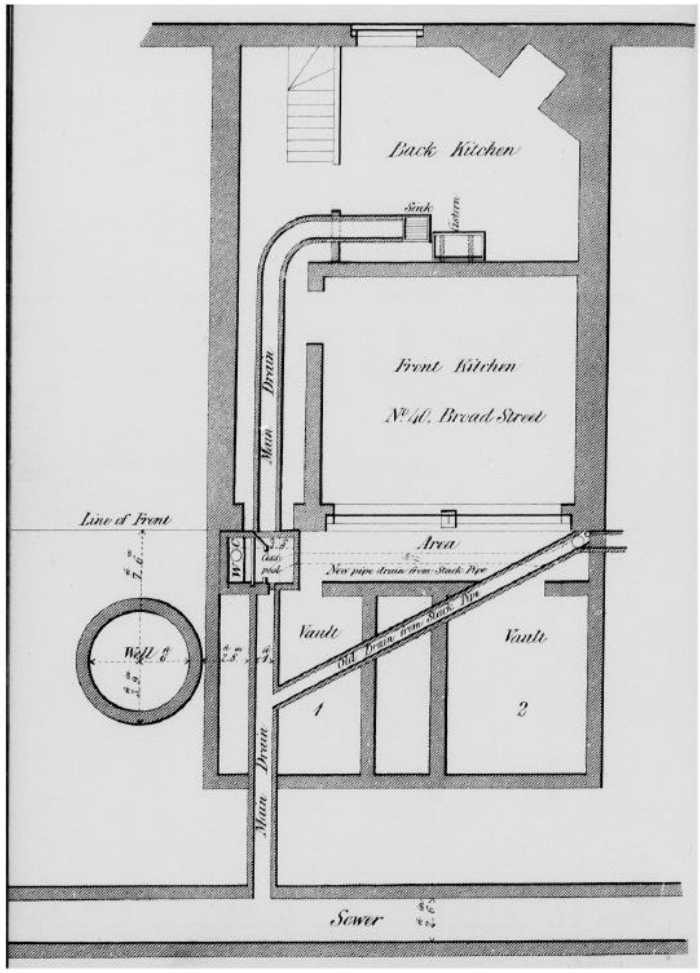

Figure 6.24 – Diagram of the drains, cesspool, and well outside of No. 40, Broad Street. Taken from Mr. York's Report*, pg. 169.*

A crucial question remains: how was this allowed to happen, especially in an era when public health initiatives were a top priority for the General Board of Health? There had been a significant amount of work done on the sewers and drains in St. James, Westminster during 1851 and 1852.[49] A report by Edmund Cooper, an engineer, to the Metropolitan Commission of Sewers stated that a new sewer was built along Broad Street, between Cambridge-street and

[49] Interestingly, one theory was that cholera had actually been caused by the construction of the new drain, as it disrupted a nearby pest-field. Further, the construction removed layers of soil and sand, which were replaced with rubbish, which led to a different form of filtration and drainage. *Report on the Cholera Outbreak in St. James, Westminster*, pg. 61.

Marshall-street. However, on the other portion of Broad Street, “no works whatever have of late years been carried on, the sewer there having been built in the year 1823, which discharges itself into Berwick-street, and is entirely unconnected, and perfectly independent, of the sewer above alluded to, built in 1851.”[50] The construction of the new sewer in 1851 did not fully address the drainage problems in St. James, Westminster, which led to cholera being able to take hold through a mis-constructed cesspool, which contaminated the local water supply.[51]

Knowledge of the updated sewers is only one half of the answer to the question of how this was able to happen. While the infrastructure was faulty, there were human involvements which played an important role as well. The best source for understanding the human actions which contributed to, and in response to cholera, are the reports written by Reverend Whitehead, who was the assistant curate at St. Luke’s on Berwick Street. He penned at least two reports, one which was published as an independent pamphlet entitled *The Cholera in Berwick Street* and one which is included in *Report on the Cholera Outbreak in the Parish of St. James, Westminster*. The contents of these two reports overlap heavily, and they provide a resident-oriented account of cholera in the parish. Rev. Whitehead attended many houses during the cholera outbreak, interviewing residents on when and how cholera came into their homes, and what water they consumed. Many of the conclusions Rev. Whitehead drew supported Snow’s theory about the Broad Street Pump, but one question Rev. Whitehead wanted to answer was where did the outbreak originate?

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[50] Edmund Cooper, *Report to the Metropolitan Commission of Sewers on the house-drainage in St. James, Westminster during the recent cholera outbreak* (London, 1854), pg. 1.
[51] For more details on the construction of the new sewer, consult the following reports: York, *Mr. York’s Report*; Mr. Cooper’s *Report of the Metropolitan Commission of Sewers*; and *Report on the Cholera Outbreak in St. James, Westminster*, pgs. 58-69.

While reading the Registrar's *Returns* in his studies of the epidemic, Rev. Whitehead came across the following entry: "At 40, Broad Street, 2nd September, a daughter, aged five months, exhaustion, after an attack of Diarrhoea four days previous to death."[52] Rev. Whitehead recalled the case, as he had been summoned to see the infant, and turned his attention to the details of the baby's illness. The occupants at No. 40, Broad Street were Mr. Thomas Lewis, his wife Sarah, and their daughter, Frances.[53] Frances had been a sickly child from birth, with frequent attacks of diarrhoea and gastro-related illnesses, though she always seemed to recover. On Monday, August 28, at six o'clock in the morning, she experienced another bout which was attended by Dr. Rogers, who reported that

> Its dejections were pale, slimy, and water, smelt very offensive; the mother tells me they were now and then of a mixed greenish and cream colour; this state of purging and sickness continued till Wednesday (30th)(*sic*). I never saw, that I can remember, what might be taken for Cholera stools, - she never looked bluish, had no cramps, there was no cold stage or collapse, nor subsequent fever, and she always passed her urine which stained the napkins. From Wednesday (30th) till Saturday (2nd) there was no purging or sickness, she could take but little food, and appeared quite exhausted, and died very quietly on Saturday at 11 a.m., aged 5 months.[54]

Rev. Whitehead returned to No. 40 and asked Mrs. Lewis about Frances's illness. She confirmed that the dejections that had begun on August 28 had ceased by August 30, and that, while nursing her child, "the dejections were collected in napkins, which, on being removed, were immediately seeped in pails, the water from which was poured partly into a sink in the backyard, and partly into a cesspool in the front area."[55] Though baby Frances did not present with typical cholera symptoms, Rev. Whitehead wrote "I cannot but feel that, whatever uncertainty there may be

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[52] Revered Whitehead, *Report of His Special Investigation of Broad Street*, in *Report on the Cholera Outbreak in the Parish of St. James, Westminster* (London, 1855), pg. 159.
[53] For information about this family, and the records pertaining to their lives and death at No. 40, see Dave Boylan, "Finding Baby Lewis. A genealogist's search for the full name of the probable index case in the 1854 Golden Square cholera outbreak," available online at: http://kora.matrix.msu.edu/files/21/120/15-78-AD-22-johnsnow-a0a1f7-a_11479.pdf.
[54] Rev. Whitehead, *Report of His Special Investigation of Broad Street*, pgs. 163-164.
[55] Rev. Whitehead, *Report of His Special Investigation of Broad Street*, pg. 159.

about the nature of infantile diarrhoea, the plain fact of this child's dejections being poured into a cesspool (the connection between which and the pump well has been clearly established) for a period of three days immediately preceding a great outburst, the phenomena of which point so decidedly to the pump as its origin, is indeed a very remarkable coincidence."[56] Reverend Whitehead identified baby Frances Lewis as what we would now call "Patient Zero" in the Broad Street cholera outbreak, and a mother's ministrations as the cause of an epidemic of never-before-seen magnitude in the parish of St. James, Westminster.

All the reports discussed above, those from the Medical Council and those investigating the parish of St. James, Westminster, paint a picture of the public health response to cholera in 1854. The public health response was two-fold: there were the precepts circulated to the local boards which echoed of the actions taken in 1849 and encouraged house-to-house visitation, removal of nuisances, and prompt medical attention. These actions had limited success, again an echo of 1849. The lack of initiative of local boards to follow these steps led to pockets of cholera across London. However, the second prong of the public health response had much more promising results. Following the epidemic there were many studies undertaken to understand the origins of cholera, and to make sense of what exactly had happened in the fall of 1854 which led to such an epidemic. Most of these studies focused on St. James, Westminster and there were public health actions taken in response to these investigations. The most famous, of course, was the removal of the Broad Street pump after Dr. Snow identified it as the common factor among most of the cholera victims. Careful investigations followed, and it became clear that the old sewer running half the length of Broad Street was old and crumbled in many places, including at No. 40, where the old cesspool was in a similar state of disrepair. When Sarah Lewis deposited

[56] Rev. Whitehead, *Report of His Special Investigation of Broad Street*, pgs. 162-163.

her child's disease-ridden feces into the cesspool, it contaminated the water supply and cholera spread unparalleled in the neighbourhood.

At first, this seems like a landmark victory in the evolution of public health response to epidemic cholera. Many historians uphold it as such, as does popular history. However, upon closer inspection, its notoriety is called into question. Reverend Whitehead compiled daily lists of mortality in his parish, which is recreated below.

Date	**Deaths**
August 19-30	0
August 30	1
August 31	1
September 1	42
September 2	63
September 3	41
September 4	43
September 5	23
September 6	21
September 7	17
September 8	16

Table 6.3 – Number of daily deaths in Broad Street from August 19 to September 8, 1854. Taken from Whitehead, The Cholera in Berwick Street, *2nd edition, (London, 1854), pg. 12.*

Consider that the Broad Street pump handle was not removed until September 8. The rapid rise and fall of cholera in the parish occurred *before* the pump handle was removed, which suggests that while the Broad Street pump may have been the origin of cholera in the parish, removing the pump hand was *not* the cause of cholera's decline. Reverend Whitehead noted this himself, questioning the role of the pump water in the epidemic's decline. He suggests that, once again, it was human actions which determined the fate of cholera: "for instance, the drinkers of the pump water were not so numerous when so many who habitually used it were already dead." He also wondered if "the unusual drain upon the well, caused by the intense thirst of the sufferers, who, as I have said, were generally supplied with the pump water, might in some measure account for the rapid change in its quality." He ends by saying that "for my own part I cannot state, from the facts before me, whether the water did actually get continually purer, or whether it first became purer and then got worse again."[57] It is possible that cholera simply ran out of victims: given that so many had already died, as observed by Rev. Whitehead and in conjunction with Snow's observation that "the mortality would undoubtedly have been much greater had it not been for the flight of the population," it is possible that there were so few unaffected persons in the general vicinity left to contract the disease.[58] Indeed, Snow expanded:

> Persons in furnished lodgings left first, then other lodgers went away, leaving their furniture to be sent for when they could meet with a place to put it in. Many houses were closed altogether, owing to the death of the proprietors; and in a great number of instances, the tradesmen who remained had sent away their families: so that in less than six days from the commencement of the outbreak, the most afflicted streets were deserted by more than three-quarters of their inhabitants.[59]

Overall, between the diminishing population – either because of deaths or flight in the face of an epidemic disease – there was a significant chance that cholera lost its footing because of a lack of hosts. Of course, this is a mere hypothesis, but the point remains: the removal of the Broad Street pump handle is perhaps one of the most over – and unjustly – celebrated public health moments in modern history, given that its removal occurred after cholera cases had already begun declining in a significant way.[60]

[57] The last question about the purity of the water, reflects the slight increase on September 4 before the decline continues. Rev. Whitehead, *Report of His Special Investigation of Broad Street*, pg. 162.
[58] Snow, *On the Mode of Communication of Cholera*, pg. 38.
[59] Snow, *On the Mode of Communication of Cholera*, pg. 38.
[60] Snow himself admitted that the pump handle was removed after the decline in cholera deaths had already begun in a letter to the editor of the *Medical Times and Gazette*. Snow, "The Cholera Near Golden Square, and at Deptford."

This is not to say that the 1854 cholera epidemic did not have public health responses which deserve to be celebrated. In fact, the emphasis placed on water and the in-depth investigations into the state of the sewers did a great deal to address the threat of cholera, and unbeknownst to them, a variety of other diseases, in the future. A very pointed response was addressing the issue at No. 40: "the old drainage [at No. 40 Broad Street] has been removed, the cesspool destroyed, and new tubular pipe drains with cemented joints, and a syphon trapped closet have been substituted."[61] On a much larger scale, improvements to the water supply and drains throughout London continued to be updated over the years, with a focus on drawing in purer water in accordance to the 1852 *Metropolis Water Act*, and creating a more integrated network of connected drains and sewers. Though perhaps a relatively detached public health response to the cholera epidemic in 1854, as it was quite broad and not exclusively driven by the threat of cholera, the investigations undertaken during this epidemic undoubtedly pointed to the importance of well-constructed drains and sewers. Though the medical-based public health responses to cholera were present during 1854, it was the infrastructure-based improvements which led to progress in the fight against cholera.

It was this contrast which best illustrates the difference in public health responses between St. James, Westminster and the sub-district of Lambeth. Unlike 1849, where Lambeth experienced cholera to such an extreme degree and was the focus on public health outcry, St. James, Westminster was the focus of public health initiatives in 1854. In fact, while Lambeth experienced cholera in 1854, a search of the *Times* newspaper turns up very little when looking for public health discussions pertaining to Lambeth. Of course, the local boards in Lambeth would have received the general orders sent around from the General Board of Health and the

[61] York, *Mr. York's Report*, pgs. 172-173.

Medical Council, but there was no focus in Lambeth on removing any nuisances which existed. There were no public heath improvements in Lambeth between the two epidemics, and they were left to suffer the effects of cholera in 1854 as they had five years earlier.

CONCLUSION

This chapter has explored in new ways the most studied cholera epidemic of Victorian London. Beginning with the mini epidemic which preceded the larger outbreak, the chapter made use of the *Weekly Returns of Births and Deaths in London* to present cholera mortality patterns at the district, sub-district, and neighbourhood levels. Despite an overwhelming outbreak in St. James, Westminster, the south district and specifically Lambeth once again experienced a high degree of cholera mortality, both in terms of crude cholera mortality and when standardized to account for population density. These findings are new contributions to the cholera literature, as the 1854 outbreak is almost always exclusively focused on the outbreak near Broad Street and the actions taken by John Snow to remove the pump handle. The work done on contextualizing the entire cholera outbreak throughout London addresses a gap in the scholarship by presenting a full picture of the epidemic.

Of course, it would be impossible to discuss the epidemic of 1854 without engaging with the existing literature on the Broad Street pump. The chapter does just that, though it presents many challenges to the celebrated historiography. First, the *Weekly Returns* were used to create street-level maps of St. James, Westminster, which contextualize Snow’s cholera map. Further, the discussion on public health responses suggests that John Snow’s work, while important, has been celebrated unjustly. This is perhaps the biggest claim this chapter makes; Snow’s work on Broad Street is accredited with ending the epidemic, and this is far from true. Not only did the work done on Broad Street happen too late to explain the sudden decrease in cholera deaths, but cholera still existed in the rest of London. Removing a local pump in a neighbourhood above the Thames did nothing to appease the suffering of cholera in Lambeth. The comparison of the cholera experiences in St. James, Westminster and Lambeth shows that there was different mortality patterns in each sub-district, and that the public health response was not the same. While St. James, Westminster was the focus of various reports and investigations, Lambeth had almost no public health intervention apart from the standard orders issued by the General Board of Health.

Throughout the chapter, there were comparisons made between the mortality patterns and public health responses from 1848 and 1854. These comparisons, which are also unique in the literature, highlight the similarities and differences in the cholera experiences and public health responses. Chapter Seven will continue to address these questions for the 1866 cholera epidemic.

CHAPTER SEVEN

CHOLERA IN 1866

As years went by, the 1854 cholera outbreak faded in memory as summer after summer passed without another deadly wave of cholera visiting London. However, the ever-growing city was to face this disease once more, in 1866. This chapter examines the cholera experience in 1866 and compares its unique mortality patterns to those in 1849 and 1854. As the last cholera outbreak in the nineteenth century, the 1866 epidemic is usually associated with the advancement in scientific theories of cholera's origin and transmission, as well as the important role the disease played in economic and international relations. Perhaps the most notable scholarship on this epidemic is Bill Luckin's "The Final Catastrophe – Cholera in London, 1866," which details the investigations into the East London Water Company, who was responsible for the outbreak. The following discussions of the cholera experience in 1866 add to the existing scholarship not only because the chapter heavily relies on the *Weekly Returns* for quantitative mortality data, which has not been plotted before, but also because comparisons between this cholera experience and the ones in 1849 and 1854 highlight just how unique this epidemic was.

The chapter begins by looking at the district mortality patterns of cholera in 1866 and identifies mortality patterns which suggest that this epidemic was the longest out of the three and yet the least deadly. The sub-district investigations further reveal that cholera deaths were most common in the east district rather than the south, and yet there was no one sub-district which continually had the highest mortality. Rather, cholera deaths occurred in institutions more often in 1866, and the recovery rate was much higher. Both these factors contribute to the lower overall cholera mortality rate, as well as the unique geographic distribution of cholera mortality.

The chapter also addresses the public health response to cholera in 1866. Unlike 1849 and 1854, whose public health response was overseen by the General Board of Health, this epidemic's public response was over seen by the Privy Council and the local boards, as set out by the 1858 *Public Health Act* and *Local Management Act*.[62] Despite this change, the 1866 epidemic demonstrated the effectiveness of the public health response and highlighted the increased, effective communication between the local boards and the Privy Council. The response from the Privy Council was focused on water supply and disinfection practices, both of which at least partially contributed to the 1866 epidemic being less deadly. However, comparing the cholera mortality patterns in London to those known in other parts of the world (particularly in North America), cholera was not less deadly only in London; it was a world-wide trend. This suggests that even though the public health response was more effective in 1866, it is highly probable that the strain of cholera in 1866 was less virulent than the previous epidemics.

THE CHOLERA EPIDEMIC OF 1866

Cholera in 1866 appeared rapidly; unlike 1849 and 1854, which both had "mini epidemics" which preceded the larger epidemics and perhaps provided an indication of what was to come, the epidemic in 1866 began with no prior indications.

[62] Recall that the local boards were previously called the Vestry and District Boards of Works.

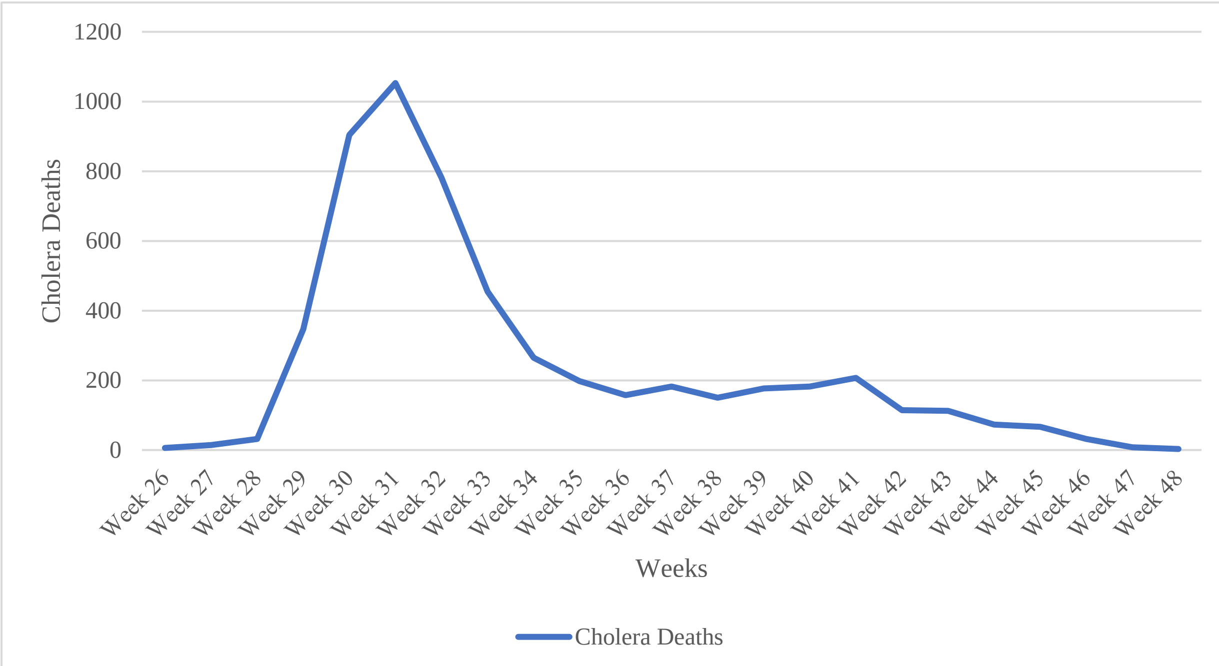


Figure 7.1 – Weekly cholera deaths, Weeks 28-50, 1866

Figure 7.1 shows the rise of cholera in London. Beginning at Week 28 there was a very rapid increase until Week 31, at which point cholera began to decline. The initial decline was swift, with cholera decreasing as fast as it had increased, but after the first three weeks of decline, the number of cholera deaths plateaued.

At its peak, the epidemic claimed 1,053 cholera deaths in Week 31. This is a considerable increase from the thirty-two cholera deaths reported a mere three weeks earlier. Week 29 reported 346 cholera deaths, and Week 30 reported 904, with an increase of 558 deaths. The decline of cholera was as sudden as its increase. Week 32 saw 781 deaths; Week 33, 455 deaths; and Week 34, 256. However, at this point the pattern began to change. Rather than a continued decrease, cholera deaths stabilized, and for the next nine weeks, the numbers of cholera deaths being reported remained between one and two hundred, except for Week 41, which recorded 207 deaths. It was not until Week 44 that the numbers dropped below one hundred; Weeks 44 and 45 reported seventy-three and sixty-seven cholera deaths respectively. Week 46 reported thirty-two, and Weeks 47 and 48 both reported less than ten cholera deaths.

The long duration of a substantial number of weekly cholera deaths in 1866 was unique to this epidemic, and it is difficult to assign start and end dates to the epidemic. While the epidemics of 1849 and 1854 were neatly contained in ten-week periods, with very clear increases, climaxes, and decreases, the epidemic 1866 appears to have lasted twenty weeks, assuming the epidemic "began" and "ended" when there were fewer than ten cholera deaths reported in a given week.[63] Stretching from Week 27 to Week 46, the cholera epidemic of 1866 was by far the longest cholera epidemic experienced in London throughout the nineteenth century.

The 1866 Cholera Epidemic in Context

Despite the long-lasting duration of the 1866 cholera epidemic, it is important to be cognizant of cholera mortality patterns, as the length of the epidemic did not necessarily mean it was more deadly compared to the previous epidemics. This section will look at the relationship between cholera deaths, zymotic deaths, and the total number of deaths reported, questioning how cholera deaths contributed to each these figures. Understood as percentages of zymotic and total death figures, cholera deaths in 1866 can be compared to the percentages in 1849 and 1854 regardless of the different number of weeks cholera was present in London. Simply put, this is a way to evaluate the deadliness of the epidemics – specifically, did the longer 1866 epidemic mean more total deaths?

[63] This is the number used in Chapters Five and Six to indicate a "significant" number of cholera deaths.

In the twenty-week period that made up the 1866 cholera epidemic, there was a total of 5,531 cholera deaths reported. Figure 7.2 shows the weekly breakdown of cholera deaths compared to zymotic deaths and the number of deaths from all causes reported in London from Week 27 to Week 46.

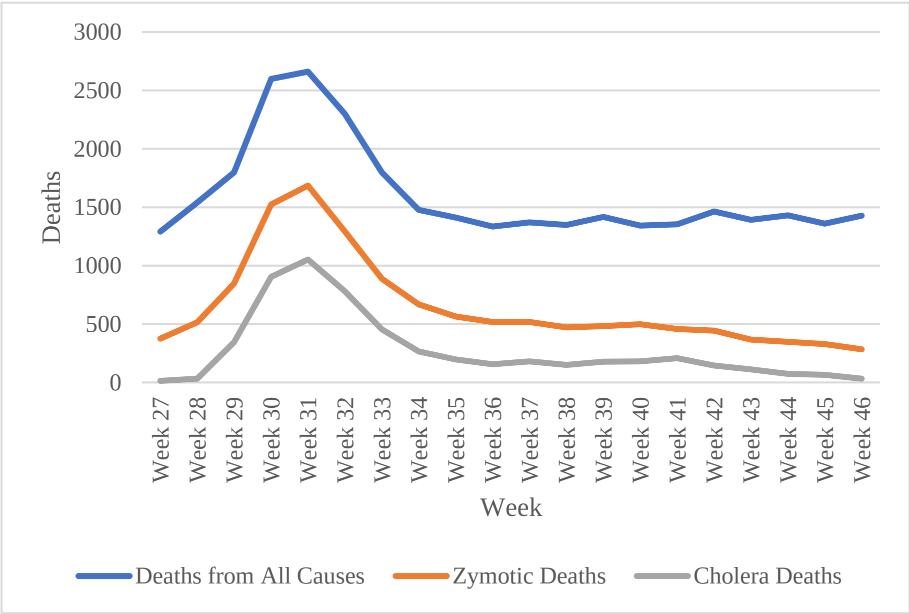


Figure 7.2 – Weekly comparison of total deaths, zymotic deaths, and cholera deaths, Weeks 29-48, 1866

The patterns of deaths – deaths from all causes, zymotic deaths, and cholera deaths – are virtually identical until Week 33. At that point, the total number of deaths fluctuates slightly while cholera and zymotic death rates remain similar. Overall, this graph suggests that cholera remained a relatively stable percentage of the zymotic deaths throughout the twenty weeks.

Let us consider Week 31. The total number of deaths reported was 2,661, and the number of zymotic deaths was 1,686. There were 1,053 cholera deaths reported, which made up 62 percent of all zymotic deaths and nearly 40 percent of all deaths recorded. Comparatively, in Week 33, the 455 cholera deaths represented 51 percent of the zymotic deaths and 25 percent of all deaths. Figure 7.3 compares how much cholera deaths contributed to the number of zymotic deaths and deaths from all causes.

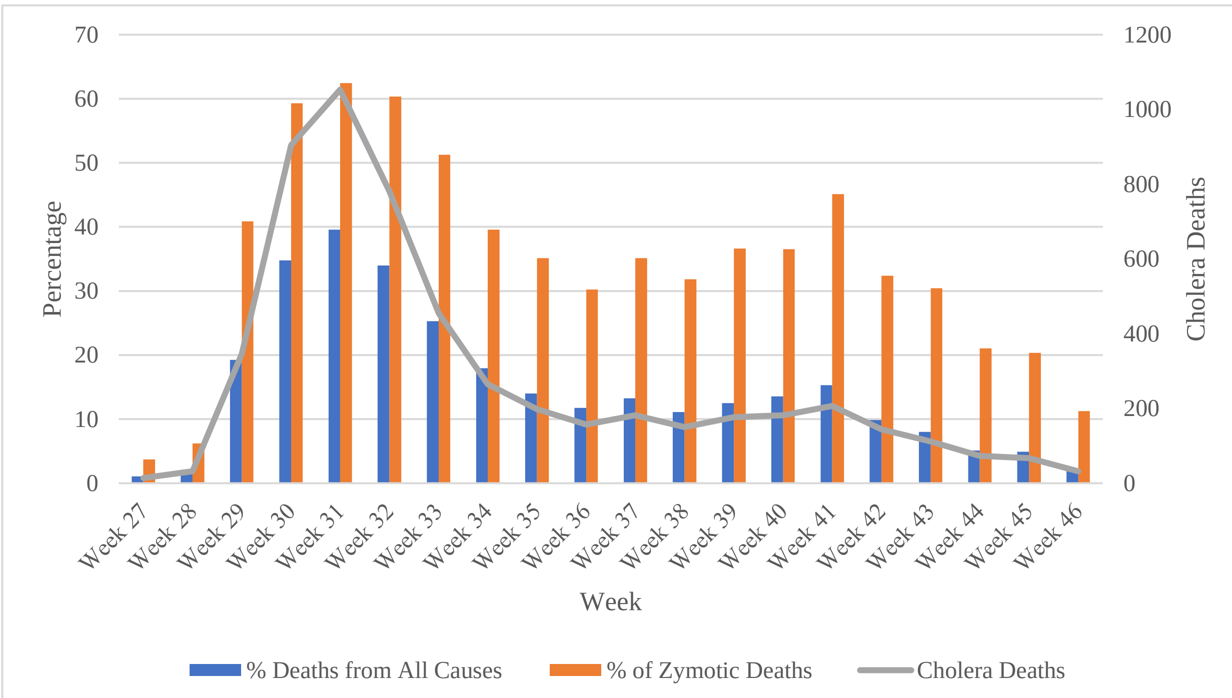


Figure 7.3 – Comparison of the percentage of cholera deaths to deaths from all causes and zymotic deaths, Weeks 29-48, 1866

This graph shows the relationship between the total number of cholera deaths and the percentage they account for in the number of deaths from all causes and the zymotic deaths. Understanding this relationship allows for comparison between the epidemics, questioning if the number of cholera deaths in 1849 and 1854 made up similar percentages of the zymotic deaths and deaths from all causes. This, in turn, will reveal if the 1866 epidemic can be considered as deadly even if it claimed less cholera victims overall. Table 7.1 shows the comparisons for each epidemic during its climax week.

	1849	**1854**	**1866**
Climax Week	36	36	31
Crude Number of Cholera Deaths	2,050	2,026	1,053
% of Zymotic Deaths	80%	82%	62%
% of Deaths from All Causes	60%	62%	40%

Table 7.1 – Comparison of mortality statistics for peak cholera mortality in 1849, 1854, and 1866

While there is some variation in the total number of deaths reported, and given that it is difficult to compare the total number of cholera deaths during each epidemic due to the different lengths of time cholera was present, the figures are similar enough to recognize that the cholera epidemics in 1849 and 1854 were more deadly, both in the crude number of victims they claimed but also the percentage cholera made up of zymotic deaths and deaths from all causes. In contrast, the epidemic of 1866 claimed fewer lives and made up a lesser percentage of zymotic and total deaths.[64]

[64] Interestingly, this suggests that in 1866 there was a wider array of causes of deaths, both zymotic and non-zymotic. Because the total number of deaths had decreased by 1866, there were fewer deaths being credited to epidemic diseases such as cholera which implies that the remainder of the deaths were from non-cholera causes.

DISTRICT MORTALITY PATTERNS

Along with the early peak and duration of the 1866 cholera epidemic, one of the things which makes this epidemic different from 1849 and 1854 was its geographic spread. This section will look at the breakdown of cholera deaths in the different districts of London. Figure 7.4 below shows the weekly breakdown of cholera deaths by district, from Week 27 to Week 46.

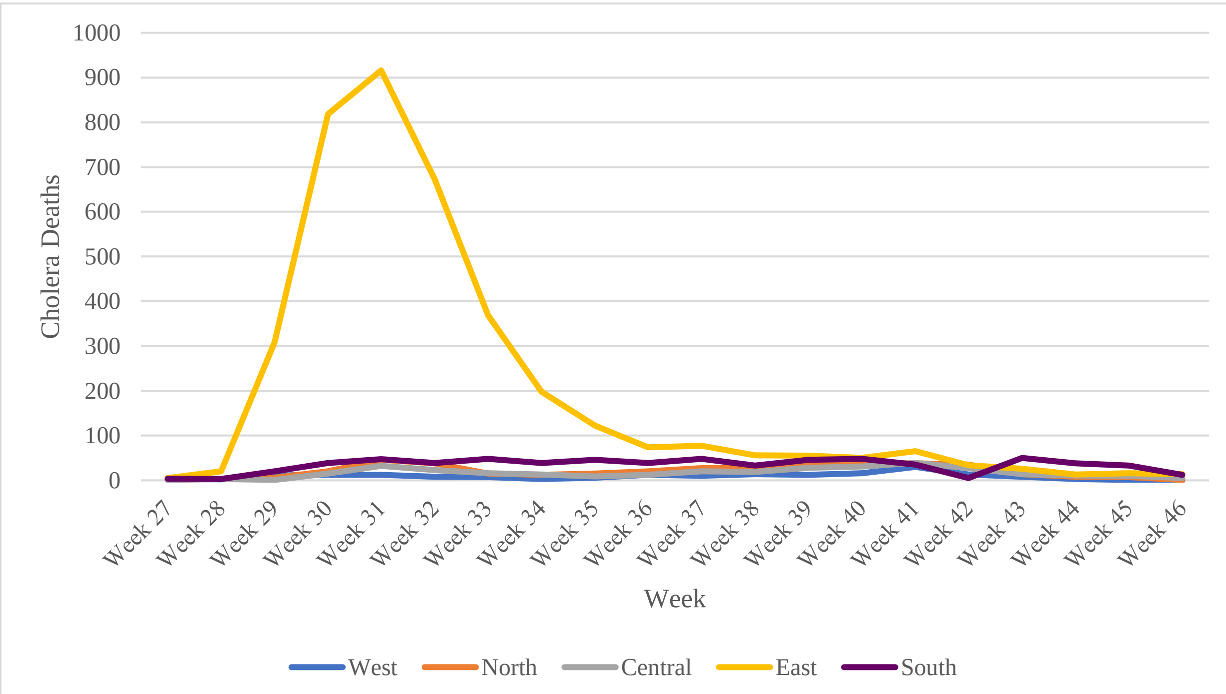


Figure 7.4 – Cholera deaths by district, Weeks 27-46, 1866

Figure 7.4 demonstrates the unmistakable pattern of cholera deaths: the east district experienced the highest number of cholera deaths by a wide margin. In fact, between Weeks 27 and 35, the east district experienced 3,429 cholera deaths compared to the 619 experienced by the rest of the districts put together. That amounts to nearly 85 percent of all cholera deaths in the first nine weeks of the epidemic occurred in the east district.

However, the geographic patterns of mortality changed significantly during the second half of the epidemic. Figure 7.5 shows a closer look of the mortality breakdown for Weeks 38 to 46.

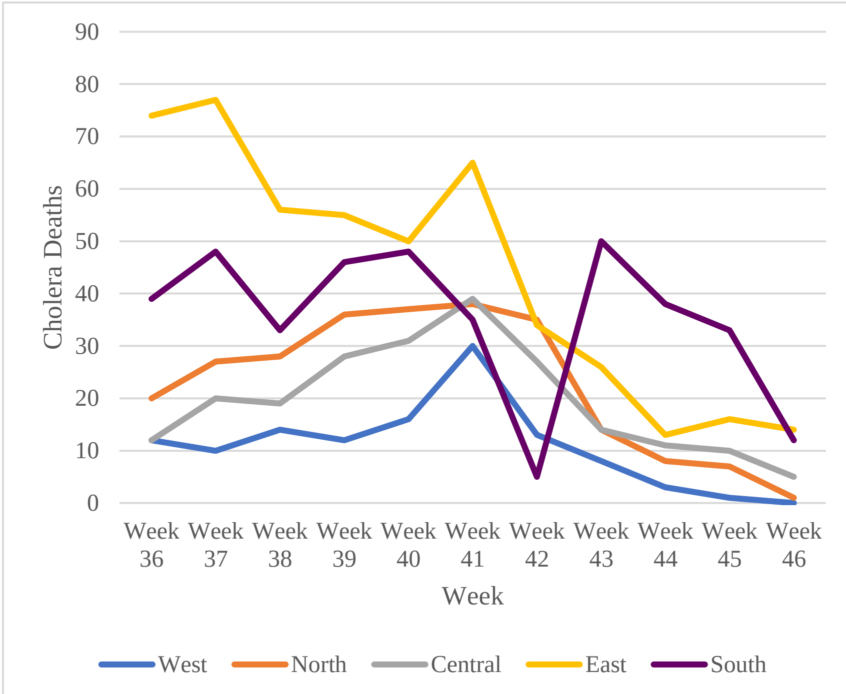


Figure 7.5 – Cholera deaths by district, Weeks 38-46, 1866

Because the scale on the y-axis is much smaller (one thousand deaths versus ninety deaths), the patterns are better highlighted. While the east district claimed highest mortality until Week 42, the gap between the district mortality figures was decreasing each week. Consider Week 31, the peak of the epidemic: the east district reported 916 cholera deaths, which was much greater than the forty-seven deaths in the south district, the next highest number. By Week 36, the difference between the two deadliest districts had decreased to thirty-five deaths. Past Week 40, the number of deaths in the districts fluctuated so much that it was impossible to predict which district would claim the most victims on any given week, and the gap between the district figures remained relatively small – the greatest difference was about thirty deaths.

Before considering the sub-district patterns of mortality within the east district, let us look at the total impact of the epidemic, and how it was divided among the district throughout its duration. Between Weeks 27 and 46 inclusive, London reported 5,501 cholera deaths. Of these deaths, 3,909 – or 71 percent – occurred in the east district. Figure 7.6 shows the weekly district cholera deaths as percentages of the total number of cholera deaths.

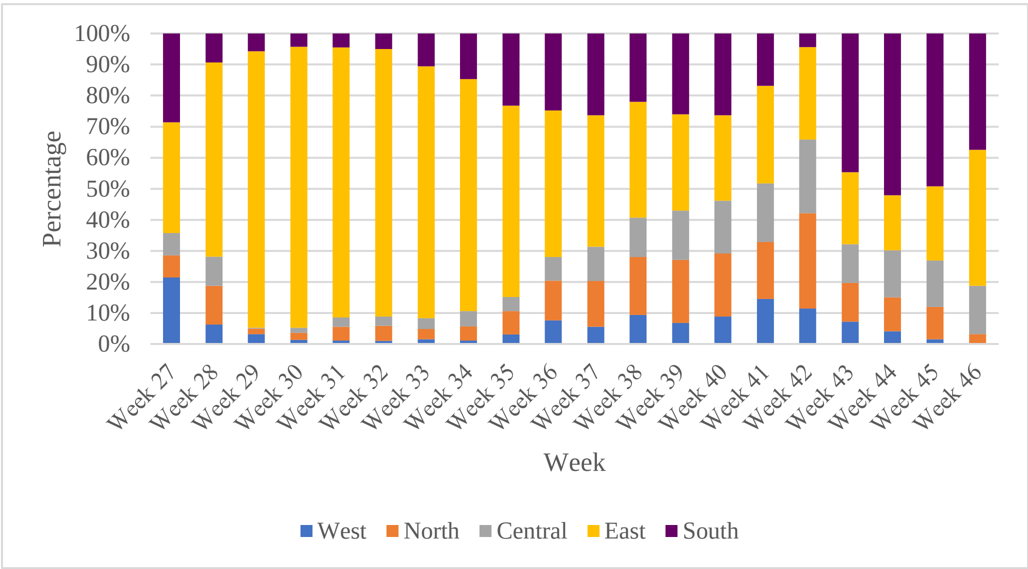


Figure 7.6 – Weekly district cholera deaths as percentages, Weeks 27-46, 1866

The east district contributed over 71 percent of all cholera deaths for six weeks – Weeks 29 through 34. There was a swift rise in Weeks 27 and 28, jumping from 36 percent to 63 percent, before reaching 89 percent in Week 29. After Week 34, there was a steady decline in the percentage of cholera deaths in the east district, with the weeks reporting 62, 47, 42, and 37 percent until Week 39, which reported 31 percent. Weeks 40 onward reflect the conclusions drawn from Figure 7.5; there was a constantly changing breakdown of cholera deaths between all districts.

Overall, the geographic distribution of cholera deaths in 1866 contrasted greatly with those in the epidemics of 1849 and 1854. Rather than the south district, which historically had recorded very high numbers of cholera deaths in the previous two epidemics, the east district dominated the mortality count during 1866. Further unique to the 1866 geographic patterns is the fact that epidemic contained two distinct patterns. For the first nine weeks or so, cholera was prevalent almost exclusively in the east district, with minimal number of deaths in any other district. However, during the second half of the epidemic, cholera mortality was continually shifting between the districts even though the total number of cholera deaths remained relatively stable. One important thing to note about this trend – cholera did not "suddenly" appear in these districts; these districts had been reporting deaths during the first wave of cholera, albeit in small numbers, and these numbers did not change drastically as the east district began to feel relief from cholera. In fact, when the east district's numbers began to subside, they began reporting figures similar to the other districts. So, while it is true that cholera was present in every district throughout the entire epidemic, the number of deaths were minimal, and nothing compared to what was experienced in the previous cholera epidemics. Without the major wave of cholera which implicated the east district, it is very possible that the number of cholera deaths in 1866 would have gone on largely unnoticed – after all, cholera is normally a summer disease and even in non-epidemic years there were reported cases of it. What defines the 1866 epidemic as an epidemic was the surge experienced in the east district.

SUB-DISTRICT MORTALITY PATTERNS

While it was true that the east sub-districts will far exceed all other sub-districts, looking at how cholera deaths were distributed between all of London's sub-districts will show how wide-spread cholera was, further suggesting that, notwithstanding the drastic increase of cholera deaths in the east district, 1866 was a relatively subdued cholera year. Figure 7.7 shows a comparison of the sub-district breakdown of cholera deaths in the west, north, central, and south sub-districts. The east sub-districts will be considered later in the chapter.[65]

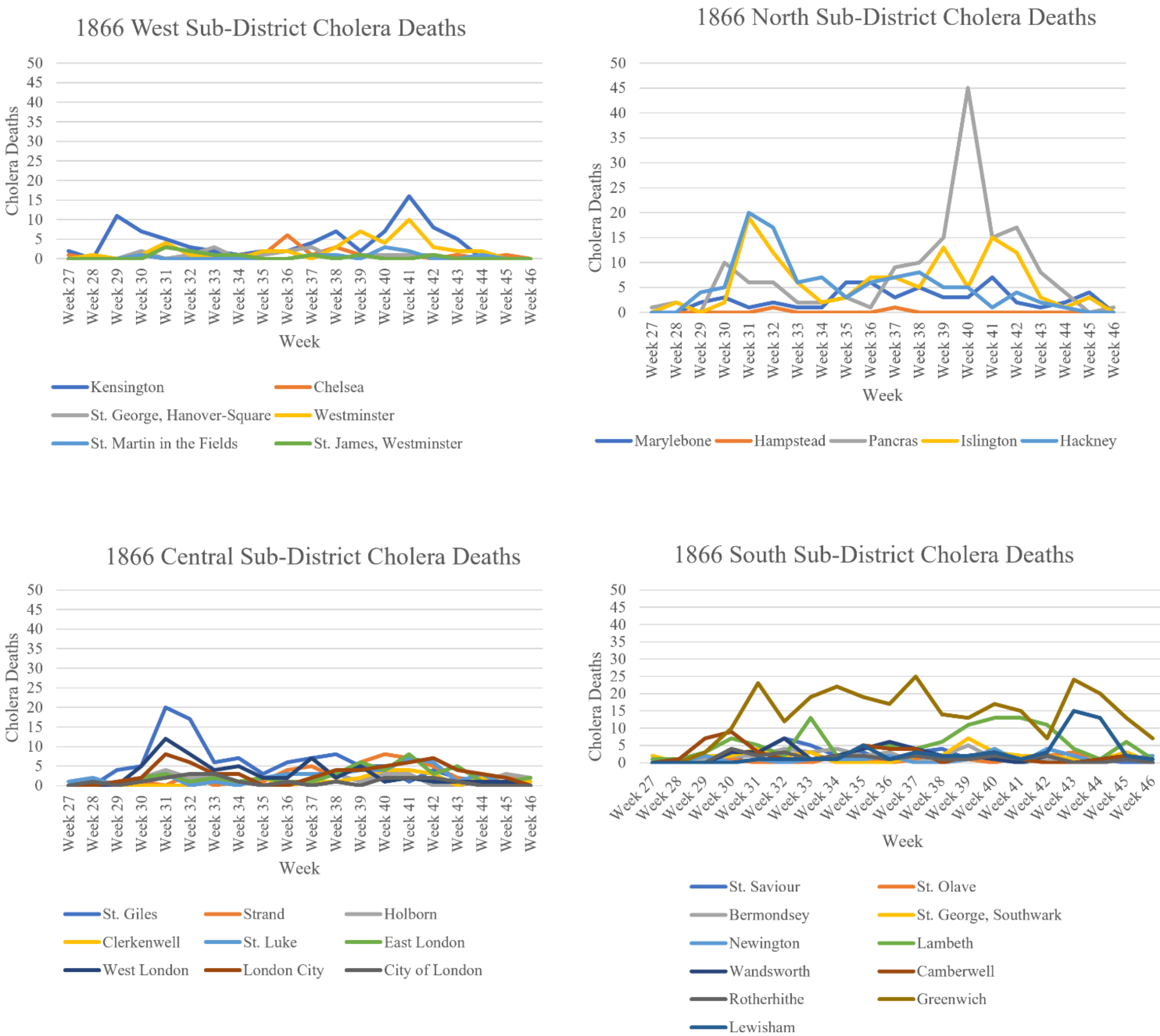


Figure 7.7 - Comparison of sub-district cholera deaths, divided into districts, Weeks 27-46, 1866

From this comparison, there appears one sub-district which far exceeds any other in the number of cholera deaths recorded. Pancras, in the north district, experienced a sizable jump from fifteen

[65] For a magnified version of Figure 7.7, see Appendix B.

cholera deaths up to forty-five in Week 40, before returning to fifteen deaths in Week 41. Similarly, Greenwich maintained a higher level of cholera deaths than all the other southern sub-districts for almost the entire epidemics, save Week 42. However, these graphs also suggest that every sub-district experienced a slight rise in Week 31, which was the peak of the epidemic. Islington and Hackney, in the north district, increased by seventeen and fifteen cholera deaths respectively, and Greenwich, in the south district, rose by thirteen deaths. In fact, out of the thirty-seven sub-districts, only twelve of them experienced an increase and two remained the same. Apart Islington, Hackney, and Greenwich, the increases were, on average, between two and three deaths. So, while the increases were not necessarily large, they do indicate that Week 31 saw a rise in the number of cholera deaths throughout all of London, and not just in the east district.[66]

The question remains – how do these increases, slight or more significant, tell us about cholera mortality patterns outside the east district during the peak of the epidemic? Of course, it is impossible to know entirely, but one possible theory is that most of the sub-districts were not influenced at all by the extreme levels of cholera mortality in the east district. A positive fluctuation of two or three – even up to five or six – cholera deaths between weeks was normal in these sub-districts. In the case of Islington and Hackney, the increase in Week 31 was relatively isolated, meaning that while there were weeks when these sub-districts increased to similar numbers of cholera deaths as Week 31, it was not until after Week 40, at which point the mortality patterns changed across all of London. This could imply a transmission vector – a person or group of persons who were in the east districts and travelled back to these sub-districts,

[66] It is important to note that while Week 31 was the peak of the epidemic when considering the total number of cholera deaths for all of London, there were weeks in certain sub-districts which peaked after Week 31, suggesting that Week 31 was not necessarily the deadliest week in all sub-districts.

thus spreading cholera which did not originate in their neighbourhood. This opens up tricky questions about how cholera deaths are tallied, as there are multiple known cases of cholera patients being moved into regions – particularly sub-districts with hospitals – and dying there, thus increasing the number of cholera deaths in that sub-district even though the disease did not originate there. Given that Islington and Hackney experienced this isolated increase in the first half of the epidemic, it is possible that there were cases of transmission, especially considering that Hackney directly borders three eastern sub-districts. This is likely less the case in Greenwich, which experienced a higher number of cholera deaths each week compared to all other sub-districts outside the east district. Because Greenwich was on the south side of the River Thames, people transmitting cholera while they travelled between the sub-districts, while still possible, is less probable. Based on the graphs in Figure 7.7, it is easily claimed that outside the east district, Islington, Hackney, and Greenwich experienced the most severe cholera outbreak during the first half of the epidemic.

However, even though these sub-districts recorded a higher number of cholera deaths than the other sub-districts, it is important to recognize that their cholera experience was far from what had occurred during the previous epidemics in 1854 and 1849. Figure 7.8 shows the total number of cholera deaths registered in each sub-district during Weeks 27 to 46, inclusive.

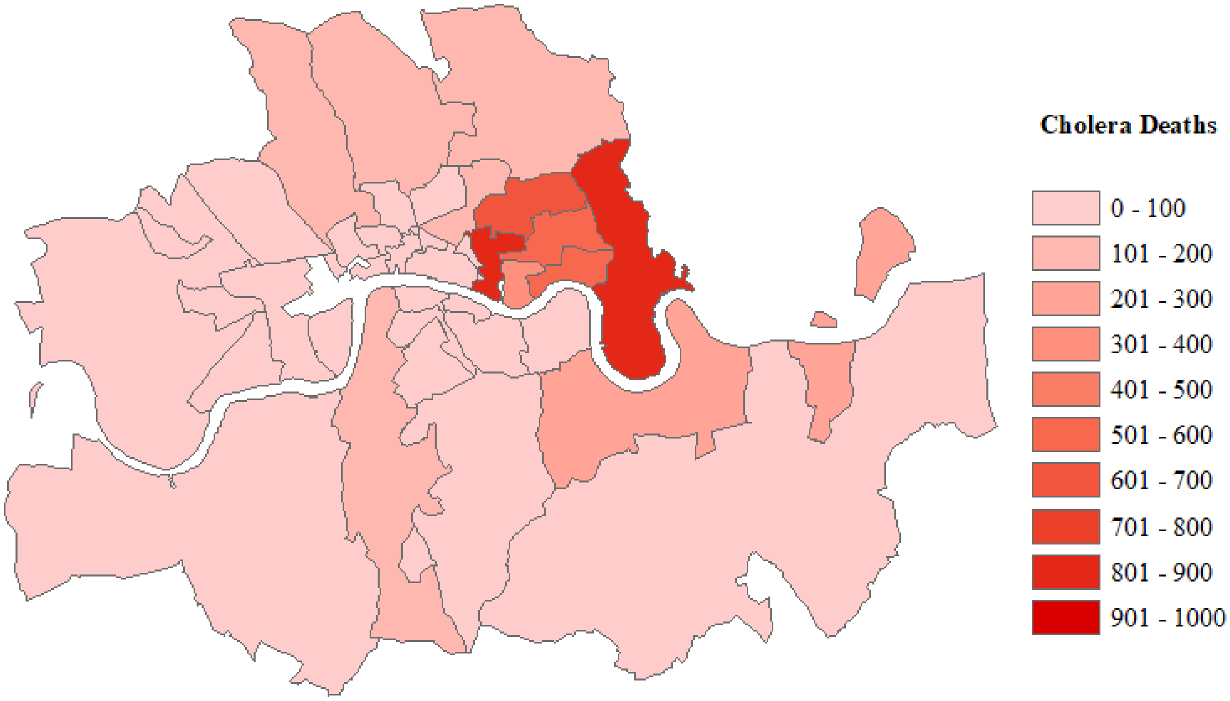


Figure 7.8 – Total number of cholera deaths per sub-district, Weeks 27-46, 1866

This map highlights two things: first, is shows the sheer concentration of cholera deaths in the east sub-districts. Second, it is very effective at demonstrating that, even with the increased numbers in Week 31 within Islington and Hackney and the higher-than-average figures in Greenwich throughout the epidemic, no sub-district ever came close to matching the cholera experience in the east sub-districts. It is fair to say that, even with the possibility of transmission between the east district and other sub-districts, cholera in the east district is what really defined the 1866 cholera epidemic. Without the deaths in the east district, cholera would have likely not even warranted much notice in London during the summer of 1866.[67]

[67] As Figure 4.5 in Chapter Four demonstrates, it was normal for a small number of cholera deaths to be recorded each year even during non-epidemic years.

THE EAST DISTRICT AND CHOLERA

Before delving into the details of cholera in the east district, there are two considerations to be made. First is that of scope – the discussions above all considered the epidemic as stretching between Weeks 27 and 46. For the following section, the epidemic timeframe will be much shorter, considering mortality data from Weeks 28 to 37. These are the weeks when the east district's cholera deaths were far higher than any other district. The other consideration is more about highlighting change over time. In 1849 and 1854, there were six sub-districts in the east. However, in 1866, there were seven. The sub-district of Stepney was divided into Stepney and Mile End Old Town in 1857, with Mile End Old Town becoming its own Poor Law Union.[68] Figure 7.9 shows the division of Stepney. Mile End Old Town was made up of two neighbourhoods: Mile End Old Town West and East. Their northern boundaries served as the division between the new neighbourhood, Mile End Old Town, and Stepney. Though changing boundary lines are a known limitation that comes with using the *Weekly Returns* over a period of the thirty years, there is little issue when comparing the earlier epidemics and the one in 1866. Because Stepney was divided along known boundary lines, the neighbourhoods remained the same. If anything, the division allows for a more detailed breakdown of mortality in the region. Unlike Chapters Five and Six, which selected south sub-districts to be considered based on the total number of cholera

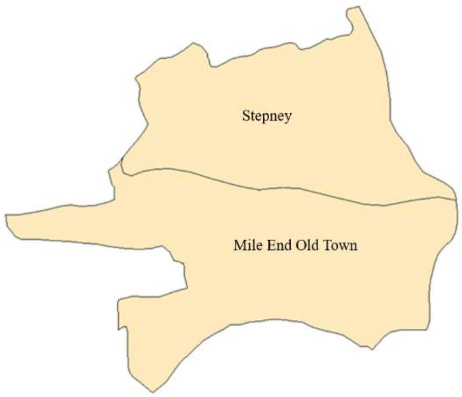


Figure 7.9 – The division of Stepney into Stepney and Mile End Old Town

[68] Peter Higginbotham, "Mile End Old Town, Middlesex, London," *The Workhouse: The Story of an Institution*, available online at: http://www.workhouses.org.uk/MileEndOldTown/.

deaths, this chapter will look at patterns of mortality in all seven sub-districts that made up the eastern district.

Between Weeks 28 and 37, there were 3,575 cholera deaths registered in the east district. Figure 7.10 shows a breakdown of how these deaths were divided by district.

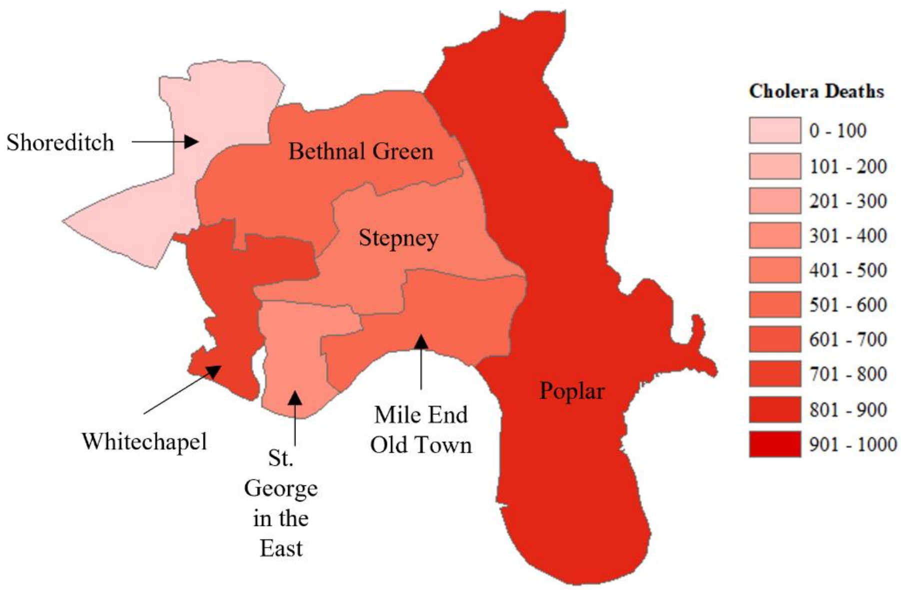


Figure 7.10 – Number of cholera deaths in the east sub-districts, Weeks 28-37, 1866

Poplar was the sub-district which recorded the most cholera deaths, with 810 deaths reported over the ten weeks. Close behind was Whitechapel, with 759 cholera deaths. Bethnal Green, Stepney, and Mile End Old Town reported 554, 536, and 465 cholera deaths respectively. St. George in the East tallied 369, and Shoreditch had the least, with a mere eighty-two deaths from cholera. What this shows is that, apart from Shoreditch, cholera was widely spread among the east sub-districts and the number of cholera deaths was not insignificant. Granted, there is a sizable difference between 810 and 369 deaths, but it is important to remember that 369 deaths was not a small number of cholera deaths, especially considering the size of Poplar against St. George in the East.

Looking at the map gives a fair idea of how much bigger Poplar was compared to the other sub-districts, but Table 7.2 shows the population density in each sub-district in 1866.

Sub-District	Area (Acres)	Area (Square Miles)	Population (Estimated in 1866)	Population Density (1000s of residents per Square Mile)	Cholera Deaths in Week 31	Cholera Deaths per 1000 Residents, Week 31
Shoreditch	646	1.01	386,044	382	16	0.04
Bethnal Green	760	1.19	192,116	162	166	0.9
Whitechapel	406	.63	277,748	441	174	0.6
St. George in the East	243	.38	196,746	518	85	0.4
Stepney	576	.90	234,804	261	135	0.6
Mile End Old Town	681	1.06	191,056	180	140	0.7
Poplar	2918	4.56	344,320	76	200	0.6

Table 7.2 – Comparison of geographic area, population statistics, and cholera mortality in Week 31 for east sub-districts. Note that the population density is presented as 1000s of residents per square mile, rounded up to the nearest whole number.

Table 7.1 highlights even more the extreme impact of cholera in Poplar. Despite having the smallest population density, the sub-district experienced the most cholera deaths. Conversely, St. George the East, which had the lowest number of cholera deaths apart from Shoreditch, had the highest population density. Overall, this suggests that the high number of deaths in Poplar were not spread between patients, meaning there were more “virgin” cases of cholera than those which were caused by coming into contact with an infected person. Of course, there is no way to trace cholera transmission in the past, but the low population density may indicate less contact between people than would have been experienced in, say, St. George in the East.

However, there is one way to gauge the distribution of cholera between the eastern sub-districts, and that is by looking at each sub-district as a percentage of the total number of cholera deaths reported in the east district. Figure 7.11 shows the sub-district cholera deaths as percentages of the total number of cholera deaths in Weeks 28 to 37.

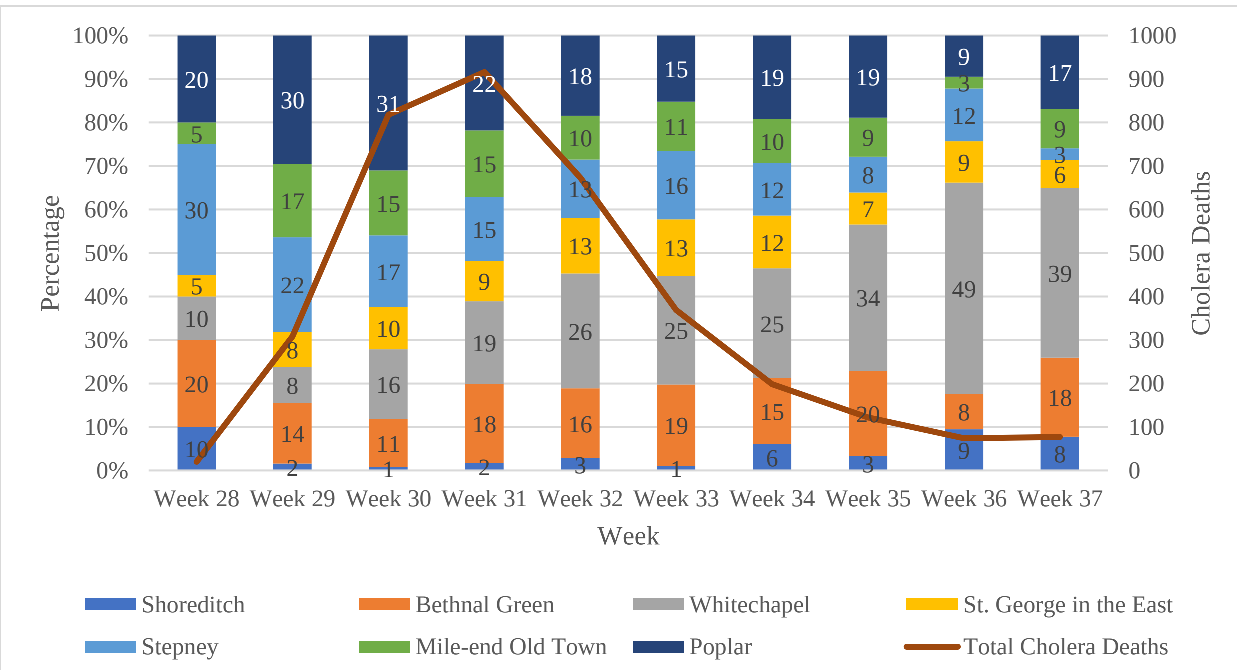


Figure 7.11– East sub-district cholera deaths, Weeks 28-37, 1866

Beginning with Week 29, as Week 28 recorded a minimal number of cholera deaths, Poplar contributed the most cholera deaths until Week 32. This is not surprising, given that its numbers were the highest of all sub-districts in each week – 91, 254, 200, and 124 deaths respectively. Interestingly, the number of cholera deaths in Poplar declined between Weeks 30 and 31 despite the overall increase. While the number in Poplar decreased, the number of cholera deaths in every other sub-district increased, just not enough to overtake Poplar as the deadliest sub-district, therefore ensuring its percentage remained the highest even though it had decreased from 31 percent down to 22 percent.

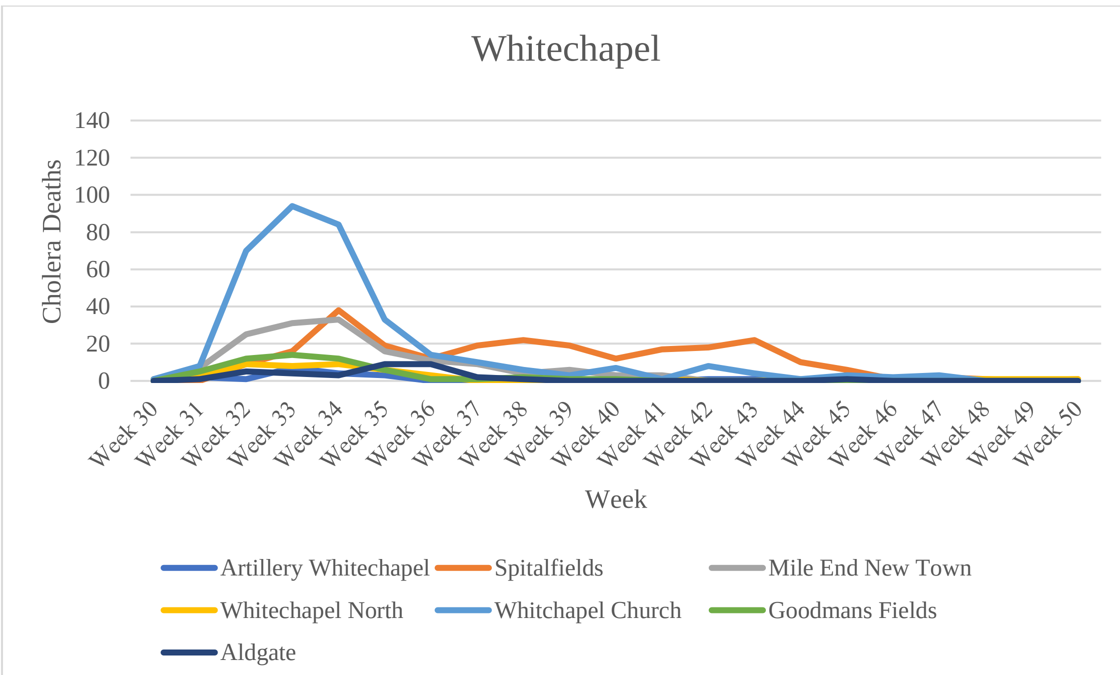
The transition between Weeks 30 and 31 shows the beginning of how cholera deaths were spread out amongst the sub-districts. Coupled with Poplar's declining dominance is the rise of Whitechapel's cholera numbers. In Week 30, when Poplar was at 31 percent of all deaths, Whitechapel was at 16 percent. In the coming weeks, that number only grew, eclipsing Poplar as the deadliest sub-district when considering the number of deaths it contributed to the total number of cholera deaths experienced in the east district. The percentage rose as high as 49 in Week 36, which came out to thirty-six cholera deaths. The rest of the sub-districts, for the first eight weeks being considered, remained relatively consistent, usually within a few percent of the previous week. In Week 36, all the sub-districts experienced a big drop in percentage. This was undoubtedly due to the large rise in the number of cases in Whitechapel that week. Week 37 is a bit of an anomaly for two reasons. One, the unexpected change in mortality patterns in Week 36 makes it difficult to predict what the week should have looked like; the sudden rise in Whitechapel challenged any consistent pattern of cholera mortality. Second, Week 37 is the end of the period being considered for the east district. As we know from the discussion above, Week 38 onwards showed some very different mortality patterns from the first half of the epidemic, meaning Week 37 could easily act as a prelude to those changing patterns and shown mortality patterns not consistent with previous weeks.

Interestingly, the mortality patterns in Figure 7.11 show very little movement of cholera in St. George in the East. Its numbers remained relatively stable – a maximum of eight percent difference if including Week 28's percentage. Given that the sub-district experienced a mere 369 cholera deaths over the ten-week period, this makes a certain amount of sense. In any given week, the number of cholera deaths in St. George in the East was moderate compared to almost every other sub-district save Shoreditch. However, the question remains – how did St. George in the East remain (relatively) unscathed despite its high population density? Similarly, why did Poplar experience cholera so vehemently despite its low population density? And where does Whitechapel fit into this, the rising number of cholera deaths as Poplar's cases began to decrease? The final section of the chapter will examine the cholera mortality patterns in St. George in the East, Poplar, and Whitechapel in-depth, narrowing the regions down to neighbourhood and street-level data to parse out why these patterns may have occurred.

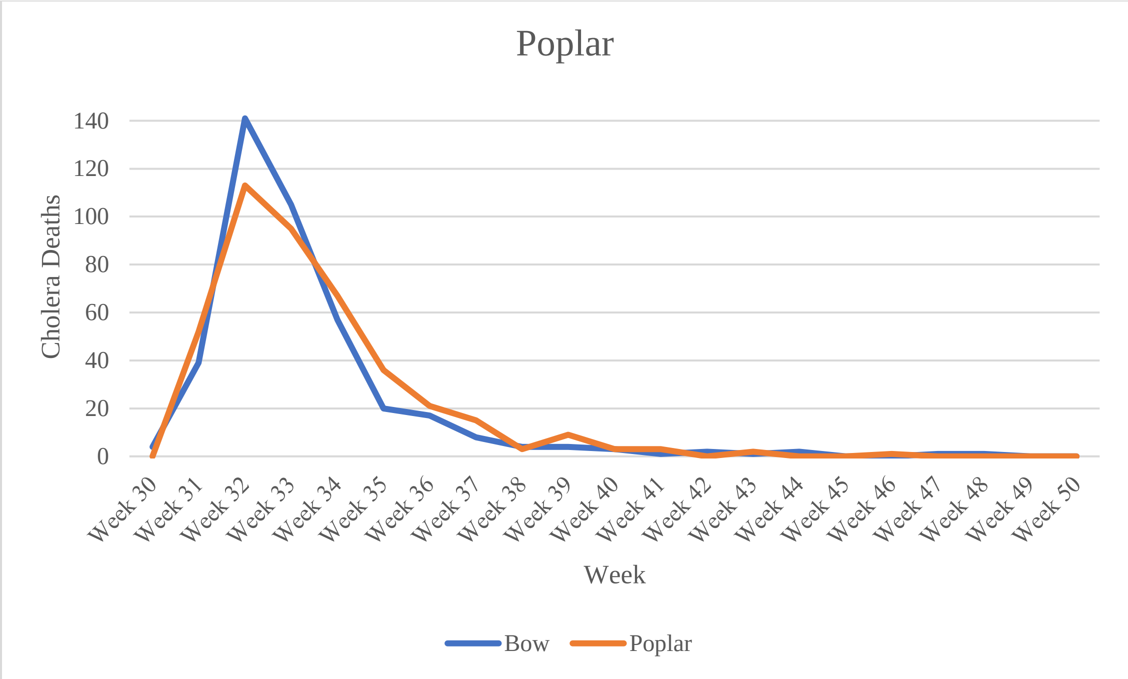
EAST SUB-DISTRICTS AND CHOLERA

The sub-district patterns of 1866 were not at all like those that have been discussed in Chapters Five and Six; rather, the epidemic of 1866 showed two distinct sub-district mortality patterns of its own. The first is that, while cholera was widespread in the East district, there was no definitive cluster of deaths in a specific neighbourhood. Unlike 1849, where Lambeth Church 2nd, and 1854 with St. James, Westminster, there is no one sub-district which stands out as the deadliest. As will be discussed below, it is not practical to map the street-level data because there were very few streets which experienced more than a handful of cholera deaths during any given week. Rather, the deaths were widely spread out and the sheer number of "one-death-streets" add up to the mortality pattern seen above. The second distinct pattern is the overwhelming influence of institutions in determining these mortality patterns. The London Hospital, located in Whitechapel, had a huge influx of cholera patients during the epidemic, many from outside the sub-district. Further, a temporary cholera hospital was established in Spitalfields, Whitechapel, on August 20, 1866.[69] While the *Weekly Returns* account for these to a degree, the presence of these hospitals can explain not only the high concentration of deaths in Whitechapel, but also the extended presence of cholera in this sub-district, particularly in Spitalfields.

Let us begin by considering the neighbourhood and street-level data for Weeks 30-50. Figure 7.12 below shows a breakdown of the neighbourhoods within Whitechapel, Poplar, and St. George in the East.



[69] Thomas Sarvis, "St. Matthew, Bethnal Green: Sanitary Statistics and Proceedings for the Year 1866," (London, 1867), pg. 8, available online at: https://wellcomelibrary.org/moh/report/b18254032/9#?m=0&cv=9&c=0&s=0&z=-0.4996%2C0.8158%2C2.0284%2C0.7918.



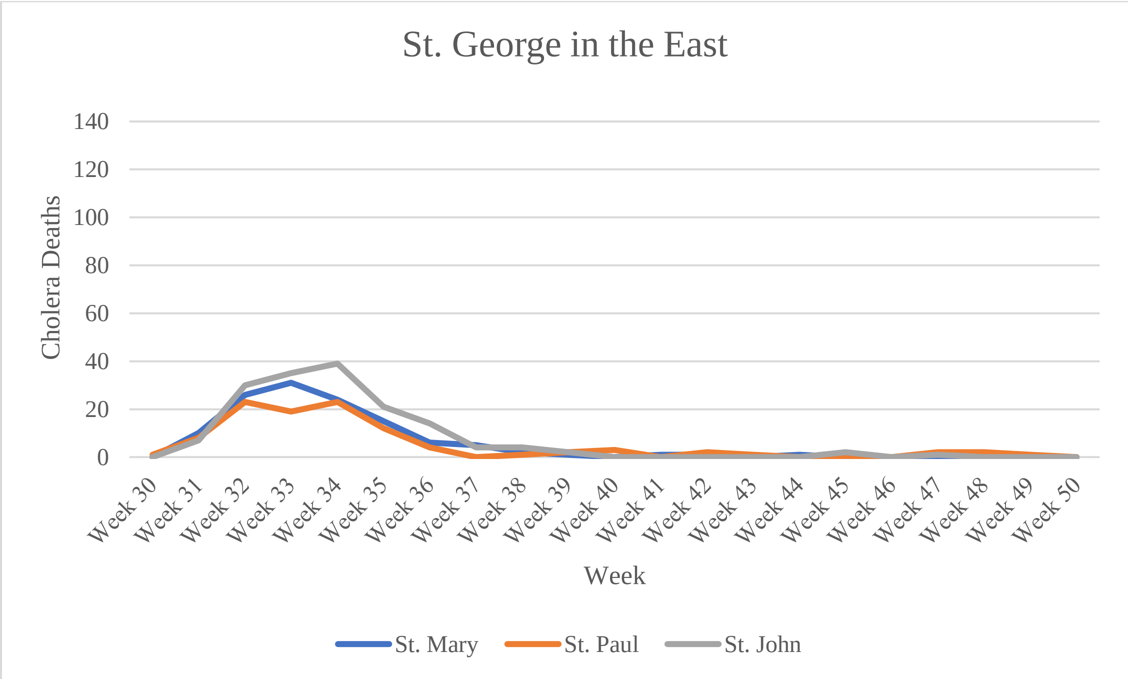


Figure 7.12 – A comparison of weekly deaths in the Whitechapel, Poplar, and St. George in the East, from Week 30 to Week 50, 1866

As Figure 7.12 shows, there was a relatively consistent pattern in all the neighbourhoods: Weeks 31 to 36 show an increase of cholera deaths followed by a marked decrease. Bow and Poplar in the sub-district of Poplar experienced the highest mortality, with Bow reaching 141 cholera deaths in Week 32. However, this was the highest number experienced by any neighbourhood throughout the east district, though this number was not that high when compared to the mortality experienced in 1849 or 1854. It is fair to say that while the east district experienced the worst of the cholera epidemic, the severity of the epidemic was far less than had been seen in previous decades. Street-level data further emphasizes how this cholera epidemic was less deadly. Street tallies for Bow and Poplar for Weeks 30-32 show 148 and 150 individual streets respectively. In Bow, of these 148 streets, 31 of them recorded cholera deaths two weeks of the three, and ten of them recorded at least one cholera death each of the three weeks. In Poplar, 36 streets had a cholera death two of the three weeks, and twelve streets had at least one cholera death all three weeks.[70] Excluding the deaths in the workhouses, infirmaries, and hospitals – which will be discussed below – the total number of deaths for most of these streets was less than a total of five cholera deaths across the three weeks. In fact, nearly all of the streets reported only one or two cholera deaths per week. Similar patterns emerge during a street-level analysis of the neighbourhoods in Whitechapel and St. George in the East. This suggests that while cholera was prevalent in the east sub-districts, there was no clustering of deaths as had been observed in St. James, Westminster in 1854 or in Lambeth Church 2nd in 1849.[71] The mortality pattern in 1866 was more spread out, which greatly lessened its severity because there were no "cholera hot spots" in which the disease was claiming victims at an uncontrolled rate.

[70] It is important to remember that this number is an approximation rather than a confirmed number. The *Weekly Returns* did not always report all cholera deaths with street-level information. Additionally, there are many instances of "street," "place," "terrace," and "row" which could easily be the same street but are described differently. The streets have been tallied as they are reported.

[71] The only exception to this would have been if the patients who died in institutions had all hailed from the same neighbourhood, potentially suggesting a clustering effect that had been masked by the movement of patients from their homes. Unfortunately, it is difficult to determine where many cholera patients lived, as their cases were recorded in their place of death.

The exception to the above mortality patterns were the institutions, but even then, the numbers of recorded cholera deaths in most institutions apart from the London Hospital (which was in Whitechapel) were minimal when compared to mortality from other epidemics. In the sub-district of Poplar, there was Grove Hall Lunatic Asylum in Bow (7 cholera deaths), the North Street Infirmary in Poplar (28 cholera deaths), and the Stepney Union Workhouse in Bow (30 cholera deaths). Outside of Poplar, there was a workhouse in Mile End New Town, Whitechapel (35 cholera deaths), and a Workhouse in St. John, St. George in the East (59 cholera deaths).[72] It is impossible to compute crude deaths figures for these institutions, as there is a lack of data, but the number of cholera deaths in these institutions suggests two things about cholera mortality. First, it suggests again that the mortality from cholera in 1866 was far less than previous epidemics. Secondly, and more importantly, it suggests that most cholera deaths occurred in institutions. It is impossible to know if disease is what drove cholera victims into the workhouses, but the fact that medical institutions recorded such a high number of cholera deaths shows the increasing tendency to seek care in hospitals in the case of illness.[73] As discussed in the sources section of the Introduction, over the nineteenth century, hospitals became more accessible for the middle and lower classes through charitable giving, as well as more inclusive of contagious diseases. The London Hospital specifically was an institution that opened its doors to cholera cases, and the fact that so many cholera deaths were registered in this institution shows that more people were turning to medical facilities for their healthcare than in previous epidemics.[74]

[72] There was no *Weekly Return* registered for Whitechapel in Week 31. For comparative purposes, this figure includes Week 33 mortality.
[73] It was not until 1867 that most hospitals opened their doors to infectious disease patients, which suggests that the close proximity of the London Hospital in Whitechapel may have influenced health-seeking behaviour for those in the east district.
[74] The London Hospital first opened in 1740 as a much smaller institution known as the London Infirmary. In 1752, construction began on the modern-day site of the London Hospital on Whitechapel Road, and its first patients were

The London Hospital in Whitechapel Church registered a vast number of cholera deaths throughout the epidemic. Their first cholera patient, a twenty-five year-old immigrant from Holland, was admitted on July 10 (Week 28), and she died the next day.[75] The *Weekly Returns* includes the following note about cholera in the hospital:

> Several wards of the London hospital are full of patients, many of them very young children in all stages of the disease; some dying, some well again and playing. The medical men have no rest, and with the Health Officers are nobly doing their duty; brave men ready to lay down their lives for their patients. The people themselves are most patient; most willing to help each other, the women always in front, and none shrinking danger. There is no desertion of children, husbands, wives, fathers, or mothers from fear.[76]

Though the hospital was inundated with cholera patients, this description of the cholera wards suggests that the hospital was coping with its demand in a respectable manner. Not only were there success stories in these hallways, but the suggested scene was not one of flight out of fear, but rather a strong degree of trust in the medical system and a sense of solidarity against cholera which bound families and neighbours together.

The *Lancet*, a medical newspaper in London, published admission, recovery, and death rates in the London Hospital on September 22, 1866 (Week 40). Since the beginning of the epidemic, the London Hospital admitted 537 cholera cases; 232 recovered and there were 282 deaths, which worked out to an approximate mortality rate of 52 percent; conversely, this also implies a 48 percent survival rate. Though there is no record of the number of cholera cases from

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admitted in 1757. Further additions and modifications were ongoing and continued to transform the London Hospital from the largest charitably funded hospital in the country into the modern, state-of-the-art hospital it is today. "London's Hospital – History at the Heart of the Community," *Tower Hamlets*, available online at: https://www.towerhamlets.gov.uk/lgnl/council_and_democracy/New_town_hall/London's_hospital_%E2%80%93_history_at_the_heart_of_the_community.aspx#:~:text=In%201752%20the%20foundation%20stone,and%20west%20wings%20%E2%80%93%20added%20later.

[75] See Footnote 4; "Review X: Report on the Cholera Epidemic of 1866 in England. Supplement to the Twenty-ninth Annual Reports of the Registrar-General of Births, Deaths, and Marriages in England," *The British and Foreign Medico-Chirurgical Review* 43:86 (April 1869), pg. 413; General Register Office, *Weekly Returns of Births and Deaths in London* XXVII:28 (1866), pg. 217.

[76] General Register Office, *Weekly Return of Births and Deaths in London* XXVII:30 (1866), pg. 246.

previous epidemics, the descriptions of cholera from the 1840s and 50s suggests that that the chances of surviving cholera were slim. The high recovery rate reported in the London hospital again suggests that the 1866 cholera epidemic was not nearly as deadly – not only because there were far fewer deaths, but because there was, presumably, a much higher rate of survival as well. When the admissions for diarrhoea are included, the London Hospital recorded 302 deaths and 427 recoveries, with 769 admissions in total.[77] In the peak of the epidemic, Weeks 30 to 33, the *Weekly Returns* Supplement reported 178 deaths, though the actual number of cholera cases was much higher.[78]

The other institution in the east district which registered a fair number of cholera deaths was the temporary cholera hospital in Spitalfields, which opened on August 20. The *Lancet* published the following description:

> This hospital is at the corner of Flower-of-Dean-street, Commercial-street, about two hundred yards from Spitalfields Church. It is a large new warehouse, almost isolated, except at the back, where there are a few poor houses. The frontage measures seventy-six feet long. It has four stories, the three upper ones being turned into wards, whilst the dispensary and store department are in the lower one. Adjoining this is the bathroom, and below is the kitchen. The wards are large, about sixty feet square, and well ventilated; and in each is a wooden compartment containing two waterclosets and a scullery. There is also a fireplace and boiler in each ward, and at night the wards are well lighted with gas. The nursing is under the management of Miss Sellon, and is admirably conducted. There are always one or more "sisters" in charge of each ward, a nurse to each patient in collapse, and one nurse to three patients in reaction. Dr. H. G. Sutton is physician to the hospital; Mr. F. M. Mackenzie (lately assistant resident at the London Hospital) is resident medical officer; and there is a dispenser. Two porters are on duty in the day, and two at night. The dead are removed to Whitechapel Workhouse and Shoreditch Depository. The treatment has been as yet simple. Most of the patients have had external hot applications and iced water; six have had castor oil, but, we are informed, without success. A convenient method

[77] "Cholera in the Metropolitan Hospitals: London Hospital," *Lancet* 88:2247 (22 September 1866), pgs. 327-328.
[78] The Supplement to the *Weekly Returns* was published weekly during the height of the cholera epidemic and included detailed accounts of many reported cholera deaths, including age, sex, occupation, address, duration of the cholera, and any notes the medical attendant felt prudent to include.

> of applying warmth has been employed here in the form of large flat indiarubber bags [*sic*] filled with hot water, which can be put under the patient if necessary.[79]

Though temporary, the cholera hospital was thoughtfully laid out, with appropriate wards for men, women, and convalescing that were well vented and spacious. There was also ample staff, including some who had been seconded from the London Hospital. The temporary cholera hospital in Spitalfields did not register as many deaths, though it still saw its fair share of mortality. On September 8, the *Lancet* reported the following fatalities:

> Since August 20th, 103 cases of cholera and diarrhoea, have been admitted. Of these, 57 were cases of cholera (31 females and 26 males), and 46 diarrhoea (24 females and 22 males). There were 26 deaths – 15 females and 9 males. The cases admitted since Aug. 28th have been 28, of which 9 have died. The hospital contains now 50 beds, but would hold another 25 easily if required. There is a male and a female cholera ward, and a convalescent ward. Most of the patients have come from the Shoreditch, Spital-fields, and Bethnal-green parishes [*sic*].[80]

These numbers suggest that from August 20, when the hospital opened, until September 8, when the article was published, the temporary cholera hospital admitted 103 cholera cases and there was a mortality rate of 25 percent. However, the *Weekly Returns* also reported the number of deaths in the temporary hospital and compared the mortality against the overall number of deaths in Spitalfields.

[79] "Bethnal Green and Spitalfields Temporary Cholera Hospital," *Lancet* 88:2245 (8 September 1866), pg. 265.
[80] "Bethnal Green and Spitalfields Temporary Cholera Hospital," pg. 265.

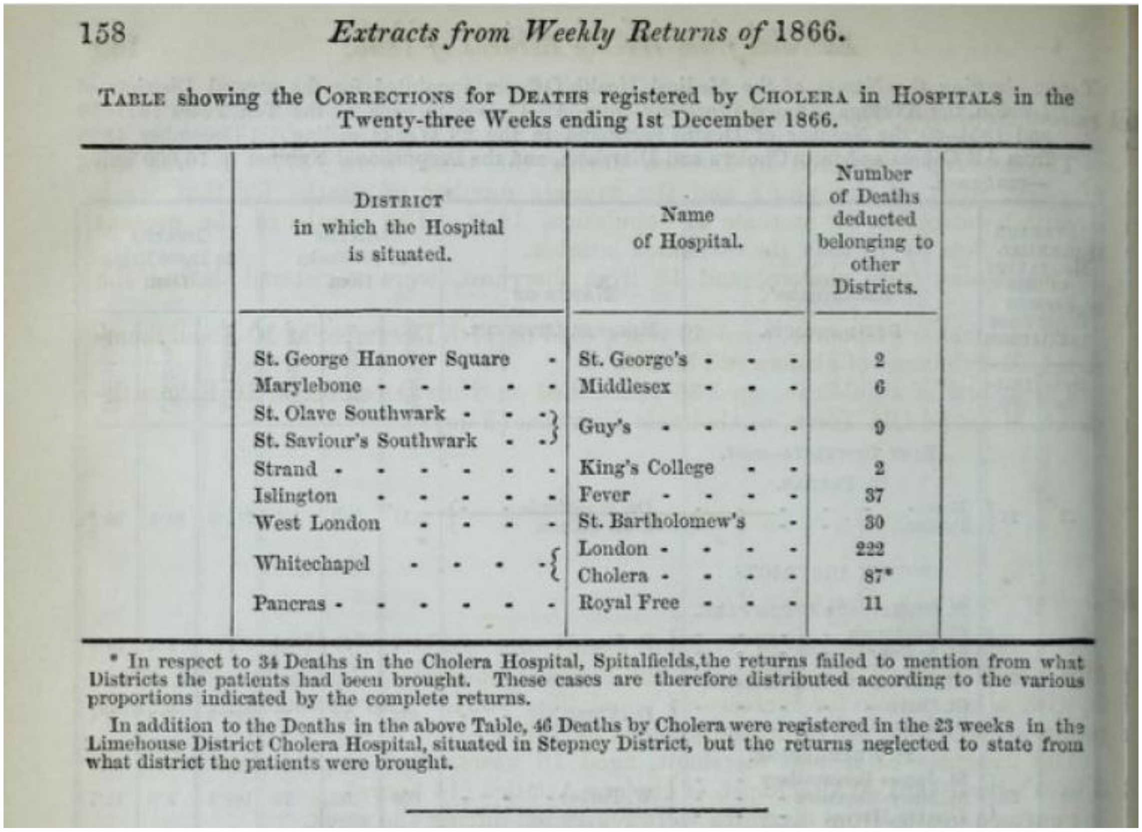
	Week 34	35	36	37	38	39	40	41	42	43	44	45
Cholera Deaths in Spitalfields	38	19	12	19	22	19	12	17	18	22	10	6
Cholera Deaths in the Temporary Cholera Hospital	5	13	19	17	9	16	16	18	10	6	1	1

Table 7.3 – A comparison of cholera deaths in Spitalfields to cholera deaths in the temporary cholera hospital, Weeks 34-45, 1866

The temporary cholera hospital on Commercial Street, Spitalfields recorded a relatively stable number of cholera deaths each week, though again, it is important to remember that this number is not a guaranteed figure reported by an authoritative source; rather, these cases were reported in a Supplement to the *Weekly Reports*, and not every cholera case was included in these publications. Because the dates of the *Lancet* publication were not constrained by the publishing schedule of the *Weekly Returns*, the death rates in the article are slightly higher than those provided in the *Weekly Returns*. However, the overall patterns are the same. Even recognizing the number of cholera deaths in the cholera hospital as an estimate, it is remarkable that the number of deaths recorded in the hospital make up a significant percentage of the total number of deaths in Spitalfields, which is a number confirmed and reported by the General Register Office. Even more interesting is the fact that there are weeks in which the number of hospital cases exceeded the number of cases in the neighbourhood, which was undoubtedly due to patients coming to the hospital from other sub-districts; some of the deaths had been redistributed to their sub-district of origin while others, such as those reported in the Supplement, were not, though, as the *Lancet* article points out, most patients who were admitted to the temporary cholera hospital were from nearby neighbourhoods. The temporary cholera hospital on Commercial Street closed its doors on November 1st, though its last patient was recorded on November 4th, the wife of a painter who had suffered cholera for ten days. The note affixed to her return reads: "From 6 George-street, Hoxton. This is the last case in the hospital, which is now closed."[81] The temporary cholera hospital was only open for a short while, but its presence can explain the prolonged cholera mortality in Spitalfields, Whitechapel after the initial cholera wave had passed. The hospital was opened on August 20 and closed November 1, which perfectly matches the increased mortality pattern in this neighbourhood.

However, evaluating the number of cholera deaths in hospitals poses a new problem unique to this epidemic. During the two previous epidemic, the General Register Office did not redistribute cholera deaths from institutions back to their place of origin. However, in 1866, the General Register Office attempted to do so. The *Report on the Cholera Epidemic of 1866* shows the following table:

[81] General Register Office, "Supplement to the Weekly Return, No. 45, for the Week ending 10th November 1866," *Weekly Returns of Births, Deaths, and Causes of Death in London* XXVII:30 (1866), pg. 835.



158 *Extracts from Weekly Returns of* 1866.

TABLE showing the CORRECTIONS for DEATHS registered by CHOLERA in HOSPITALS in the Twenty-three Weeks ending 1st December 1866.

DISTRICT in which the Hospital is situated.	Name of Hospital.	Number of Deaths deducted belonging to other Districts.
St. George Hanover Square	St. George's	2
Marylebone	Middlesex	6
St. Olave Southwark; St. Saviour's Southwark	Guy's	9
Strand	King's College	2
Islington	Fever	37
West London	St. Bartholomew's	30
Whitechapel	London	222
	Cholera	87*
Pancras	Royal Free	11

* In respect to 34 Deaths in the Cholera Hospital, Spitalfields, the returns failed to mention from what Districts the patients had been brought. These cases are therefore distributed according to the various proportions indicated by the complete returns.

In addition to the Deaths in the above Table, 46 Deaths by Cholera were registered in the 23 weeks in the Limehouse District Cholera Hospital, situated in Stepney District, but the returns neglected to state from what district the patients were brought.

Figure 7.13 – Redistribution of cholera deaths taken from Report on the Cholera Epidemic of 1866, *pg. 158*

Whitechapel, according to this table, had at least 309 cholera deaths which occurred in hospitals within its borders but originated elsewhere. The *Weekly Returns* are not explicit about their system of redistribution, making it difficult to establish with absolute accuracy the number of cholera deaths reported each week in any given sub-district. As mentioned above, the figures reported assume redistribution, but any Supplements published, with details regarding the *Returns* from certain sub-districts, do not reflect the redistribution data, though many times the textual notes of a return included the victim's place of origin. However, the fact remains: the London Hospital in Whitechapel Church and the temporary cholera hospital on Commercial Street in Spitalfields were taken advantage of by cholera patients, reflecting a change in health behaviour from the previous epidemics and serve as a reasonable explanation for the unique mortality patterns in Whitechapel.

PUBLIC HEALTH RESPONSE

The public health response in 1866 was vastly different from the previous two epidemics. As discussed in Chapter 2, the *Metropolis Management Act* was passed in 1855, and it provided much-needed structure to the administration of London and its parishes. The *Act* brought together all forms of nuisance control under one jurisdiction and established a hierarchical system between local parish boards and the metropolis. The *Act* did little to address the medical needs of its parishes, though it formalized the appointment of medical officers of health in each parish by the local boards.[82] Though this practice was already in place, it served as a way to solidify the hierarchy between local practitioners and the Privy Council, who oversaw this important role.

The stronger communication between the Privy Council and these medical officers is quite apparent when combing through the reports on cholera in 1866. During the height of the epidemic, the Privy Council sent questionnaires to each medical officer with specific questions regarding the quality and supply of water, as well as the actions taken when a case of cholera was suspected. The first set of questions reflected the ongoing desire to identify the origins of cholera. By 1866, there was still no definitive theory on cholera transmission, though the emerging two perspectives were the contagionist camp and the anticontagionist camp. The anticontagionists were heavily motivated by economic and political agendas and they believed

[82] Great Britain, House of Lords, *Metropolis Local Management Act. A Bill Intitutled An Act for the better Local Management of the Metropolis*, Bills and Acts, volume 5, page V. [i], paper number 258 (London: Parliament 1854-55), pg. 47.

that quarantine was ineffective at containing cholera. This had a large implication on international affairs and was the focus of several International Sanitary Conferences in the later nineteenth century.[83] The contagionists, on the other hand, believed that cholera was transmitted between persons, though the precise vector was still uncertain. Recalling the extensive studies undertaken after the 1854 Broad Street outbreak, water supply and condition were of great concern for the Privy Council. Even if cholera was not conclusively linked to the water supply, improper drainage and a lack of access posed one of London's biggest nuisances and threat to public health, which is why the Privy Council was so determined to collect information from its parish medical officers of health. In their circular, the Privy Council asked for responses which addressed the following points:

1. On the water supply of the district since June last, and the results of any analyses which have been made.
2. If the district is supplied partly by two or more companies, has any difference in the mortality of the parts supplied by the respective companies been observed?
3. On the effects of pump, well, or spring water on disease.
4. General information as to causes of mortality from cholera in the district.[84]

Over the subsequent weeks, medical officers submitted their observations to the Registrar General, who published them in the *Weekly Returns* beginning September 15. About a month later, the Privy Council requested further information from the medical officers of health. On October 20, the responses to the following additional questions were printed.

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[83] See Huber Valeska, "The Unification of the Globe by Disease? The International Sanitary Conferences on Cholera, 1851-1894," *The Historical Journal* 49:2 (June 2006), pgs. 453-476; Alex Chase-Levenson, *The Yellow Flag: Quarantine and the British Mediterranean World, 1780-1860* (Cambridge, UK: Cambridge University Press, 2020).
[84] *Report on the Cholera Epidemic of 1866: Supplement to the Twenty-Ninth Annual Report of the Registrar-General of Births, Deaths, and Marriages in England* (London, 1868), pg. 160.

1. What is the number of medical visitors and nuisance inspectors employed in your district? Are they under your control?
2. What steps are taken to secure the early treatment of diarrhoea?
3. What measures are employed to disinfect or destroy chemically the dejections of cholera patients?
4. Is every house in which a cholera patient is attacked visited, and is the disinfection of bed, linen, &c. carried out under inspection so as to secure its efficiency?
5. Are the linen and beds destroyed immediately replaced by the authorities?
6. Have you anything to remark generally in connexion with the hygienic state of the houses in which deaths from cholera were registered last week?[85]

The responses to both sets of questions varied greatly, both in content as well as in detail. Some parish medical officers of health were very detailed in their replies, while others never submitted a report. However, the circulation of the questionnaires, as well as what was being asked, reflects a heightened sense of competency by the Privy Council and the local boards. There appears to be better communication and knowledge transfer between the two, which helped ensure that the public health response to the epidemic was as thorough as possible. Interestingly, the content of the medical questions had not changed since the 1849 epidemic, though the first set of questions about water reflect the increasing concerns about possible origins of cholera. The ideas of public health, nuisances, and sanitation were consistent, but the process in which concerns and solutions were acted upon significantly improved by 1866, at least in part due to the 1855 *Metropolis Management Act*.

This second set of questions also highlighted the emphasis the Privy Council placed on disinfection and sanitation. The responses to the questionnaires sent by the Privy Council, along with contemporary newspapers, provide numerous examples of disinfectant practices. Perhaps the most detailed comes from a report about cholera is Bristol:

[85] *Report on the Cholera Epidemic of 1866*, pg. 178.

> The chemical agents used in these various operations, public and private, were principally sulphate of iron, carbolic acid, and MacDougall's and Calvert's powders. The first of these was much employed in larger operations; for which, as indeed for disinfection generally, it is admirably suited, by its cheapness, by the absence of corrosive power, and by many other qualities. Often, in order to secure a more abiding disinfection, this agent was placed in bult in the convenient form of a coarse powder, in the drain or sewer – a mode of employment which deserves to be widely imitated. In the infected house, the disinfecting powders were found very convenient for many purposes. In almost every case, a thick layer of one or the other of these was placed under the breech of the patient. Dispersed by a common dredger, such as cooks use for dredging flour, they were found to be the readiest means of sweetening the foul air of a filthy and crowded house. Chloride of lime and Condy's fluid, in water, were sometimes used for the disinfection of tainted linen, and chlorine, in the gaseous form, for fumigations; but, in almost every case, all tainted linen was destroyed.[86]

An equally thorough report was submitted by the medical officer of health for the sub-district of Islington, Dr. Edward Ballard , submitted on October 17, 1866:

> As regards disinfection, &c., my practice is this: On occurrence of a case of cholera or choleraic diarrhoea I send a man at once to pour carbolic acid into the privy and inlets of house drains in the invaded and adjoining houses, and take care that carbolic acid is also supplied for use in the utensils, or else Burnett's fluid, which is preferred by patients on account of its freedom from smells. This disinfection is repeated day by day for three or four days, and the whole adjoining streets similarly treated … dust accumulations are disinfected with MacDougal's powder, and then ordered for removal, and MacDougal's powder is scattered about the floors and staircases of the house and about the yard … in nearly all instances I have ordered the bedding to be destroyed, seeing it first soaked with carbolic acid; any filthy clothes or rags or dirty pieces or carpet are similarly treated. Other things which appear worth preserving or are not much stained, such as sheets, blankets, or articles or clothing, I see put into a solution of Burnett's fluid or a weak solution of carbolic acid … the floors in all cases, and if dirty the walls and ceilings of the room and sometimes of the entire house, are then smeared or washed over with carbolic acid and water, and a notice given to the owners to cleanse and limewhite under the Sanitary Act.[87]

[86] William Budd, "Asiatic Cholera in Bristol in 1866," *The British Medical Journal* 1:328 (April 13, 1867), pg. 418.
[87] *Report on the Cholera Epidemic of 1866*, pg. 179.

There are several pages of notes from various medical officers of health, and the following excerpts highlight the most common practices for disinfecting and sanitising a house after a cholera patient:

> The chief disinfectants are – chloride of lime, Burnett's liquid, Condy's liquid, and a solution of carbolic acid. The medical attendant should give directions for the use of these agents. Condy's fluid is well adapted for cleansing the mouth and hands before taking food; and carbolic acid for cleansing bedding and cloth, which would be damaged by mineral disinfectants.[88]
>
> *
>
> 3. The free use of Condy's fluid, chloride of lime, and carbolic acid … 5. Linen and beds destroyed are replaced by authorities.[89]
>
> *
>
> 3. Chloride of lime and carbolic acid, liquid and powder, have been freely used, and supplied gratuitously wherever disinfectants have been required … 5. Beds and linens and clothes have been burned in the three instances where the disease has occurred, and have been replaced with new ones by the authorities.[90]
>
> *
>
> Prior to the appointment of the visitors a staff of workmen was engaged, who were employed daily in cleansing privies, water butts, yards, and cellars, and, when necessary, limewashing both the outside and inside of the houses of the poor.[91]
>
> *
>
> All linen, &c., is disinfected by being immersed first in boiling water, and afterwards in a solution of carbolic acid or chloride of lime; beds, bolsters, and woollen fabrics are destroyed by fire.[92]

As these sources reveal, the most common disinfectants were carbolic acid, chloride of lime, and various "brand name" powders and fluids.[93] The wide array of disinfectants allowed almost

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[88] George Johnson, "Rules for the Treatment of Epidemic Diarrhoea and Cholera," *The British Medical Journal* 2:290 (21 July 1866), pg. 65.
[89] *Report on the Cholera Epidemic of 1866*, pg. 180.
[90] *Report on the Cholera Epidemic of 1866*, pg. 181.
[91] *Report on the Cholera Epidemic of 1866*, pg. 183.
[92] *Report on the Cholera Epidemic of 1866*, pg. 184.
[93] These included MacDougal's powder, Culvert's powder, Burnett's fluid/liquid (which was chloride of zinc), and Condy's fluid (which was permanganate of potash). *Report on the Cholera Epidemic of 1866*, pg. 199.

every surface and household good to be sanitized, including linens. Anything that could not be sanitized properly – mainly beds and soiled clothes – was burned and replaced at full cost by the local board. The above excerpts also suggest that it was not just the houses that were cleaned during the cholera outbreak. Privies, streets, and communal spaces were also under the purview of the medical officers of health, and these spaces were routinely maintained according to the responses submitted to the Privy Council. Of course, it is important to remember that not all sub-districts returned these reports, which suggests that the sub-districts who did not were lacking the proper infrastructure, personnel, and funds to carry out this important work.

John Liddle was the medical officer of health for Whitechapel, and he wrote on October 19th, in response to the medical questionnaire, that,

> The information contained in the daily returns of deaths from cholera is attended with this beneficial result, viz., that it enables me to send a qualified medical practitioner, Dr. Duke, to visit the house where a death is recorded, and to destroy the clothes and bedding of the deceased, and to inquire into the sanitary condition of the house and locality, and to ascertain the existence or otherwise of diarrhoea in the neighbourhood.[94]

Liddle's response indicates that Whitechapel was fairing relatively well in terms of responding to cholera patients; there was a practitioner who visited the homes and sanitary precautions were followed. This simple fact – the ability to keep on top of the epidemic – is likely one of the reasons why cholera never took hold in any neighbourhood and why the street-level mortality shows a scattering of one or two deaths per street rather than an overwhelming number of cholera deaths in one location. However, there is one aspect of the public health response which has yet to be discussed, which the first set of questions circulated to the medical officers reflects: the saga of the East London Water Company.

[94] *Report on the Cholera Epidemic of 1866*, pg. 182.

The East London Water Company served almost the entire east district. It was the only source of water in Poplar and serviced about ninety percent of Whitechapel. The Company drew its water from the River Lea at Higham Hill, which was about three miles above Lea Bridge.[95] The Company also took advantage of reservoirs which pumped water with London's largest water pump, named Victoria, located at Old Ford and at Lea Bridge.[96]

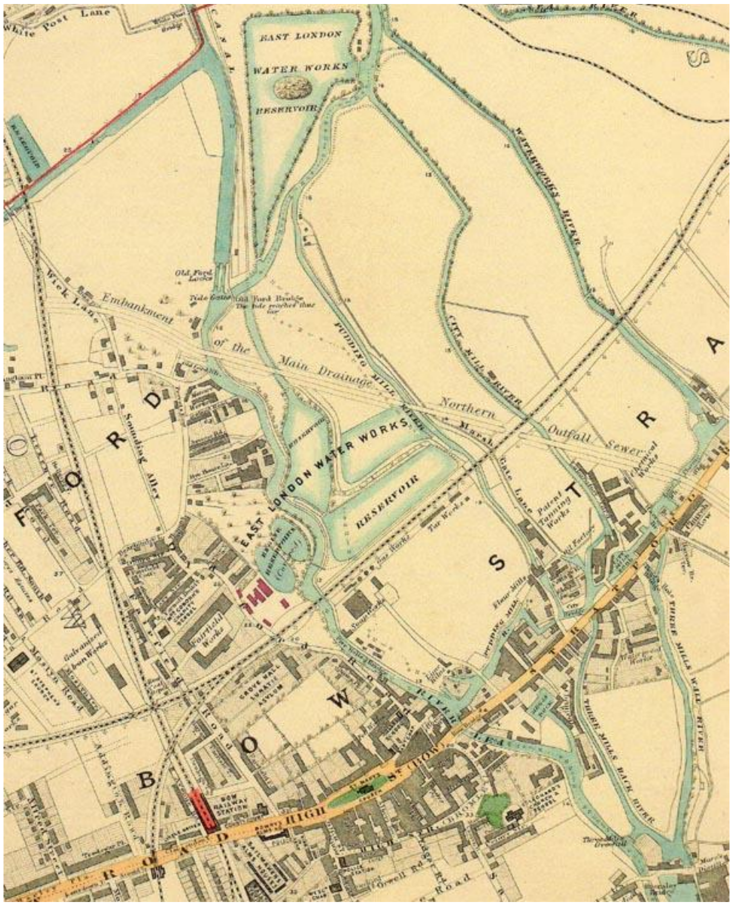

Figure 7.14 – A map of the East London Water Company's reservoirs as seen in Edward Stanford's 1862 map of London. "East London Waterworks Company," UCLA Epidemiology, Fielding School of Public Health, *available online at http://www.ph.ucla.edu/epi/snow/1859map/eastlondon_waterworks.html*.

It was the reservoir at Old Ford that caused a large outcry, as they were found in violation of the 1852 *Metropolitan Water Act*. Within the pumping station were three reservoirs: one was

95 *Report on the Cholera Epidemic in 1866*, pg. 260.

96 "East London Waterworks Company," *UCLA Epidemiology, Fielding School of Public Health, John Snow Site*, available online at: http://www.ph.ucla.edu/epi/snow/1859map/eastlondon_waterworks.html.

covered, as per the *Act*'s instructions, and two were not. This, in addition to the belief that there was a canal which apparently connected the River Lea to one of the filter beds, started the accusations against the East London Water Company as being responsible for the outbreak.[97]

The Company responded by writing in the *Times* that the canal had been out of use since 1853 and existed only as a drain from the filtration bed, that any water drawn from nearby was transported in an iron pipe "and never sees light or risks pollution between the filter-bed and the consumer," and "that not a drop of unfiltered water has for several years past been supplied by the company for any purpose."[98] The accusations shifted opinions about the East London Water Company, and William Farr, who was still working at the GRO, requested a chemical analysis of the water from the reservoirs at Old Ford.[99] Even though the analysis of the water did not turn up anything damning, the reputation of the East London Water Company was still tarnished. However, because it was the only water company serving most of eastern London, they remained overwhelmed with business, which would ultimately lead to the blame for the cholera outbreak being placed squarely on their shoulders. Though cholera had passed by December 1866, investigations were still ongoing and it was around then that Charles Greaves, one of the engineers for the East London Water Company, admitted that the Company had, indeed, drawn from the uncovered reservoirs during periods of high demand.[100] Even though the analysis of the uncovered reservoir had revealed the water was of an acceptable quality, the admission that the Company had drawn on water which was forbidden by the 1852 *Water Act* led to many firmly believing that it was, in fact, the East London Water Company who was to blame for the cholera outbreak of 1866.

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[97] Bill Luckin, "The Final Catastrophe – Cholera in London, 1866", *Medical History* 21 (1977), pg. 34.
[98] Charles Greaves, "The Public Health," *Times*, 2 August 1866, pg. 10.
[99] Luckin, "The Final Catastrophe," pg. 34.
[100] Luckin, "The Final Catastrophe," pg. 38.

What happened following Greaves's statement about the use of uncovered water turned out to be one of the more tangible public health initiatives to emerge from the cholera outbreak. The Rivers Pollution Commissioners "deplored the company's laxness in distributing filtered supplies which had then been immediately subjected to admixture with untreated water," though the Company faced no legal charges for disobeying the *Metropolitan Water Act*.[101] However, there was a strong push from sanitarians and public health enthusiasts that the water companies which serviced London to be held to much higher standards of performance and compliance with the *Metropolitan Water Act*. It was not enough for water companies to provide chemical analyses, as these could obviously be inaccurate given that cholera was believed to have originated from water that chemically tested normal. There was a backlash that such an important facet of healthy living – the supply and quality of water – was a commercial operation rather than one controlled by the government. In fact, most of the arguments over water supply stemmed from a political and economic perspective rather than a true desire to remove a public health nuisance.[102] Even though many officials never commented exclusively on the role the East London Water Company played in spreading cholera in 1866 – almost all of them did admit that local factors such as housing and population density likely had an impact to some degree – the cholera outbreak of 1866 proved to be invaluable for eliciting change in public health in the future. Following this epidemic, public water supply came under intense government scrutiny to ensure better access and quality.[103]

[101] Luckin, "The Final Catastrophe," pg. 38.
[102] Luckin, "The Final Catastrophe," pgs. 38-39, 41.
[103] Luckin, "The Final Catastrophe," pg. 42.

THE EFFECTIVENESS OF PUBLIC HEALTH IN 1866

The cholera outbreak in 1866 was much less deadly than the previous two epidemics which are examined in this thesis. This begs the question: *why*? What explains the decreased mortality that London experienced in 1866 when compared to 1849 and 1854? This section will briefly address two theories which offer an answer to this question: the public health response theory, which posits that it was the increased public health measures enacted which stemmed the tide of cholera, and a theory which suggests that the lack of a "mini epidemic" reflected a less virulent strain of the disease itself.

The first theory is one heavily found in the literature about the cholera outbreak of 1866 around the world. London was not the only city to experience lower than usual mortality. Works by historians including Charles Rosenberg, Geoffrey Bilson, Bruce Curtis, and Madeline Fowler have highlighted that cholera in North American urban centres such as New York, Toronto, and Halifax in 1866 was far less deadly, and that "there were some apparent successes against cholera, which suggested that effective action against the disease was possible."[104] Throughout this scholarship, the emphasis is on the successful steps taken to combat the disease. Much credit is given to the creation of local boards of health and the steps taken to disinfect, sanitize, and quarantine any potential disease threats. Many public health initiatives were taken early on in 1866: "fearing a repetition of the scenes of horror witnessed by the country [Canada] in 1832, 1849, and 1854-55, the government acted early" and on February 20, 1866 "won approval for the proclamation of the Public Health Act and the creation of the Central Board of Health."[105] Similarly, New York adopted its Metropolitan Sanitary District and Board of Health on February

[104] Geoffrey Bilson, *A Darkened House: Cholera in Nineteenth-century Canada* (Toronto: University of Toronto Press, 1980), pg. 136.
[105] Bruce Curtis, "Social Investment in Medical Forms: The 1866 Cholera Scare and Beyond," *Canadian Historical Review* 81:3 (September 2000), pg. 359.

26, 1866. Following the rapid actions in the city, New York had "no explosion of cholera similar to those that had taken place in 1832 and 1849. The mildness of the epidemic was no mere stroke of good fortunate, observers agreed, but the result of careful planning and hard work by the new health board."[106] The story in Halifax was much the same: due to the quick actions of the public board of health, "Halifax deserved some credit in confining cholera to the quarantine station that spring."[107]

The historiography of the 1866 cholera epidemic – not only in London but also in North America – emphasizes the successes of public health measures in preventing cholera from claiming as many lives as it had during the previous epidemic. The comparisons drawn between the chaotic responses of the 1830s, 40s, and 50s pales against the organized, structured boards of health which were formed as preventative measures against the threat of cholera in 1866. These preventative measures were backed by rapid advancements in scientific understandings of the disease. Though it would be another seventeen years before Koch discovered the cholera bacteria, *vibrio cholerae*, there was a growing belief that cholera was transmissible and contagious. Though the contagionist-anticontagionist debates were lingering, particularly during the International Sanitary Conferences, those acting in response to the threat of cholera chose to act as though the disease was transmissible by people and was prevented by sanitation efforts. It was this decision, many historians argue, that stopped cholera in 1866 from being another deadly epidemic. The measures undertaken by the Privy Council in London support this idea; the increased sanitation duties of the medical officers of health and the growing reliance on medical institutions both suggest that cholera was kept at bay through preventative measures. However,

[106] Charles Rosenberg, *The Cholera Years: The United States in 1832, 1849, and 1866* (Chicago: University of Chicago Press, 1962), pg. 205.
[107] Madeline Fowler, "From Empire to Colony," *Acadiensis* 47:2 (Summer/Autumn 2018), pg. 66

there is another theory about why cholera in 1866 was far less deadly, one that has little to do with the social and medical responses in favour of a microbiological explanation.

One of the aspects that made the 1866 cholera outbreak unique compared to the 1849 and 1854 epidemics in London was the lack of "mini epidemic" the previous winter. In both 1848 and 1853, there had occurred smaller, localized outbreaks which preceded – and perhaps foreshadowed – the coming of an epidemic of greater proportions. This phenomenon has been explained as a "herald wave" of cholera in which "a non-summer introduction of a new cholera strain can result in an initial herald wave, followed by a severe outbreak the following summer."[108] Figure 7.15 is taken from "Herald Waves of Cholera in Nineteenth Century London" and shows how mathematical models were used to confirm this theory.

[108] Joseph H. Tien et al., "Herald Waves of Cholera in Nineteenth Century London," *Journal of the Royal Society Interface* 8 (2011), pg. 756.

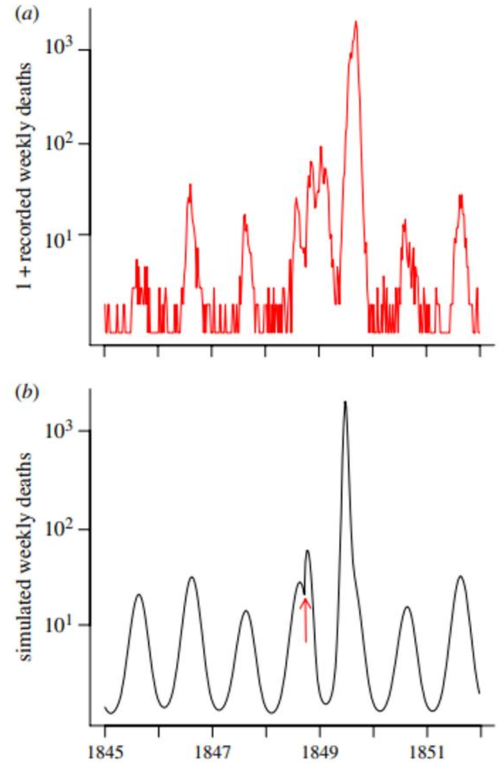

Figure 3. Model simulations of London cholera, compared with observed cholera deaths. (*a*) Observed weekly deaths from 1845 to 1852. (*b*) Simulation results corresponding to endemic cholera, together with the introduction of a new cholera strain in late September 1848 (arrow).

Figure 7.15 – Partial reproduction of Figure 3 in "Herald Waves of Cholera in Nineteenth Century London," pg. 758, which demonstrates the mortality pattern of a herald wave of cholera using mathematical models.

As the mathematical model shows, the increase in mortality in 1848 corresponds almost perfectly with the mini epidemic discussed in Chapter Five. The absence of a mini epidemic – or a herald wave – in 1866 suggests that perhaps the disease itself was less virulent in 1866 and that is why there were so few deaths compared to previous epidemics. This theory suggests that, at least partial, the microbiology of the disease contributed to the high mortality in 1849 and 1854: a new strain of cholera made the disease more deadly. So, while the public health response was certainly more proactive and effective in 1866, it is impossible to know for sure, as the historiography has long suggested, if that was the reason the epidemic in 1866 was less deadly.

CONCLUSION

By 1866, cholera was a known threat to London even though the last epidemic was a twelve-year-old memory. London had experienced substantial changes in its infrastructure since 1854, mainly with the 1858 *Public Health Act* and *Local Management Act*, which shifted matters of public health from the now-dismantled General Board of Health to the Privy Council and local boards. London itself had also grown substantially and was now home to approximately three million people. Unlike 1848 and 1853, the autumn of 1865 and the early months of 1866 passed without a rise in cholera deaths, perhaps creating a false sense of security. Regardless, cholera arrived in the summer months of 1866.

The 1866 cholera experience was very different from the previous two epidemics. Apart from there being no "mini epidemic," the epidemic arrived earlier and lasted longer than any other cholera epidemic. Similarly, the geographic mortality patterns were not the same. Lambeth, and indeed the whole south district, did not reclaim its title as the deadliest sub-district and district. In fact, almost all the cholera deaths in 1866 occurred in the east district. As discussed in Chapter Two, the East End of London during this period gained notoriety for being poor, loud, and dirty. No one ventured there without explicit purpose – often missionaries, parish officials, and medical officers of health, and even they went as little as possible. Yet in this district of London, cholera took hold and claimed over nearly 4,000 cholera victims.

The district mortality patterns show that the east district suffered the worst from cholera, but they also suggest that, unlike the previous two epidemics, cholera existed throughout all districts London for an extended period. Until Week 36 – about nine weeks into the epidemic – the number of cholera deaths was continuously highest in the east district. Past Week 36, the mortality patterns began to shift, and week-to-week, it was impossible to predict which district would have the highest cholera mortality rate. However, even though cholera lasted longer than it had in previous years, it is important to recognize that, as a summer disease, the number of cholera deaths registered in the second half of the epidemic were minor in comparison to those reported in 1849 and 1854. This, in accordance with literature about cholera in North America in 1866, suggests that the 1866 cholera strain was not as virulent and anywhere it struck, it did not claim as many victims as it had in past years.

Cholera mortality in the east district was well distributed, and all the sub-districts except Shoreditch experienced a significant number of cholera deaths. However, even with comparing crude death figures and standardized mortality rates, it becomes obvious based on the data that there was no “cholera hot spot” in the east sub-districts. The cholera experience was uniformly deadly throughout the east and there was no “clustering” that mirrored what happened in Lambeth Church 2nd or St. James, Westminster. However, unlike Lambeth Church 2nd and St. James, Westminster, there were two institutions in the east district which can account for at least a portion of the mortality pattern.

London Hospital in Whitechapel Church and the Spitalfields temporary cholera hospital were both institutions which accepted cholera patients. The *Weekly Returns of Births and Deaths*, along with other contemporary sources, report mortality rates in these institutions. However, there is no consistency about deaths being reallocated. The General Register Office attempted to reallocate deaths in their reporting. While important for understanding the geographic mortality patterns, the reallocation in the records is not consistent, which makes it difficult to accurately show how the cholera mortality patterns were influenced by institutional deaths.

The final section of the chapter discussed the public health response. Unlike 1849 and 1854, the hierarchical structure of the Privy Council and the local boards appears highly effective at communication and knowledge transfer. The Privy Council issued questionnaires to the local boards to ascertain the steps taken in combatting the cholera. These questionnaires addressed two main aspects: water supply and disinfection. Though it is impossible to fully evaluate if the 1866 cholera epidemic was less deadly because of less virulent strain or a more effective public health response, it cannot be denied that by 1866, the response of the Privy Council was superior to what it had been seventeen years prior. Further, the Privy Council, through investigations about the water supply, successfully identified the source of cholera in the east district: the East London Water Company had been drawing water which did not meet the quality standards set out by the *Metropolis Water Act*, and the company shouldered the blame for the last cholera epidemic in nineteenth-century London.

CONCLUSION

Epidemic cholera never again visited London, but it is still a known and active disease. After Robert Koch re-discovered the cholera bacillus in 1883, the disease largely disappeared from Europe and North America.[523] However, the seventh pandemic began in 1961 in South Asia, and impacted Africa and North and South America in the 1970s and 90s respectively. The World Health Organization estimates that there are anywhere from 1.3 to 4.0 million cases of cholera yearly, with up to 143,000 deaths, and the disease is endemic in many countries lacking public health infrastructure. There is currently a global action plan dedicated to reducing cholera mortality by 90 percent by 2030.[524]

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This thesis has addressed three research questions throughout its chapters.

1) What was it like to live in, be sick in, and die in London?

2) What were the cholera experiences in London in 1849, 1854, and 1866?

3) What was the public health response to cholera, and was it successful in lowering cholera mortality?

LIVING, SICKNESS, AND DYING IN LONDON

Chapters Two, Three, and Four addressed the first research question. Chapter Two began by describing what it was like to live in London. The housing in the rapidly growing metropolis varied considerably, with the wealthy living in brick homes in the west and poor labourers living in tenements in the east. Though there existed a middle class, the dichotomy of west versus east

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[523] Filippo Pacini originally discovered the bacillus in 1854. Margaret Pelling, *Cholera, Fever and English Medicine, 1825-1865* (Oxford, UK: Oxford University Press, 1978), pg. 3.
[524] "Cholera," *World Health Organization*, last modified 30 March 2022, available online at: https://www.who.int/news-room/fact-sheets/detail/cholera.

was established during the early nineteenth century, and the East End developed its own social identity. The housing crisis and rapidly rising population highlighted the need for social and sanitary reform, a connection emphasized by Sir Edwin Chadwick.

Chadwick's 1842 report on the *Sanitary Conditions of the Labouring Population of Great Britain* was one of the first to address sanitation and public health in England. The 1848 *Public Health Act* created a overarching administrative board, though this model was not adopted by London until 1855, with the *Metropolis Management Act*. The legislation passed grouped all forms of "nuisances" – everything from rubbish piles to street lighting – under the authority of local boards, who reported to the overseeing authority. In London, this was the General Board of Health. Accompanying the legislation was the rise of vital statistics, a way to collect information about the births, deaths, and marriages in England. The General Register Office was established in 1836 and was instrumental in providing a transparent understanding of mortality in England. While Chapter Two heavily detailed living in London – and the legislative work that went on behind the scenes – Chapters Three and Four explored being sick in and dying in London.

Medical care in nineteenth-century London varied considerably, as it was an era of expansion within the medical market. The rise of new practitioners meant that the traditional trifecta of medical personnel – physician, surgeon, and apothecary – were facing competition. This led to a push for medical licencing regulation, and while successful in certain areas of medicine, the medical marketplace continued to offer patients a wide array of treatment options. As discussed in Chapter Four, there was no known cause of cholera which meant that it was difficult to prescribe a cure. There was a wide variety of preventative and responsive treatment options, including rehydration therapy. Although rehydration practices had their own risks, reintroducing liquid into cholera patients was a common treatment. Equally common, though admittedly counteractive to rehydration therapy, were purgatives.

Also changing in medical care were the scientific principles which were the basis for understanding contagious and epidemic diseases. In a pre-bacteriological era, diseases began to be understood as the result of morbid poisons within the blood; morbid poisons, in turn, were the result of chemical processes – either putrefaction or fermentation. William Farr introduced the term *zymotic* into his life-tables, which were the statistical tables published by the General Register Office. The new term reflected the changing scientific principles of disease causation. The classification of disease was an important facet of the rise of vital statistics and is one of the cornerstones of the methodology of this thesis. The *Weekly Returns of Births and Deaths in London* is an invaluable resource for understanding mortality patterns throughout nineteenth-century London, as mortality is classified by cause. The zymotic deaths are what we today would think of as contagious, and this is where cholera deaths were included. The disease classification within the *Weekly Returns* allows for contextual comparisons of mortality patterns; the relationship between zymotic mortality rates and overall mortality rates is the first step in evaluating the severity of cholera outbreaks. However, the *Weekly Returns* also provide aggregated data based on sex and age, which is also important when considering the mortality patterns.

Chapter Four used the vital statistics in the *Weekly Returns* to begin examining the cholera experience in London in the 1840s, 50s, and 60s. While the cause of cholera was unknown, the one thing most medical practitioners could agree on was the importance of premonitory diarrhoea. As one of the earliest symptoms of cholera, identifying its presence was crucial in ensuring prompt treatment. However, the presence of diarrhoea makes it difficult to fully ascertain the true extent of cholera mortality because diarrhoea, while being a symptom of cholera, was also its own disease within the life-tables. Diarrhoea, dysentery, and cholera were grouped together by Farr, and while dysentery was easily identifiable due to blood in the stool, diarrhoea and cholera deaths were often conflated. In the early weeks of cholera epidemics, there was an increase in the number of diarrhoea deaths registered. It was not until the reality of the epidemic was fully realized that the number of diarrhoea deaths declined, which coincided with the rising number of cholera deaths. This implies that these diarrhoea deaths could have been early cholera cases, and medical practitioners did not know to look for other symptoms, thus registering the death as a diarrhoeal death when the diarrhoea was actually a mere symptom of cholera.

This pattern of misdiagnosis is one of the unique contributions of this thesis. Though the risk of misdiagnosis is known when using vital statistics, it is difficult to fully account for the possibility. Using the weekly breakdown of deaths from the *Weekly Returns* has allowed for a comparative analysis of diarrhoea and cholera mortality, which in turn indicates that the diagnostic practices changed as cholera epidemics progressed and suggests that at least a degree of diarrhoea deaths were misdiagnosed cholera cases. Chapter Four concluded by providing the first glimpse of cholera mortality patterns in London by examining the seasonality of cholera, and its overall mortality across the three epidemics covered in this thesis. Though brief, this introduction to mortality patterns served to shift the focus of the thesis into the second and third research questions. Chapters Two, Three, and Four present a thorough context for understanding the mortality patterns of cholera. The cholera experience was defined not only by mortality patterns, but by the broader experiences of living in, being sick in, and dying in London.

THE CHOLERA EXPERIENCES OF 1848, 1854, AND 1866

Chapter Five explored London's cholera experience in 1848 and 1849. The large epidemic in the summer of 1849 was preceded by a mini cholera epidemic in the fall of 1848 and a highly localized outbreak in Mr. Drouet's Infant Poor Establishment in the early weeks of 1849. The 1849 epidemic which occurred during the following summer was most deadly in the south district, and the mortality data was used to demonstrate how cholera moved throughout several south sub-districts over a period of weeks. However, the neighbourhood of Lambeth Church 2nd was consistently the deadliest, both in terms of crude deaths as well as when standardized for population density. Street-level data shows the spread of cholera in the neighbourhood, a level of detail rarely shown in cholera mortality patterns. This geospatial analysis showed that cholera in Lambeth Church 2nd was spread over many streets, rather than having one particular house or street which bore the brunt of cholera mortality. This was true even when considering Princes Street, which was home to the Princes Street workhouse, which served most of Lambeth. Standardized mortality ratio calculations were used to evaluate the impact the workhouse had on the number of cholera deaths and the corresponding mortality patterns for the sub-district.

In 1853, cholera returned to London in the autumn. Another mini epidemic, this outbreak did not have the same localized mortality pattern as in 1848. It was less deadly, and far less localized, with cholera mortality present in multiple sub-districts across London. The 1854 cholera epidemic presented mortality patterns which mirrored, in part, the mortality patterns from 1849, but there was one major difference. While the south district claimed the most cholera deaths, and again Lambeth was the deadliest sub-district, there was a heavily localized cholera outbreak in the west sub-district of St. James, Westminster. This is the famed story of John Snow, and the removal of the Broad Street pump. Chapter Six considers the sub-districts of Lambeth and St. James, Westminster in greater detail, and the section on Lambeth reveals that while Lambeth Church 2nd was still the neighbourhood with the highest cholera mortality, the epidemic in this sub-district lingered much longer than it had in 1848. The total number of cholera deaths was lower, and the movement of the disease was slower, which made for a longer cholera experience in Lambeth. St. James, Westminster, on the other hand, had a very different cholera experience. The number of cholera deaths in this neighbourhood rose and declined quickly. The fast decline is often attributed to the work of Dr. John Snow, who identified the communal pump outside of No. 40 Broad Street as the epicentre of the localized outbreak and petitioned the General Board of Health to remove the pump handle. The chapter conducts a street analysis within St. James, Westminster to fully contextualize this moment in public health history and highlights the mortality patterns of not just Broad Street, but of the entire neighbourhood.

The 1866 cholera experience was very different from 1849 and 1854. Not only was there no mini epidemic which preceded it, but the epidemic occurred much earlier in the year, lasted much longer, and yet was far less deadly. The geographic distribution of cholera deaths was also unique: rather than the south district, which had been the deadliest district in the previous two epidemics, it was the east district which registered the most cholera deaths, but cholera was present in all five main districts. The mortality patterns changed as the weeks progressed. Beyond Week 36, cholera mortality varied considerably between the districts, though it is important to recognize that the number of cholera deaths being registered was much less than in previous years. In the east district, there was no one sub-district that consistently experienced the highest number of cholera deaths, and cholera was rampant in several east sub-districts. These mortality patterns are further evidence that the 1866 cholera epidemic experience was vastly different from the previous two studied in this thesis.

Chapter Seven, apart from identifying the unique mortality patterns, considers the cholera experience in the east sub-districts. Though cholera was never localized, meaning there were no "hot spots" as there had been in Lambeth Church 2nd or St. James, Westminster, the presence of institutions in Whitechapel Church and Spitalfields do contribute to the mortality patterns. The London Hospital and the Spitalfields temporary cholera hospital both recorded a significant number of cholera deaths. These institutions admitted a lot of cholera cases, and there was an approximate 50 percent recovery rate. This suggests that health-seeking behaviour was changing, and that the majority of cholera deaths in 1866 were taking place in institutions rather than at home. However, this does pose a methodological issue, as reallocation was not consistent among the existing mortality records. The General Register Office attempted to do this, but it was not standardized, and it is difficult to assess the true mortality patterns of the east sub-districts due to this limitation. However, there are notes which indicate that most of the patients in these hospitals were from the same or surrounding sub-district. Regardless, the mortality patterns and cholera experience of 1866 were defined more by institutional deaths and a drawn-out epidemic which was far less severe than previous years.

THE PUBLIC HEALTH RESPONSE TO CHOLERA IN 1849, 1854, AND 1866

In 1849, London was not included in the 1848 *Public Health Act*, and public health matters were governed by the 1846 *Nuisances Removal and Disease Prevention Act*. While London did have a General Board of Health, it was highly ineffective as it required a Parliamentary act to issue any orders. In 1849, the General Board of Health had such permission, and issued instructions on the sanitation and inspection of all sub-districts and neighbourhoods by medical officers of health. However, most neighbourhoods were unable to carry out the orders due to a lack of personnel, funding, and infrastructure. This was certainly true in Lambeth Church 2nd; a review of articles published in the *Times* shows the high level of dissatisfaction the residents of the neighbourhood felt towards the medical officers of health and local board. They complained about offensive smells, dirty streets, and the lack of effort to address these nuisances. Even the medical officer expressed his frustration at not having enough personnel to carry out the house-to-house visitation as ordered by the General Board of Health, and he resigned after serving the neighbourhood of Lambeth Church 2nd for eighteen years. Though the hierarchical system of public health administration was in place in 1849, it was still in its infancy and proved highly ineffective in addressing the cholera epidemic.

The public health response in 1854 was much more developed than it had been five years prior. Still governed by the 1846 *Nuisance Removal and Disease Prevention Act*, the hierarchical structure of the General Board of Health was the same as it had been in 1849. There was a new president of the General Board of Health, Sir Benjamin Hall, and he was intent on making the General Board more effective. He appointed nine medical officers of health who submitted daily reports directly to him, and he reviewed the data to ensure that the steps being taken were effective. The orders issued by Hall regarding sanitation and medical visitation were nearly identical to those from 1849. However, even with this improved hierarchy of public health administration and the transparent involvement of the president of the General Board of Health, the orders issued by Hall were often ignored. The General Board of Health had no legal ability to enforce the orders, and many sub-districts once again did not act on the orders given.

Hall also created a medical council which was concerned with identifying the cause of the cholera outbreak. Not surprisingly, this council was very interested in what had happened in St. James, Westminster. There were several investigations conducted and reports written about this outbreak, and many of them included detailed observations about the environment of Broad Street, including temperature and weather, water quality and infrastructure, and known nuisances. John Snow is, of course, the most famous actor in the 1854 Broad Street pump outbreak, and had the pump handle removed, but there are several other important reports considered in Chapter Six. For example, it was Reverend Whitehead, the curate of St. Luke's, who identified Frances Lewis as "patient zero" of the epidemic. Through a detailed analysis of the cholera mortality patterns in St. James, Westminster and the numerous reports of the Broad Street outbreak, it is suggested that Snow's removal of the pump handle, though widely celebrated as a hallmark in public health history, was not the reason for the decline of cholera deaths in St. James, Westminster and that this narrative, which is so well known in medical and public history, is inaccurate.

Chapter Seven examined the public health response in 1866. Like the epidemic experience, the public health response in 1866 was vastly different. The 1858 *Public Health Act* and *Local Management Act* had dismantled the General Board of Health and turned responsibility for public health matters over to the Privy Council and local boards. There was much more communication between the two than there had been with the General Board of Health, which led to more effective public health policies. There was an emphasis not only on sanitation and disinfection practices, which the chapter covers in detail, but there was a great concern about the quality and source of water supplied to the neighbourhoods of London. This was not without merit, as the Privy Council recognized that the East London Water Company had been drawing water from a reservoir which did not meet the standards set out in the 1852 *Water Management Act*, and this was the cause of the epidemic.

This final chapter also engages in an important discussion on why the epidemic of 1866 was far less deadly than the previous two. Many historians believe that the rise of effective public health policies – mainly disinfection, sanitation, and quarantine – were the reason cholera never took hold like it had in 1849 or 1854, and this pattern was observed in North America as well as in Britain. However, the chapter offers an alternative theory. There was no mini epidemic in 1866 and an article entitled “Herald Waves of Cholera in Nineteenth Century London” suggests that this was an important factor in making the epidemic less deadly. The article claims that the previous two epidemics were preceded by a “herald wave” of a new strain of cholera about half a year before the outbreaks, and it was the microbiological virulence of the disease which made them so deadly. Because 1866 was not a new strain of cholera, the disease itself was less virulent and therefore led to fewer cholera deaths. The mortality patterns discussed throughout the thesis match the mathematical models used to support this argument. Though it is impossible to know what strains of cholera were infecting the residents of London in 1849, 1854, or 1866, this is a theory which challenges the dominant narrative in public health history and deserves consideration. In the end, however, there is no denying that by 1866, the public health response to cholera had come a long way compared to 1849 and 1854, and this undoubtedly played at least some part in lowering cholera mortality in 1866.

CONTRIBUTIONS

This thesis has made several contributions to the existing scholarship on cholera in the nineteenth century. Chapters Two, Three, and Four have provided a cohesive analysis of London living in the 1800s. They analysed the numerous legislative changes which altered the relationship between London and its surrounding parishes; identified the existing public health infrastructure and the changes undertaken over the long nineteenth century; recognized the challenges within the rapidly changing medical marketplace; examined theories of contagious and infectious diseases, particularly their causation, transmission and treatments; acknowledged disease classification practices; and identified the registration districts and sub-districts of London. At the end of Chapter Four, cholera was introduced against this thorough background of living, being sick in, and dying in London. Chapters Five, Six, and Seven undertook detailed analysis of the 1849, 1854, and 1866 cholera outbreaks to highlight the cholera experience in London, as well as the public health responses to cholera.

Chapter Five, which examined the cholera outbreak of 1849, included street-level data and maps which have never been analysed to such a detailed degree. No study of cholera has narrowed its focus to one single neighbourhood and used choropleth maps to demonstrate cholera mortality. The use of the *Weekly Returns of Births and Deaths* in this chapter particularly highlighted how cholera mortality patterns existed at all levels: district, sub-district, and neighbourhood. Further, this chapter used standard mortality ratios to evaluate the impact of an institution on mortality patterns. There is a lot of literature which highlights the dangers institutions pose when consulting mortality records; reallocation practices challenge the authenticity of mortality patterns, especially when there is no data which reflects the patient's origin. Chapter Five successfully showed how institutions can be present and the mortality patterns still be accurate.

Chapter Six – the 1854 epidemic – expanded the current historiography to look beyond John Snow and the Broad Street Pump. The geospatial analysis showed that, apart from St. James, Westminster, cholera mortality in London was felt most significantly in the south district, particularly in Lambeth. However, the comparison between 1849 and 1854 also suggests that this outbreak was less deadly than the one in 1849. The chapter does engage heavily with the work that has been done on John Snow and the Broad Street pump but does so in a way which incorporates the entire sub-district rather than focusing on one house and street. The streel-level maps in this chapter contextualize the Broad Street outbreak and mortality patterns to include the surrounding neighbourhoods. Further, this chapter challenges what is perhaps one of the most well known and celebrated moments in public health history. The removal of the Broad Street pump handle which was so famously championed by John Snow was not, in fact, the reason for the declining mortality rates in St. James, Westminster and had no bearing on the cholera outbreak in the rest of London.

Chapter Seven highlights several new themes to be further explored in future cholera research. This epidemic was vastly different from the previous two, both in terms of the number of cholera deaths but also the mortality patterns. This epidemic saw cholera raging in the east district rather than the south. Further, mortality records suggest that there was no one sub-district, neighbourhood, or street which registered an extreme number of cholera deaths, suggesting this epidemic was less deadly and yet it lasted much longer than the previous epidemics. This epidemic also saw the rise of institutional deaths, which indicates a change in health seeking behaviour in Victorian society, especially because most of the cholera patients at the London Hospital and Spitalfields temporary cholera hospital were local. This chapter also challenges the reason this epidemic was less deadly. Many historians argue that the less deadly mortality patterns – which were observed not only in London but also in North America – reflected growing public health infrastructures overseen by efficient, legally-backed Privy Council. However, the lack of a preceding mini epidemic indicates that this strain of cholera was not new and was therefore less virulent than the strains from 1849 and 1854, which had been introduced by a “herald wave” approximately six months earlier.

The work done with the *Weekly Returns of Births and Deaths in London* is far more detailed than most existing studies, and examines mortality patterns not only of cholera, but of zymotic deaths and deaths from all causes. The mortality patterns are considered at the district, sub-district, and neighbourhood levels. Further, this thesis used this information to create never-before-seen maps of cholera mortality across London, its sub-districts, and its streets. Apart from undertaking an intensely detailed analysis of the mortality records in the *Weekly Returns of Births and Deaths in London*, this thesis has provided a new comparative study not only of the cholera experiences but of the specific public health responses issued in response to each epidemic. Public health history has been widely studied, and cholera figures heavily in its pages, but this is the first study which addresses policies as they directly related to cholera and evaluates their successes, short comings, and changes over time.

Epidemic Diseases, Past and Present

The *Weekly Returns of Births and Deaths in London* are a valuable, largely untapped resource not only for cholera but for very many diseases which Londoners faced every day. The *Returns* include detailed information about the state of health in London, its population statistics, its weather, and medical information regarding specific, contemporary disease threats. There is no end to the work which can be done with this source if enough time and patience is given to transcribing the data which fill its pages. The same can be said for mapping mortality. In the age of digital history, producing choropleth maps which show mortality patterns is becoming more accessible with user-friendly software and this, together with researchers who take advantage of the *Weekly Returns*, has the potential to change how historians understand mortality in the nineteenth century.

This thesis has been written during the COVID-19 pandemic and the conclusions drawn about the public health response are just as applicable today as they were in the nineteenth century. There are two lessons to be taken from this evaluation of the relationship between epidemic disease and public health infrastructure in an urban environment. The first is understanding the nature of the disease and the second is the nature of public health policies.

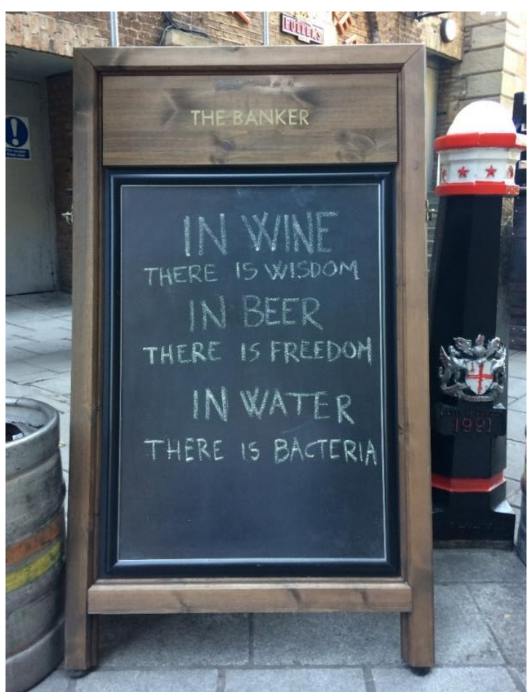
The first parallel drawn between the COVID-19 pandemic and the cholera epidemics lies in understanding the nature of the disease. A public health policy – preventative or reactive – is only effective if it targets the right transmission agent. In nineteenth-century London, as Chapter Four discussed, there was no understanding of germs or bacteria. This pre- bacteriological era was ruled by theories of miasma, putrefaction, morbid poisons, and fermentation. Today, we have the benefit of being able to identify the causes of diseases … and yet, it took the World Health Organization over two years to fully identify – and change their policies to reflect – the airborne transmission of COVID-19.[525] Debates over the use of masks, social distancing, self isolation and quarantine, ventilation, and air purification systems reflected the unknown nature of COVID-19, a disease which while belonging to a known pathogen family, was ultimately new. Despite advances in science, we found ourselves understanding what it must have been like for the General Board of Health in 1849, 1854, or 1866: not knowing exactly how to combat this deadly invader, the public health policies issued were ultimately ineffective in stopping the epidemic because they did not target the right mode of transmission. It is easy to look back at the

[525] Lewis Dyani, "Why the WHO took two years to say COVID is airborne," *Nature* news feature, 6 April 2022, available online at: https://www.nature.com/articles/d41586-022-00925-7; Brittany Greenslade, "Droplet, aerosol, airborne: The confusion over how COVID-19 spreads," *Global News* Health, 6 May 2021, available online at: https://globalnews.ca/news/7838988/droplet-aerosol-airborne-how-covid-19-spreads/.

medical professionals in the pre-bacteriological era and scoff at their ignorance, but perhaps COVID-19 has served up a dose of humility by making us realize that advanced scientific technology does not automatically give us answers and that disease threats, while better understood today than they were in the nineteenth century, are still very much an enigma.

The second parallel between COVID-19 and cholera reflects the nature of public health policies, and whether they are precautionary or reactive. Cholera was a disease that was predictable; it moved across the globe, and it never took London by complete surprise – there was always an indication it was coming based on the mortality patterns of France and Germany. However, the public health policies enacted were largely ineffective. As Chapters Five, Six, and Seven detailed, this was mostly because the public health infrastructure was too immature to adequately cope with such a public health crisis, particularly in 1849 and 1854. However, in 1866, the public health response was much better and yet cholera still managed to claim thousands of lives. Even though the public health policies in place were targeting the wrong vector, as discussed above, it must also be said that these policies were largely implemented too late to be fully effective. The same can be said of COVID-19 policies, or any policy which is reactionary to a public health threat. Rather than having policies which are created after a disease threat has emerged, the most effective public health policies are preventative and always in practice, with the hopes of quelling any disease threat before it becomes epidemic or pandemic in scale. Once a disease reaches a scope of such magnitude, it challenges the public health infrastructure in place. This was true in London – especially in the two earlier epidemics – and it is true today. All one needs to do is look to the constantly changing advisories from the beginning of the COVID-19 pandemic: what should we wear on our faces, how far apart should we stand, when should we go to the hospital for our symptoms, what can we do to prevent contracting the disease? Again, it is easy to scoff at the unpreparedness of the General Boards of Health of Victorian London, but it is important to remember that we found ourselves in the same chaos in 2019.

Perhaps not as much has changed in one-hundred-and-fifty years as we like to think. We as a society are still at the mercy of epidemic diseases and our public health policies are only as effective as our understanding of the disease. In future decades, the history books will detail the COVID-19 pandemic, which has circled the globe numerous times in its three years, and much work will be done about mortality patterns based on geography, age, sex, and occupation. Cities will be divided into districts and sub-districts, with mortality plotted across boundaries and in institutions, and public health policies will be evaluated with a historian's eye. At this point, with the pandemic still ongoing, there are more questions than answers and looking forward, there will be much work to do on epidemic diseases. One thing, however, will remain true – it was true in 1849, 1854, and 1866, and it is true today: in wine there is wisdom; in beer there is freedom; in water there is bacteria.



APPENDIX A

FORMS USED BY THE MEDIAL PRACTITIONERS AND JUSTICES OF THE PEACE, AS INCLUDED IN *Bill for more speedy Removal of Nuisances, and to enable Privy Council to make Regulations for Prevention of Contagious and Epidemic Diseases*, pgs. 7-8.

THE SCHEDULES

TO WHICH THIS ACT REFERS.

SCHEDULE (A.) s. 1.

CERTIFICATE OF MEDICAL PRACTITIONER.

To the Guardians of the Poor of the Union or Parish [as the case may be].

I, the undersigned A. B., a duly qualified Medical Practitioner, residing at [insert name of the parish], having viewed the dwelling-house occupied by one X. Y. [or a certain piece of land near the King's Head public-house, or certain premises occupied by one Y. Z., as the case may be, describing the premises], situate in street, in the parish of in the county of , do hereby certify that the said dwelling-house is in a filthy or unwholesome state, [or that there is an accumulation of offensive or noxious matter, refuse, dung and offal on the said piece of land, or that there is a foul and offensive drain, privy or cesspool on the said premises occupied by Y. Z., situate, &c., [as the case may be], and that the same is likely to be prejudicial to the health of the occupiers, or of the persons whose habitations are in the neighbourhood of the above-mentioned premises. Witness my hand this day of One thousand eight hundred .

(signed) A. B.,
Member of the Royal College of Surgeons,
[as the case may be].

SCHEDULE (B.) s. 1.

ORDER OF JUSTICE.

To the Guardians of the Poor of the Union or Parish [as the case may be], and to their servants and assistants, and to all other persons whom this Order may concern.

County of [or Borough, &c. of] to wit. } WHEREAS complaint on oath hath been made before me, one of Her Majesty's Justices of the Peace, acting in and for the County of [or Borough, &c. of, as the case may be], by the Guardians of the Poor of the Union [as the case may be], that the dwelling-house occupied by one X. Y., situate

580. C

situate in street, in the parish of in the said county of [describing the premises], is in a filthy and unwholesome state [or that there is an accumulation of offensive or noxious matter, refuse, dung and offal, on a certain piece of land near the King's Head Inn, situate, &c., or that there is a foul and offensive drain, privy or cesspool in certain premises occupied by one Y. Z., situate, &c., [as the case may be], and the Certificate in writing under the hand of A. B., of , surgeon, [as the case may be,] addressed to the Guardians of the Poor of the Union, certifying that the same is likely to be prejudicial to the health of the occupiers, or of the persons whose habitations are in the neighbourhood thereof, having been now produced before me, I the said Justice do hereby, in pursuance of the Statute in that case made and provided, order the owner [or occupier, as the case may be], of the said dwelling-house [or of the said piece of land, or, of the said premises occupied by Y. Z.], within Hours from the service of this my order, or a true copy thereof, on such owner [or occupier], or if service cannot be forthwith effected upon him, then within Hours from the period when this my order or a true copy thereof shall have been affixed upon some part of the said premises, to whitewash, cleanse and purify the said dwelling-house, [or to take and carry away the said accumulation of offensive or noxious matter, refuse, dung and offal from the said unoccupied piece of land, or, to cleanse the said foul and offensive drain, privy or cesspool], and if default shall be made by the said owner [or occupier] in obeying this my order, then I, the said Justice, authorize and require, order and direct you, the said Guardians of the Poor, to enter upon the said premises, and to cleanse, whitewash and purify the said dwelling-house [or to remove, take and carry away the said accumulation of offensive or noxious matter, refuse, dung and offal from the said piece of land, or, to cleanse the said foul and offensive drain, privy or cesspool].

And for your so doing this shall be your sufficient warrant and authority.

Given under my hand and seal this day of
One thousand eight hundred and .

B. C. (L. S.)

SCHEDULES A, B, AND C AS INCLUDED IN *Metropolis Local Management. A Bill Intituled An Act for the better Local Management of the Metropolis*, pgs. 93-96.

SCHEDULE (A.)

PART I.

Parishes each electing Two Members of the Metropolitan Board of Works.

Saint Marylebone.
Saint Pancras.
Lambeth.
Saint George Hanover Square.
Islington, Saint Mary.
Shoreditch, Saint Leonard.

PART II.

Parishes each electing One Member of the Metropolitan Board of Works.

Paddington.
Saint Matthew Bethnal Green.
Saint Mary Newington, Surrey.
Camberwell, including Peckham.
Saint James Westminster.
Saint James and Saint John Clerkenwell to be considered as One Parish.
Chelsea.
Kensington, Saint Mary Abbot.
Saint Luke Middlesex.
Saint George the Martyr Southwark.
Bermondsey.
Saint George in the East.
Saint Martin in the Fields.
Hamlet of Mile End Old Town.
Woolwich.
Rotherhithe.
Saint John Hampstead.

SCHEDULE (B.)

Parishes united into Districts for the Purposes of the Act.

Part I.

Districts each electing One Member of the Metropolitan Board of Works.

Name of District.	Parishes.	Number of Members to be elected to District Board.
Whitechapel District -	Saint Mary Whitechapel - -	27
	Christchurch Spitalfields - -	12
	Saint Botolph without Aldgate, in the County of Middlesex - -	6
	Holy Trinity, Minories - - -	1
	Saint Katherine, Precinct of - -	1
	Mile End New Town, Hamlet of -	6
	Liberty of Norton Folgate - -	3
	Old Artillery Ground - - -	1
	Tower, District of - - -	1
	Total - - -	58
Westminster District -	Saint Margaret - - -	30
	Saint John the Evangelist - -	27
	Total - - -	57
Greenwich District -	Saint Paul Deptford, including Hatcham	21
	Saint Nicholas Deptford -	6
	Greenwich - - - -	30
	Total - - -	57
Wandsworth District -	Clapham - - - - - -	18
	Tooting Graveney - - - -	3
	Streatham - - - -	9
	Saint Mary Battersea, excluding Penge	12
	Wandsworth - - - - -	9
	Putney, including Roehampton -	6
	Total - - -	57
Hackney District -	Hackney - - - - -	51
	Saint Mary Stoke Newington -	6
	Total - - -	57

Name of District.	Parishes.	Number of Members to be elected to District Board.
Saint Giles District -	Saint Giles in the Fields - -	27
	Saint George Bloomsbury - -	21
	TOTAL - - -	48
Holborn District -	Holborn, Saint George the Martyr -	24
	Saint Andrew above Bars - -	9
	Saint Sepulchre, in the County of Middlesex - - - -	6
	Saffron Hill, Hatton Garden, Ely Rents, and Ely Place - -	9
	The Liberty of Glasshouse Yard -	1
	TOTAL - - -	49
Strand District -	Saint Anne Soho - - -	18
	Saint Paul Covent Garden - -	9
	Saint John the Baptist Savoy, or Precinct of the Savoy - -	1
	Saint Mary-le-Strand - -	3
	Saint Clement Danes - -	15
	Liberty of the Rolls - - -	3
	TOTAL - - -	49
Fulham District -	Saint Peter and Saint Paul Hammersmith - - - -	24
	Fulham - - - -	15
	TOTAL - - -	39
Limehouse District -	Saint Anne Limehouse - -	15
	Saint John Wapping - -	3
	Saint Paul Shadwell - -	6
	Ratcliffe, Hamlet of - -	12
	TOTAL - - -	36
Poplar District - -	All Saints Poplar - - -	24
	Saint Mary Stratford-le-Bow - -	9
	Saint Leonard Bromley - -	15
	TOTAL - - -	48

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Part II.

Districts united for electing One Member each of the Metropolitan Board of Works.

Name of District.	Parishes.	Number of Members to be elected to District Board.
Saint Saviour's District	Christchurch - - - -	15
	Saint Saviour "including the Liberty of the Clink" - - - -	24
united with	Total - - -	39
Saint Olave District -	Saint Olave - - - - -	12
	Saint Thomas Southwark - -	1
	Saint John Horselydown - -	15
	Total - - -	28
Plumstead District -	Charlton next Woolwich - -	9
	Plumstead - - - - -	12
	Eltham, including Mottingham Hamlet	6
	Lee - - - - - -	9
united with	Kidbrooke - - - - - -	1
	Total - - -	37
Lewisham District -	Lewisham, including Sydenham Chapelry - - - -	24
	Hamlet of Penge - - -	3
	Total - - -	27

SCHEDULE (C.)

The Close of the Collegiate Church of Saint Peter.
The Charter House.
Inner Temple.
Middle Temple.
Lincoln's Inn.
Gray's Inn.
Staple Inn.
Furnival's Inn.

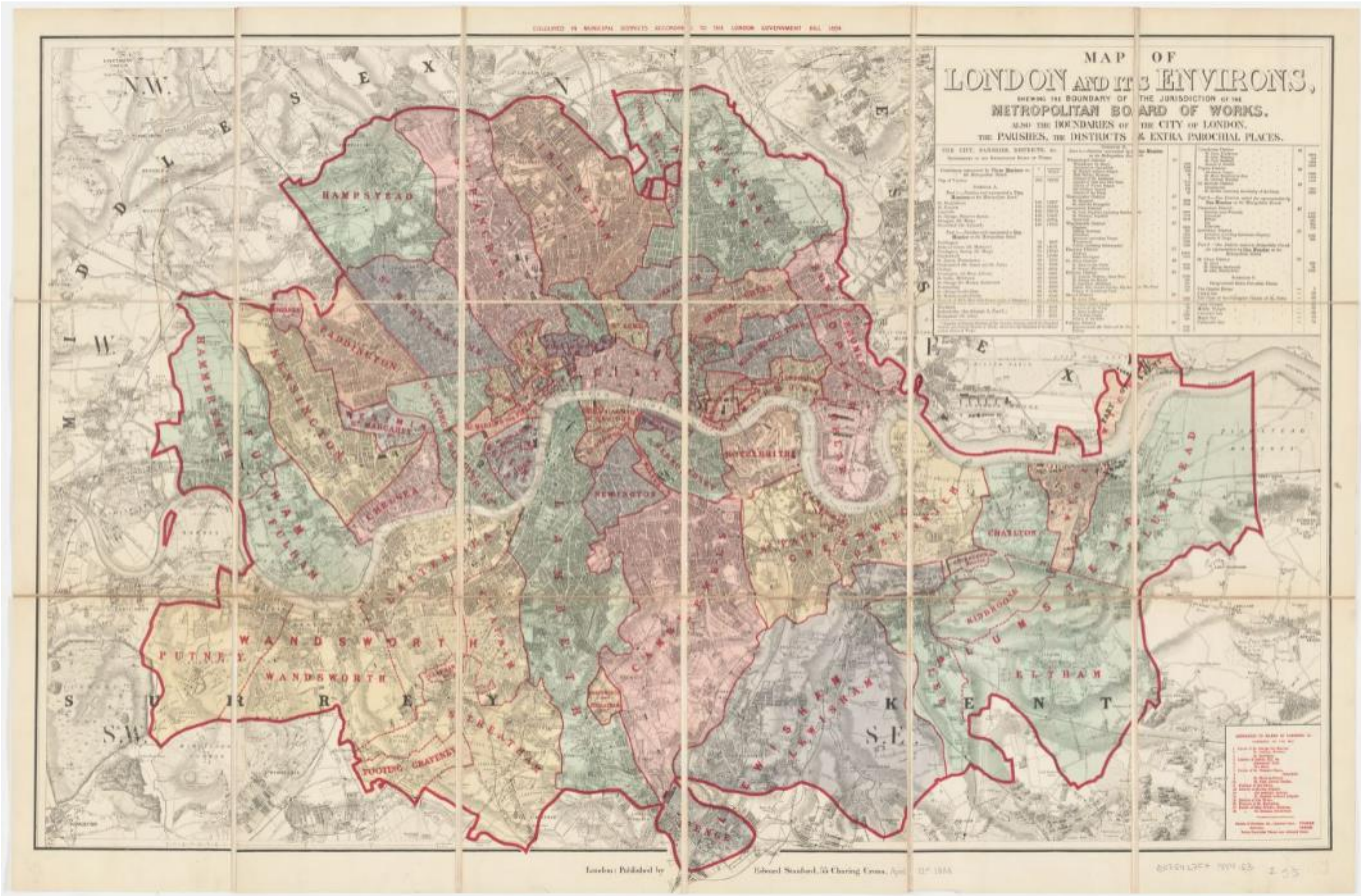
APPENDIX B

CHART CONVERTING WEEK TO DATE FOR 1848, 1849, 1853, 1854, AND 1866.

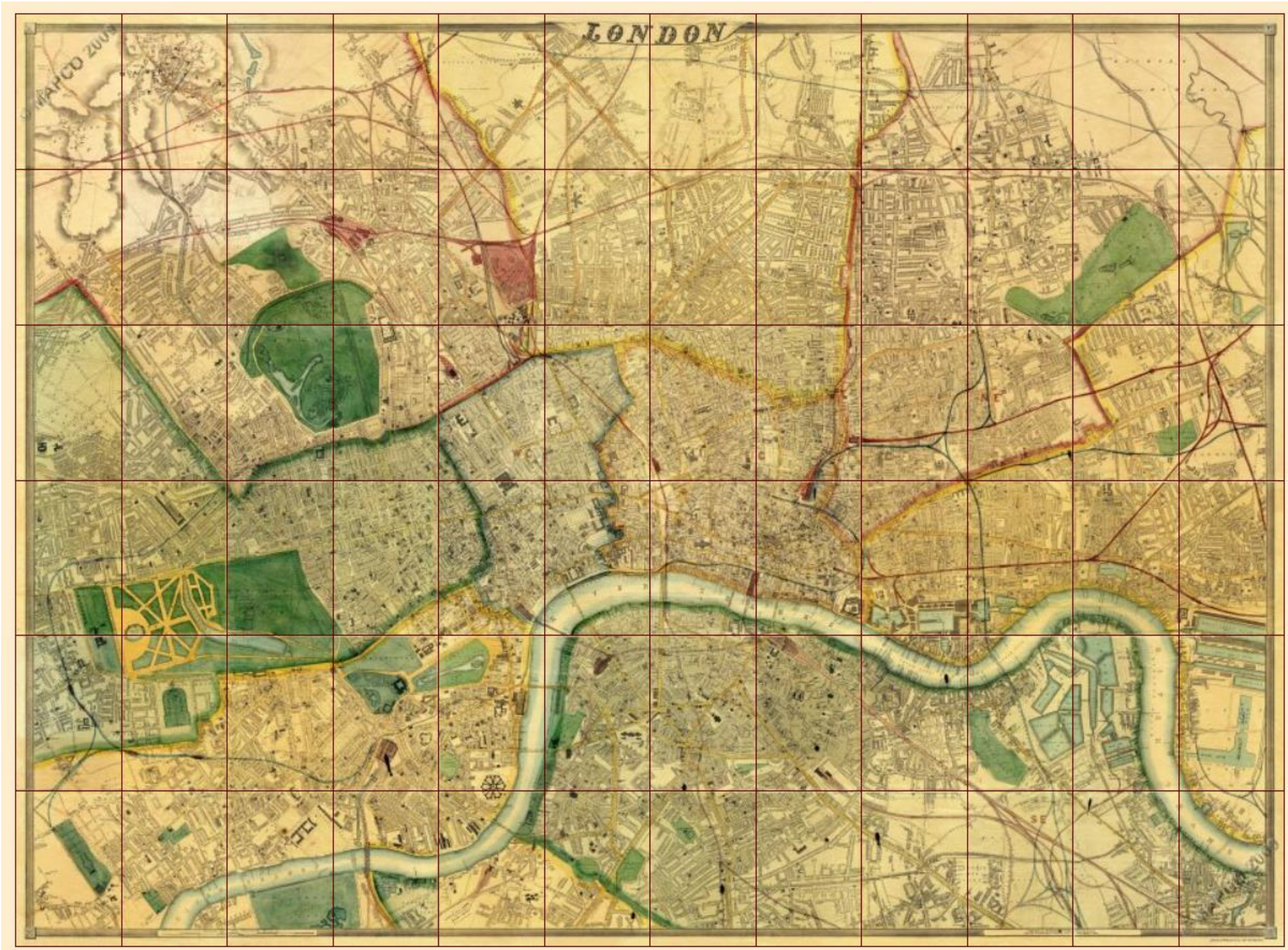
Note that the date listed in the *Weekly Returns* is the day the week ended.

	1848	1849	1853	1854	1866
Week 1	1 January	6 January	1 January	7 January	6 January
Week 2	8 January	13 January	8 January	14 January	13 January
Week 3	15 January	20 January	15 January	21 January	20 January
Week 4	22 January	27 January	22 January	28 January	27 January
Week 5	29 January	3 February	29 January	4 February	3 February
Week 6	5 February	10 February	5 February	11 February	10 February
Week 7	12 February	17 February	12 February	18 February	17 February
Week 8	19 February	24 February	19 February	25 February	24 February
Week 9	26 February	3 March	26 February	4 March	3 March
Week 10	4 March	10 March	5 March	11 March	10 March
Week 11	11 March	17 March	12 March	18 March	17 March
Week 12	18 March	24 March	19 March	25 March	24 March
Week 13	25 March	31 March	26 March	1 April	31 March
Week 14	1 April	7 April	2 April	8 April	7 April
Week 15	8 April	14 April	9 April	15 April	14 April
Week 16	15 April	21 April	16 April	22 April	21 April
Week 17	22 April	28 April	23 April	29 April	28 April
Week 18	29 April	5 May	30 April	6 May	5 May
Week 19	6 May	12 May	7 May	13 May	12 May
Week 20	13 May	19 May	14 May	20 May	19 May
Week 21	20 May	26 May	21 May	27 May	26 May
Week 22	27 May	2 June	28 May	3 June	2 June
Week 23	3 June	9 June	4 June	10 June	9 June
Week 24	10 June	16 June	11 June	17 June	16 June
Week 25	17 June	23 June	18 June	24 June	23 June
Week 26	24 June	30 June	25 June	1 July	30 June
Week 27	1 July	7 July	2 July	8 July	7 July
Week 28	8 July	14 July	9 July	15 July	14 July
Week 29	15 July	21 July	16 July	22 July	21 July
Week 30	22 July	28 July	23 July	29 July	28 July
Week 31	29 July	4 August	30 July	5 August	4 August
Week 32	5 August	11 August	6 August	12 August	11 August
Week 33	12 August	18 August	13 August	19 August	18 August
Week 34	19 August	25 August	20 August	26 August	25 August
Week 35	2 September	1 September	27 August	2 September	1 September
Week 36	9 September	8 September	3 September	9 September	8 September
Week 37	16 September	15 September	10 September	16 September	15 September
Week 38	23 September	22 September	17 September	23 September	22 September
Week 39	30 September	29 September	24 September	30 September	29 September
Week 40	7 October	6 October	1 October	7 October	6 October
Week 41	14 October	13 October	8 October	14 October	13 October
Week 42	21 October	20 October	15 October	21 October	20 October

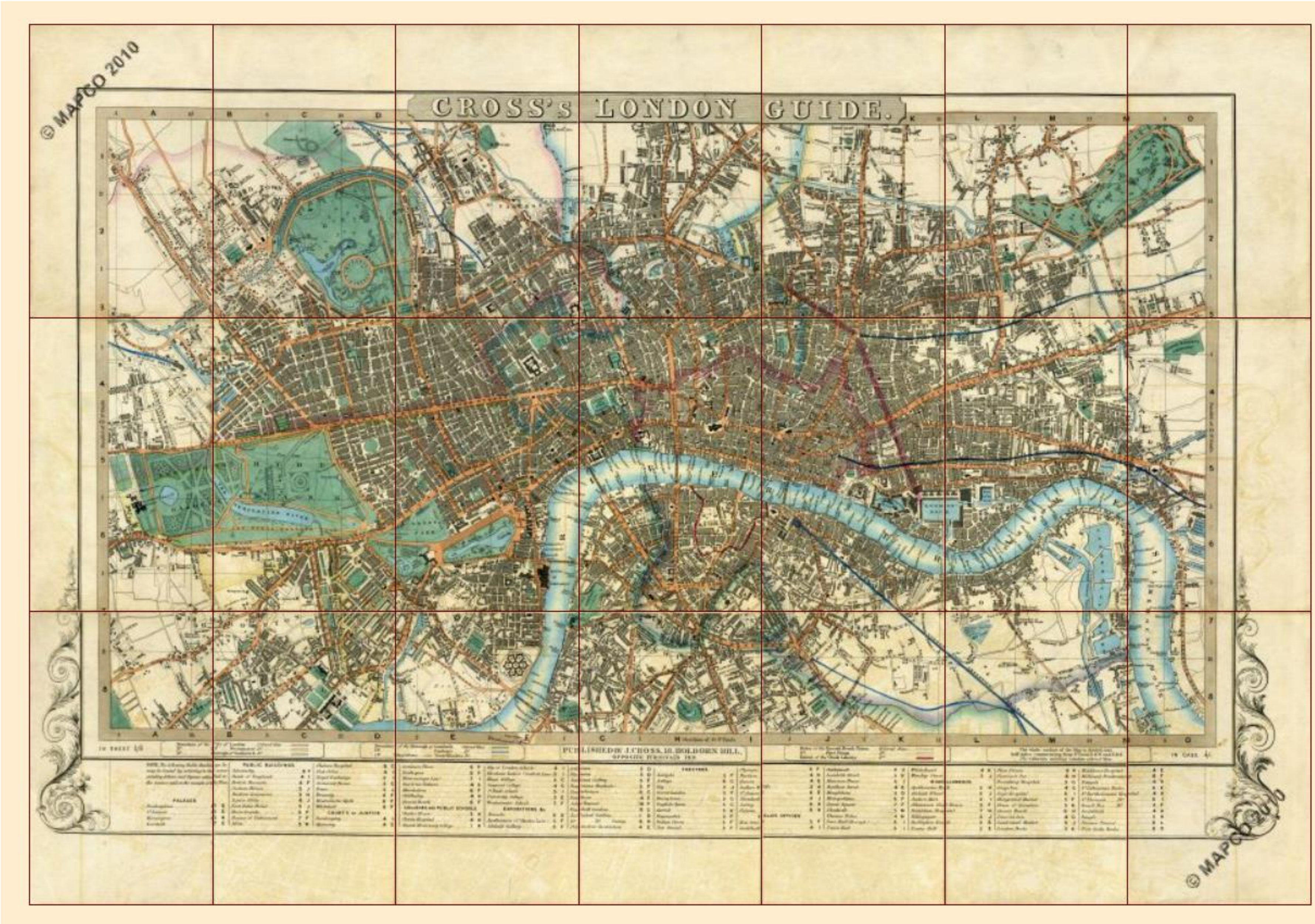
Week 43	28 October	27 October	22 October	28 October	27 October
Week 44	4 November	3 November	29 October	4 November	3 November
Week 45	11 November	10 November	5 November	11 November	10 November
Week 46	18 November	17 November	12 November	18 November	17 November
Week 47	25 November	24 November	19 November	25 November	24 November
Week 48	2 December	1 December	26 November	2 December	1 December
Week 49	9 December	8 December	3 December	9 December	8 December
Week 50	16 December	15 December	10 December	16 December	15 December
Week 51	23 December	22 December	17 December	23 December	22 December
Week 52	30 December	29 December	24 December	30 December	29 December
Week 53			31 December		



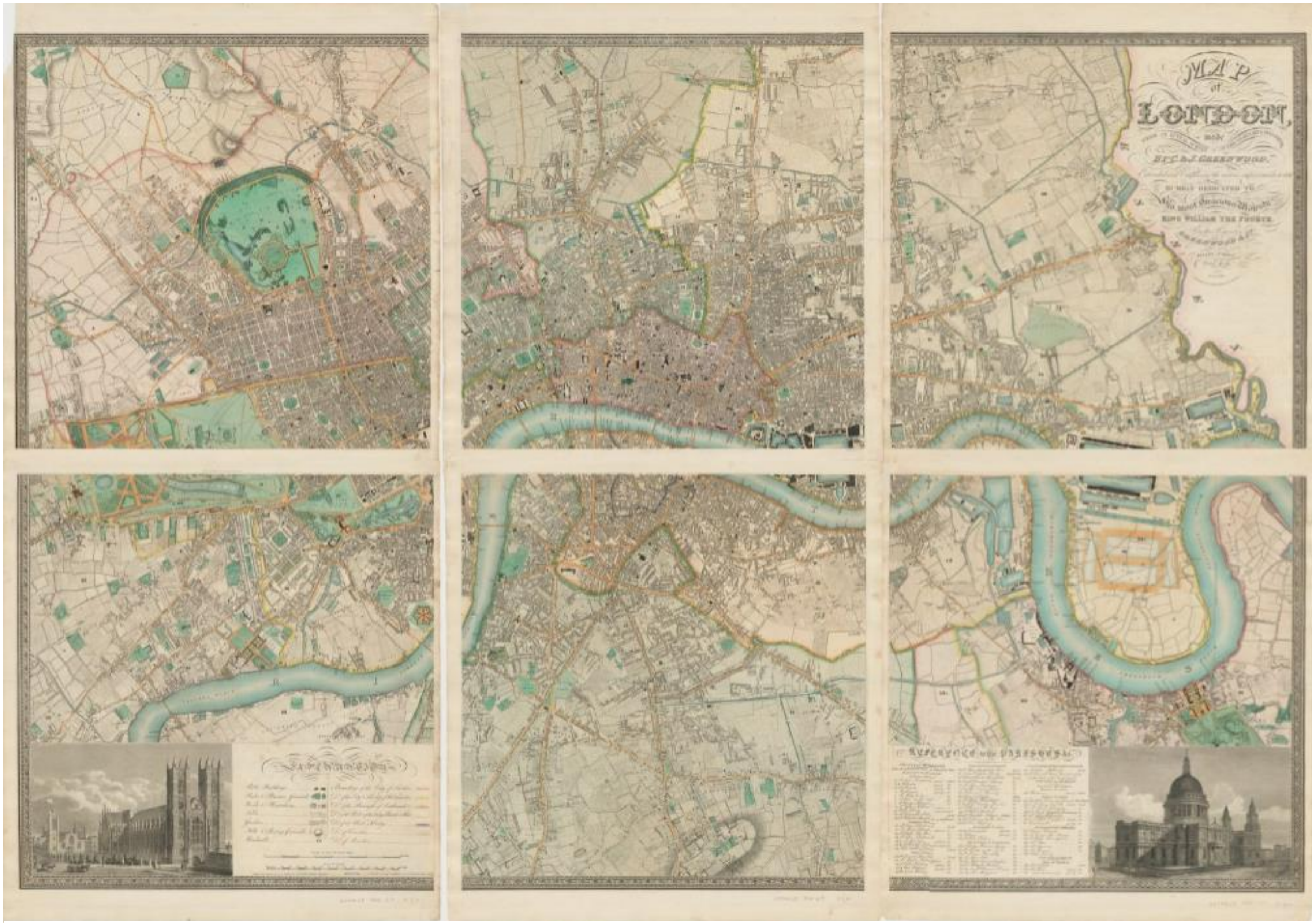
“Map of London and its Environs, shewing the Boundary of the Jurisdiction of the Metropolitan Board of Works,” (London: Edward Stanford, 21 April 1884), provided by Harvard University, available online at: https://iiif.lib.harvard.edu/manifests/view/ids:7066353.



B. Edward Weller, “Map of London 1868,” *MAPCO (Map and Plan Collection Online)*, available online at: http://london1868.com/index.htm



included "Cross's London Guide 1844," *MAPCO (Map and Plan Collection Online)*, available online at http://mapco.net/cross1844/cross1844.htm



C. &. J. Greenwood's "Map of London," (London: Josiah Neele, 31 August 1830), provided by Harvard University, available online at https://iiif.lib.harvard.edu/manifests/view/ids:8982548

FIGURE 4.12 - Comparison of weekly diarrhoea deaths from 1849 to 30-year weekly average, with cholera deaths

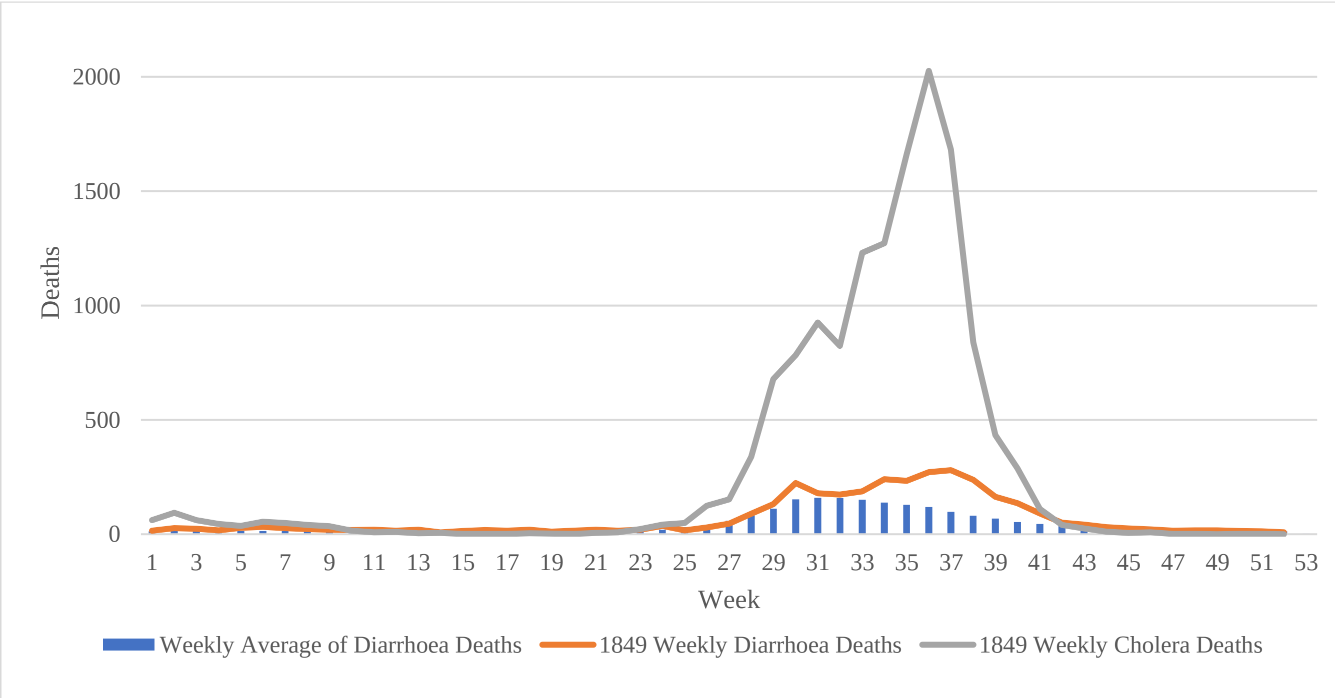


FIGURE 4.13 - Comparison of weekly diarrhoea deaths from 1849 to 30-year weekly average, with cholera deaths

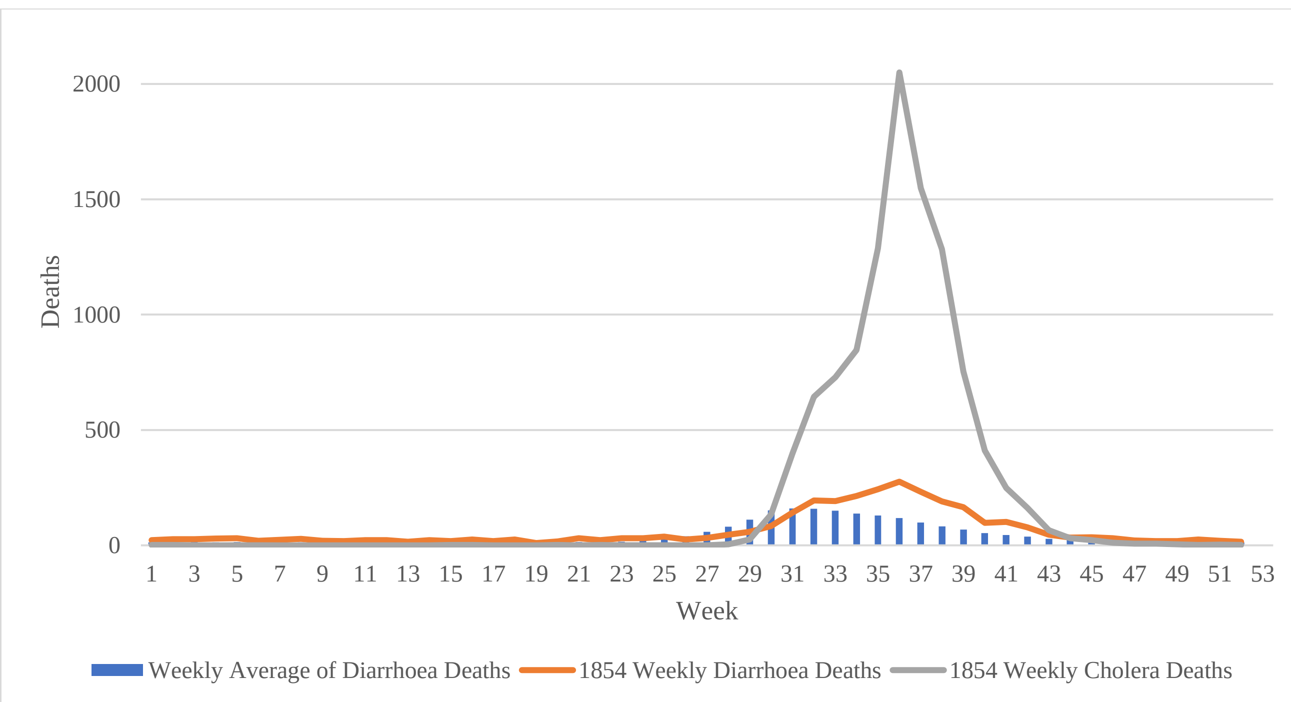


FIGURE 4.14 - Comparison of weekly diarrhoea deaths from 1860 to 30-year weekly average, with cholera deaths

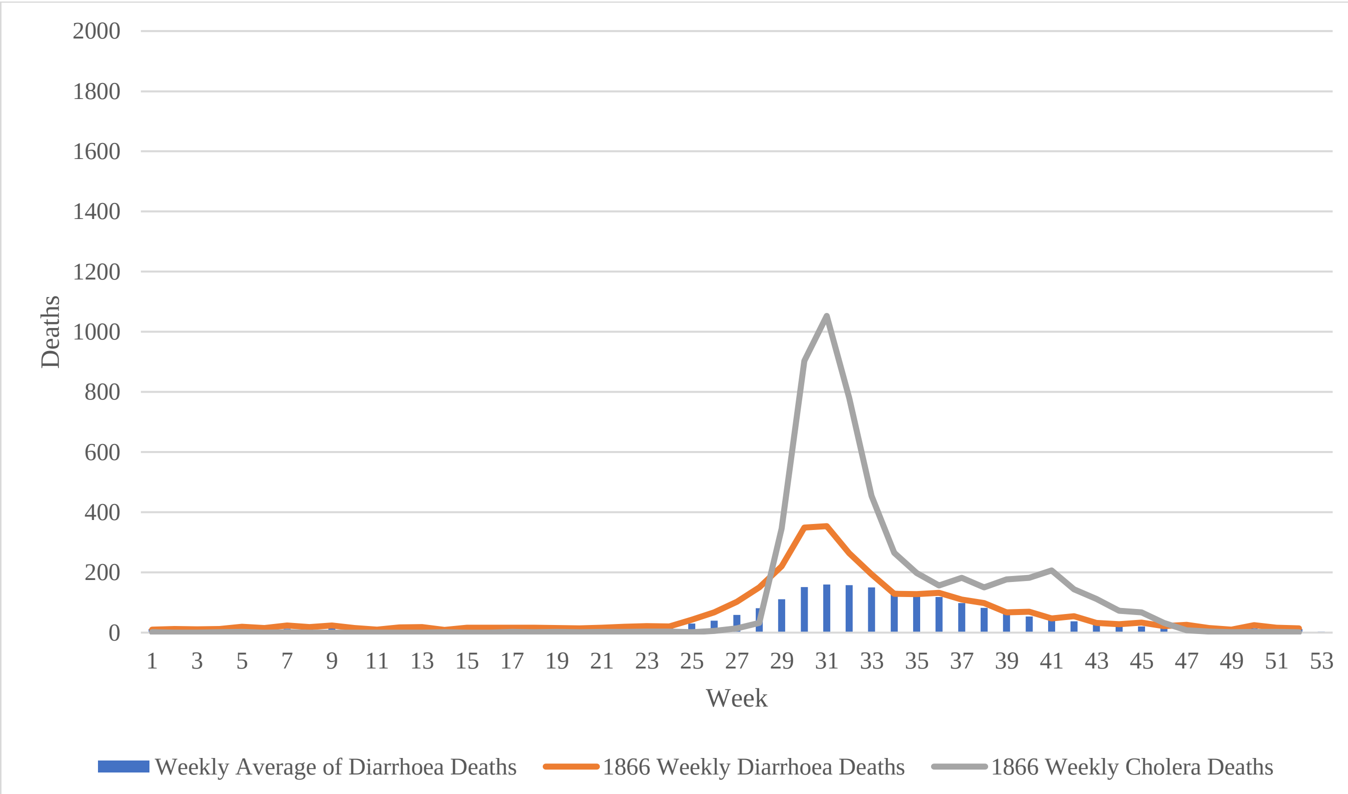
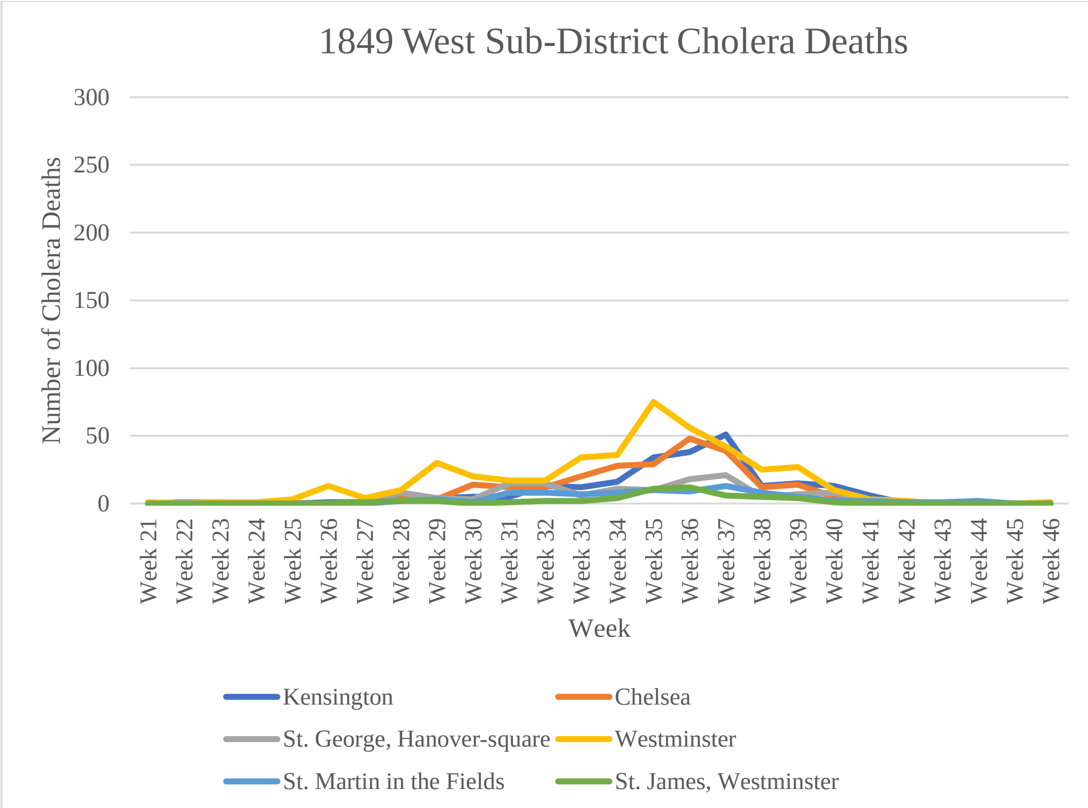
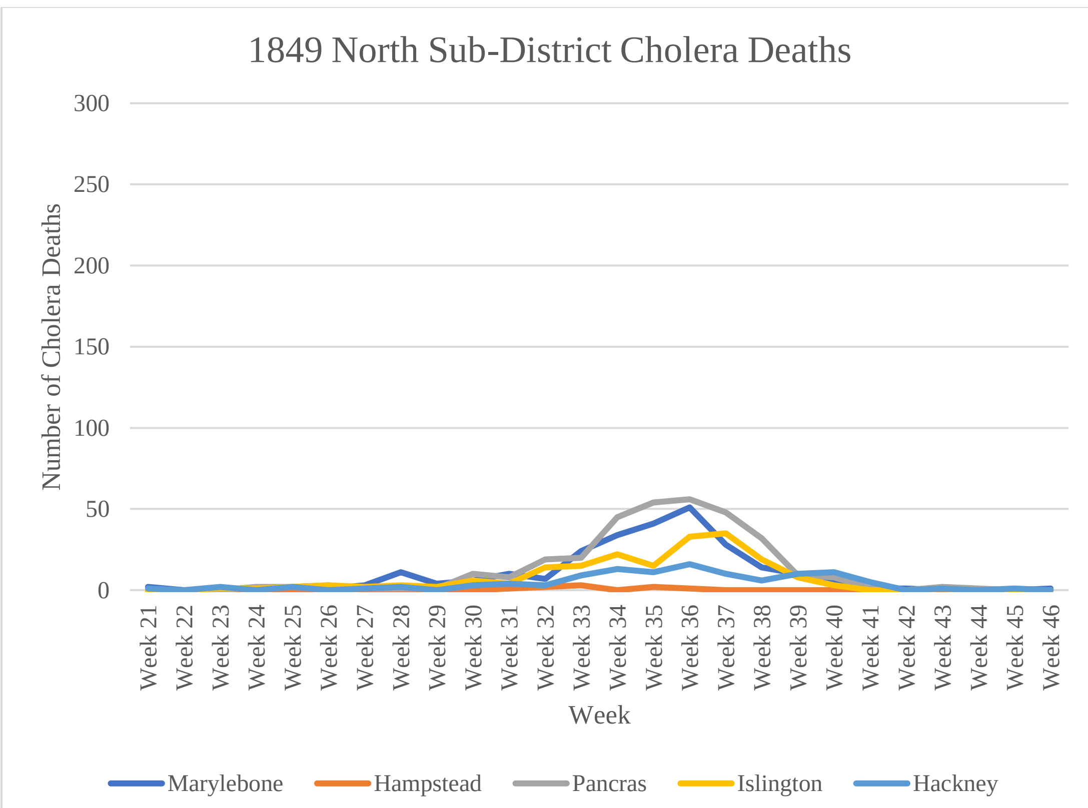
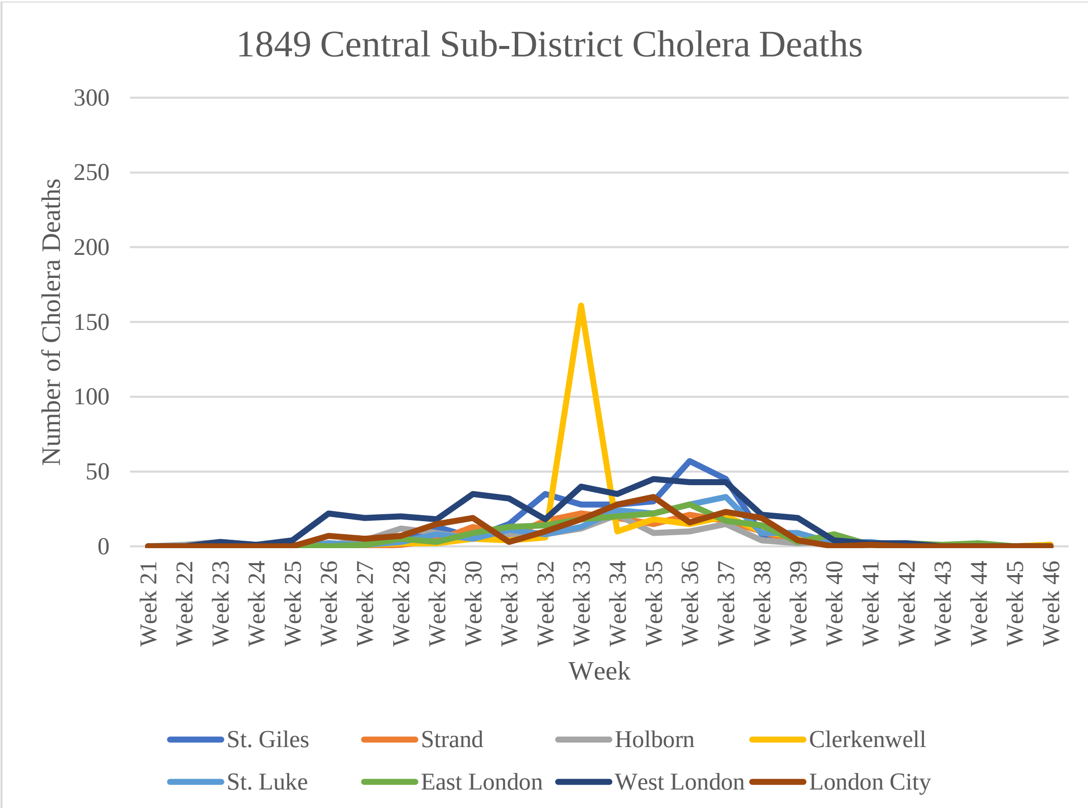
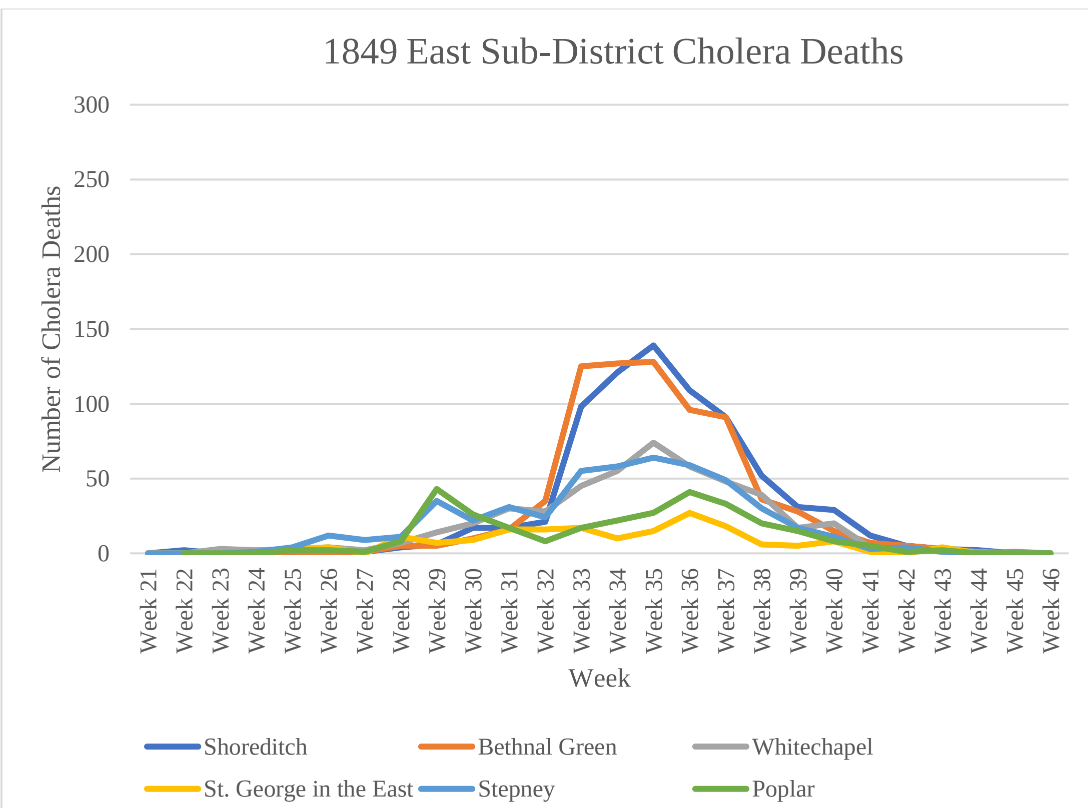


FIGURE 5.10 - Comparison of 1849 Sub-District Cholera Deaths






1849 Central Sub-District Cholera Deaths
300
250
200
150
100
50
0
Number of Cholera Deaths
Week 21
Week 22
Week 23
Week 24
Week 25
Week 26
Week 27
Week 28
Week 29
Week 30
Week 31
Week 32
Week 33
Week 34
Week 35
Week 36
Week 37
Week 38
Week 39
Week 40
Week 41
Week 42
Week 43
Week 44
Week 45
Week 46
Week
St. Giles
Strand
Holborn
Clerkenwell
St. Luke
East London
West London
London City


1849 East Sub-District Cholera Deaths
300
250
200
150
100
50
0
Number of Cholera Deaths
Week 21
Week 22
Week 23
Week 24
Week 25
Week 26
Week 27
Week 28
Week 29
Week 30
Week 31
Week 32
Week 33
Week 34
Week 35
Week 36
Week 37
Week 38
Week 39
Week 40
Week 41
Week 42
Week 43
Week 44
Week 45
Week 46
Week
Shoreditch
Bethnal Green
Whitechapel
St. George in the East
Stepney
Poplar

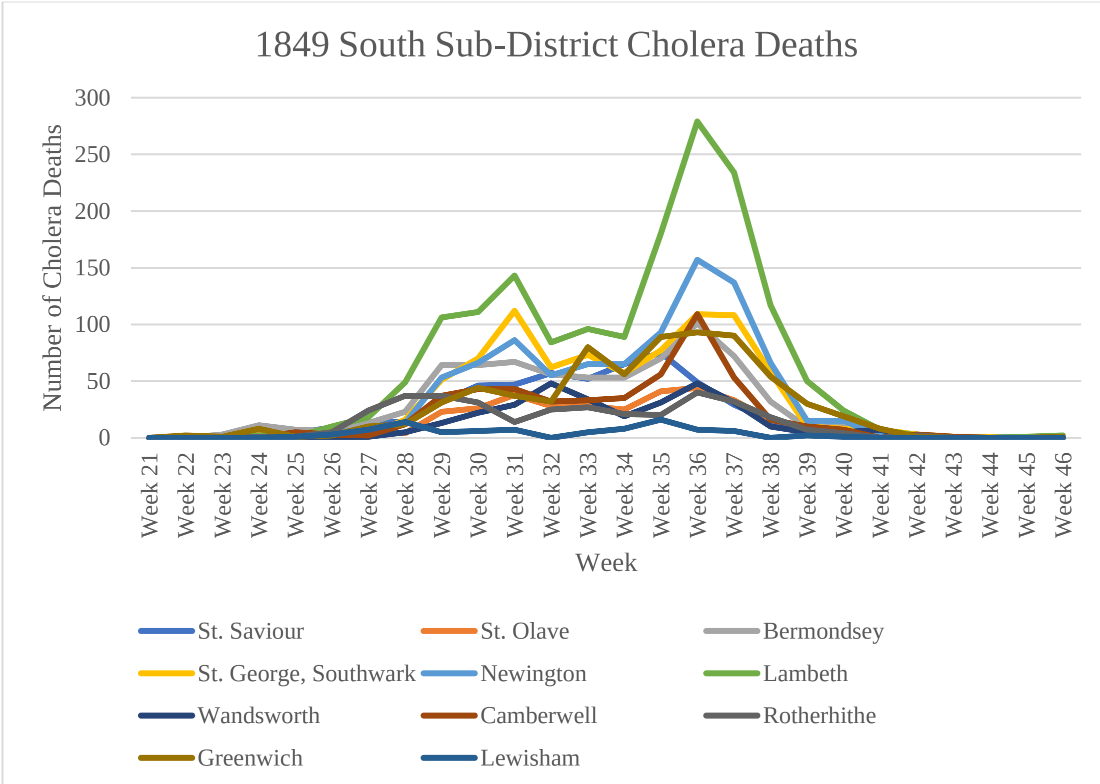
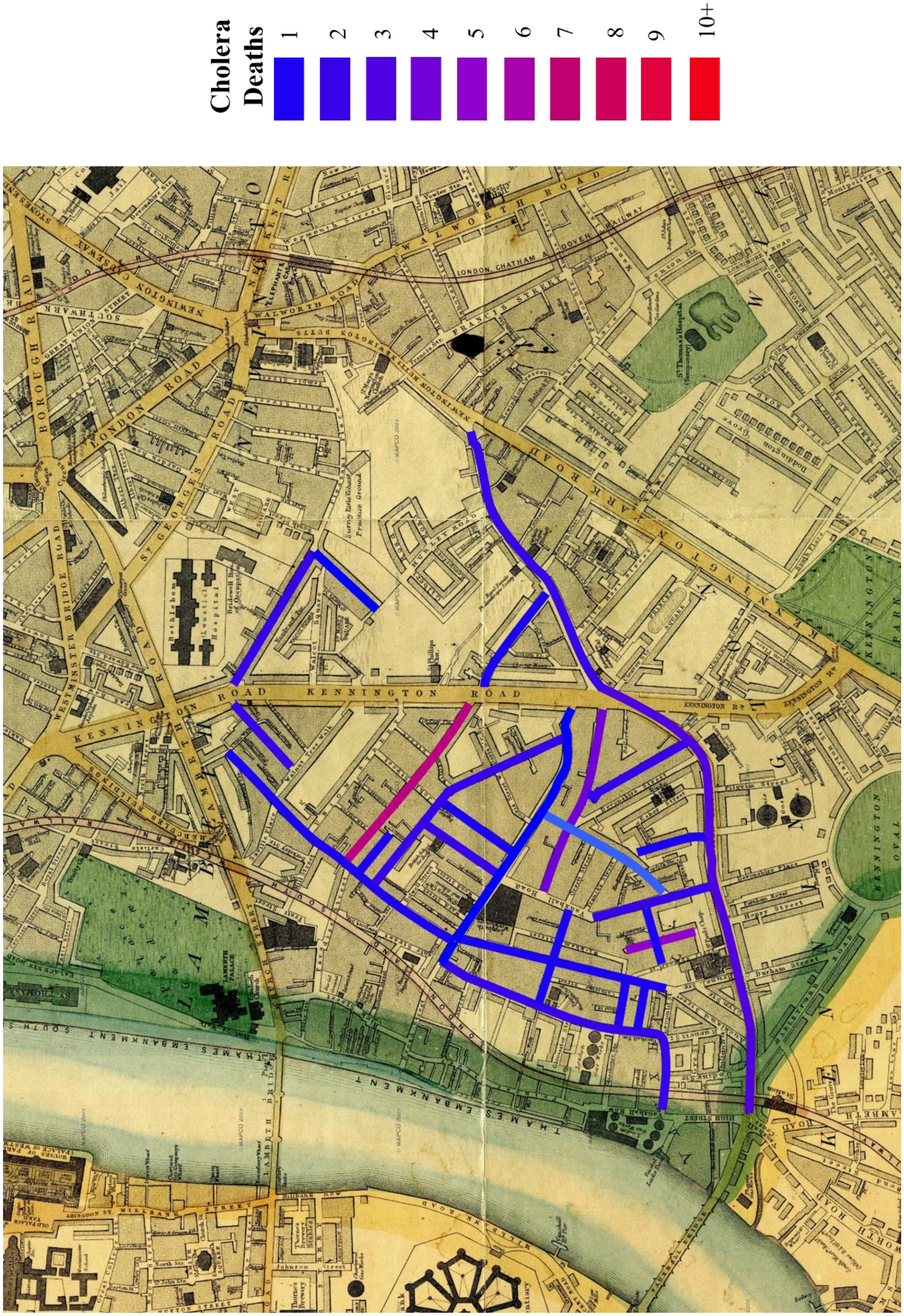
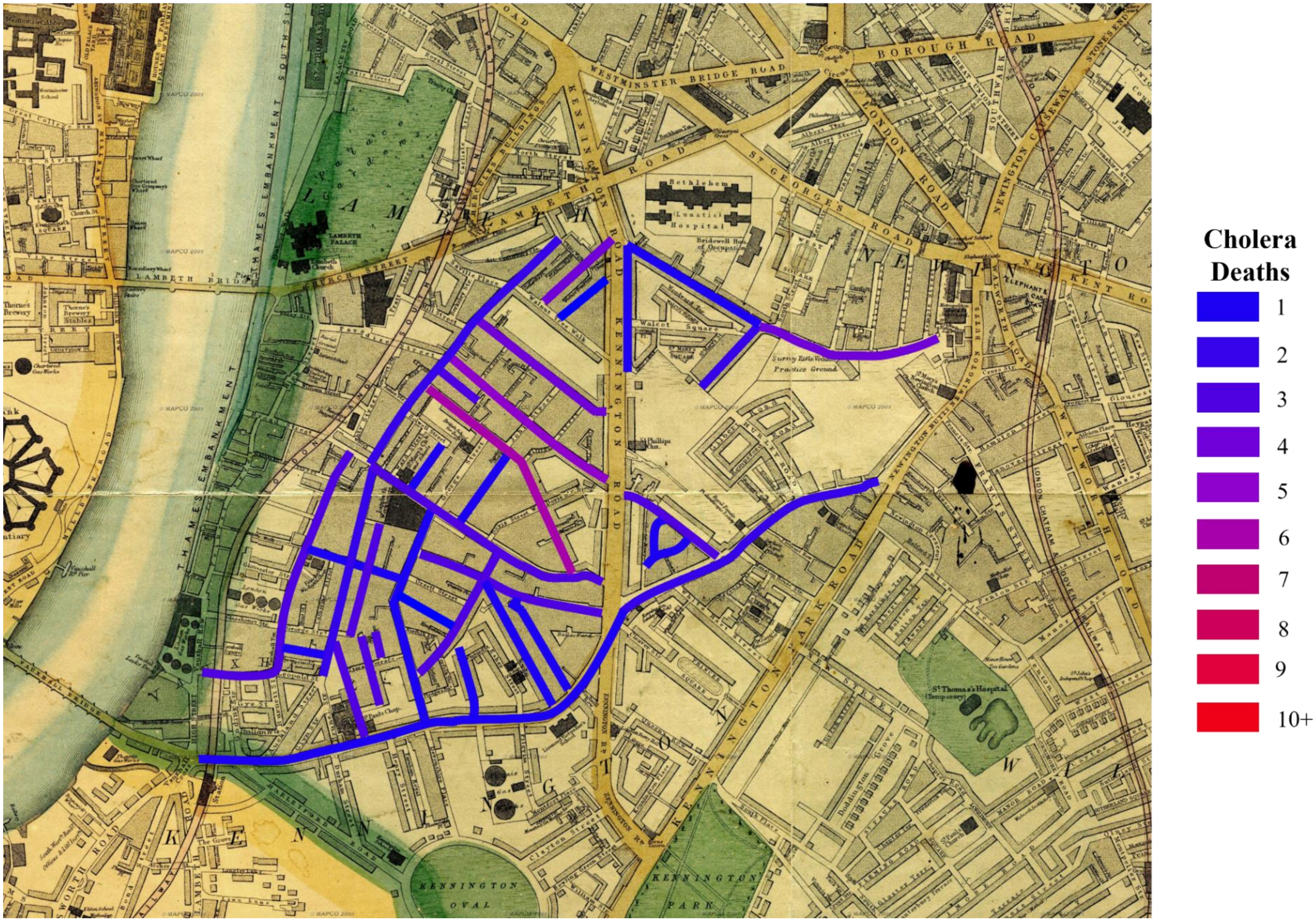

1849 South Sub-District Cholera Deaths
Number of Cholera Deaths
300
250
200
150
100
50
0
Week 21
Week 22
Week 23
Week 24
Week 25
Week 26
Week 27
Week 28
Week 29
Week 30
Week 31
Week 32
Week 33
Week 34
Week 35
Week 36
Week 37
Week 38
Week 39
Week 40
Week 41
Week 42
Week 43
Week 44
Week 45
Week 46
Week
St. Saviour
St. Olave
Bermondsey
St. George, Southwark
Newington
Lambeth
Wandsworth
Camberwell
Rotherhithe
Greenwich
Lewisham

FIGURE 5.19 - Comparison of street-level mortality in Lambeth Church 2nd, Weeks 35, 36, and 37



Week 35

Week 36


Cholera
Deaths
1
2
3
4
5
6
7
8
9
10+
KENNINGTON ROAD
WESTMINSTER BRIDGE ROAD
LAMBETH ROAD
ST GEORGES ROAD
LONDON ROAD
BOROUGH ROAD
NEWINGTON CAUSEWAY
KENNINGTON PARK ROAD
THAMES EMBANKMENT
KENNINGTON OVAL
KENNINGTON PARK
Bethlehem Lunatic Hospital
Walcot Square
Surrey Rifle Volunteers Practice Ground
LAMBETH PALACE
St Thomas's Hospital (Temporary)

Week 37

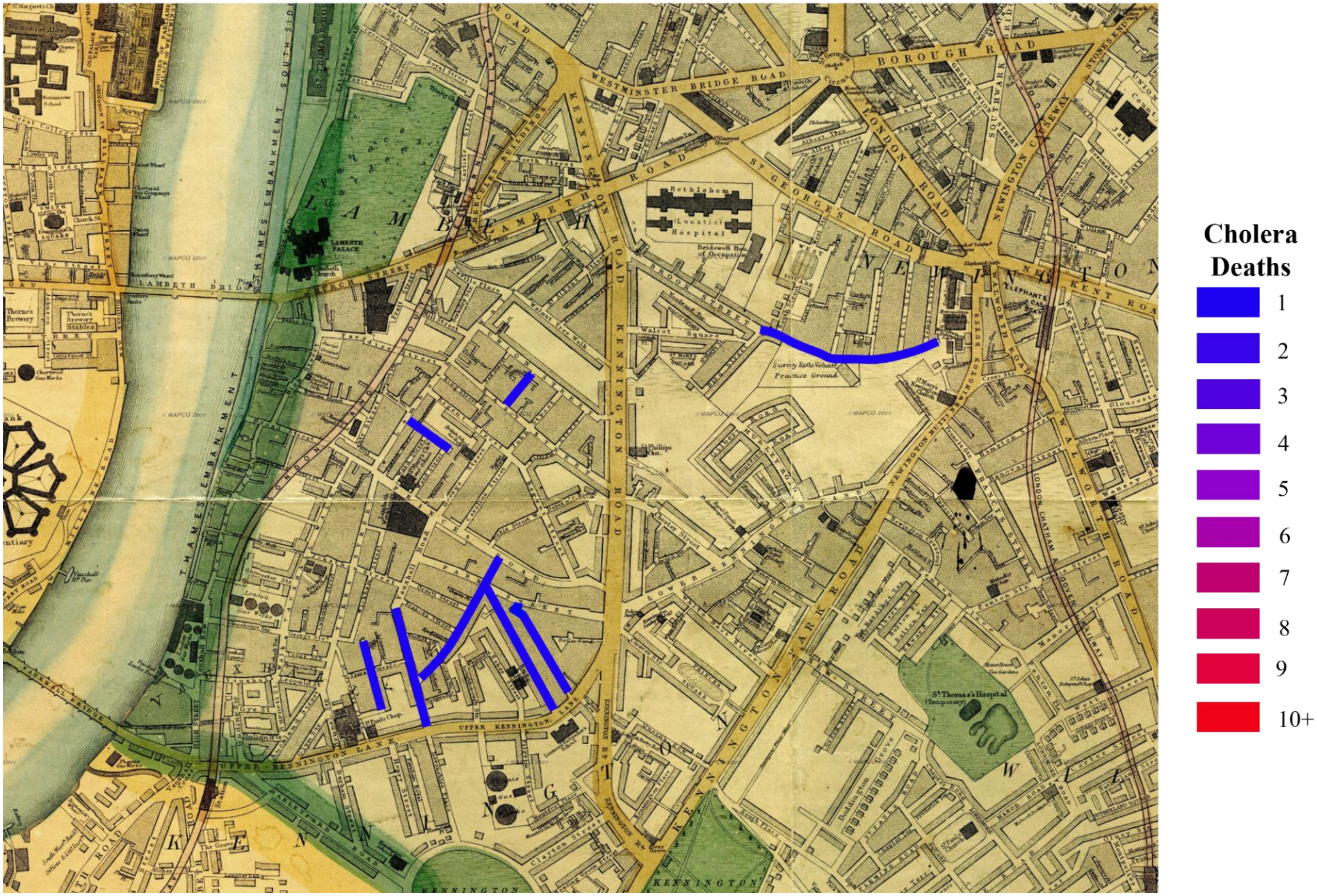

Cholera Deaths
1
2
3
4
5
6
7
8
9
10+
WESTMINSTER BRIDGE ROAD
BOROUGH ROAD
LONDON ROAD
ST GEORGES ROAD
KENNINGTON ROAD
LAMBETH
NEWINGTON
NEWINGTON CAUSEWAY
WALWORTH ROAD
NEWINGTON BUTTS
KENNINGTON PARK ROAD
UPPER KENNINGTON LANE
THAMES EMBANKMENT
LAMBETH BRIDGE
VAUXHALL BRIDGE
LAMBETH PALACE
Bethlehem Lunatic Hospital
Surrey Rifle Volunteers Practice Ground
St Thomas's Hospital (Temporary)
KENNINGTON
© MAPCO 2004

FIGURE 5.20 - Total cholera deaths in Lambeth Church 2nd from Weeks 35-37, 1849

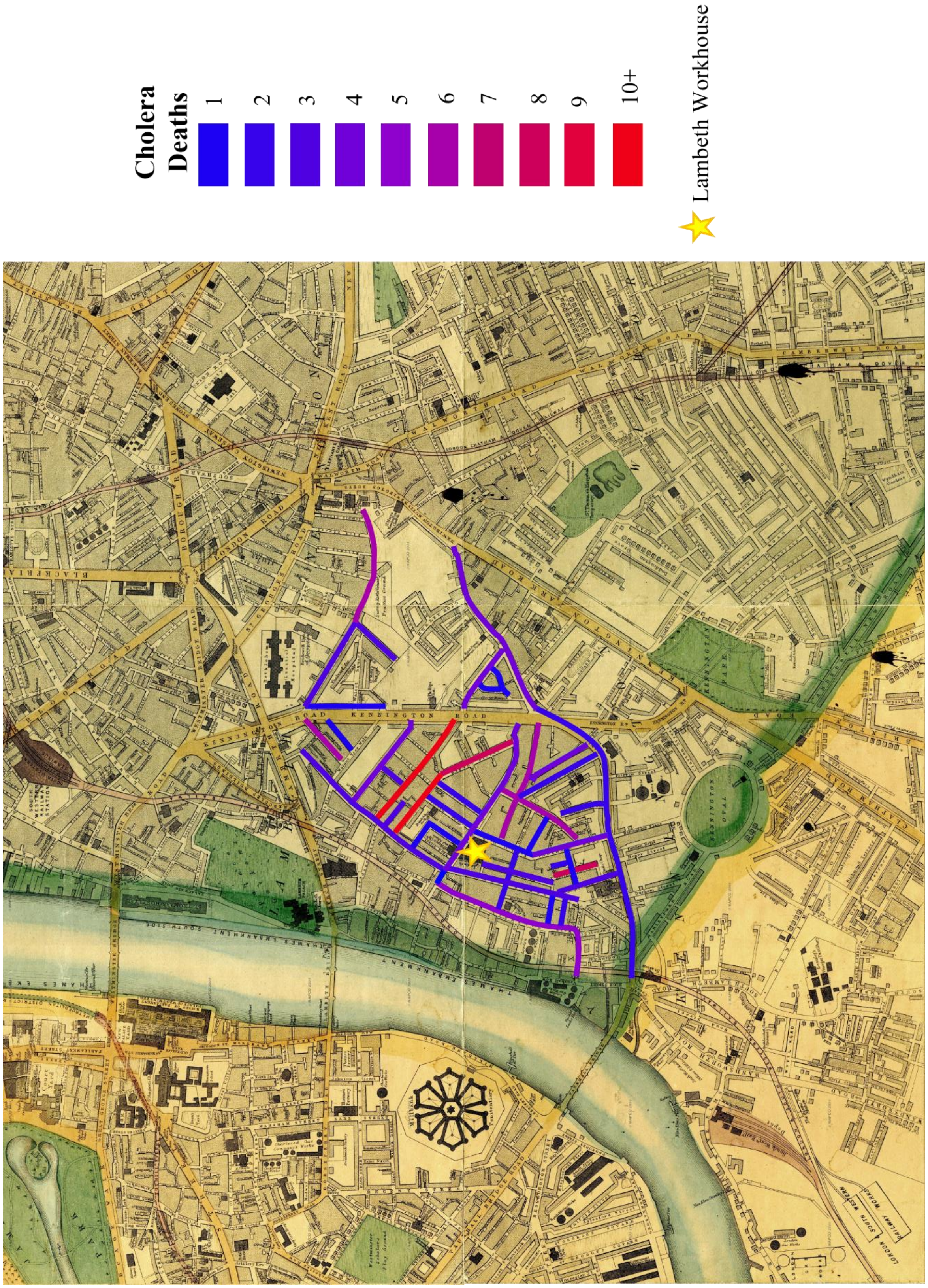
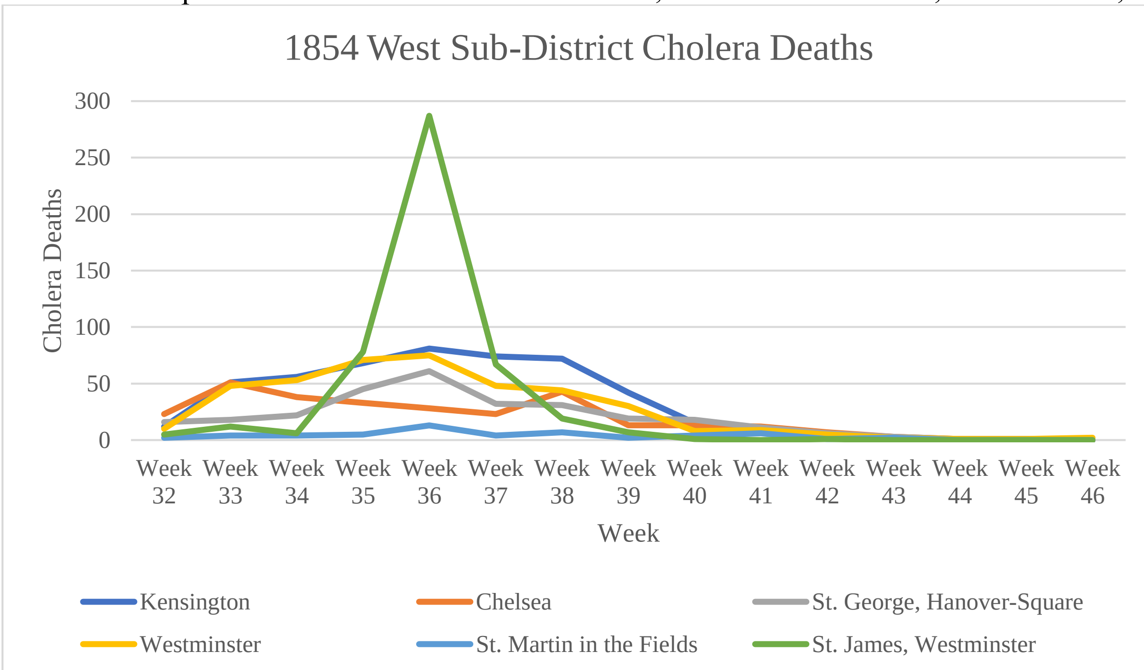
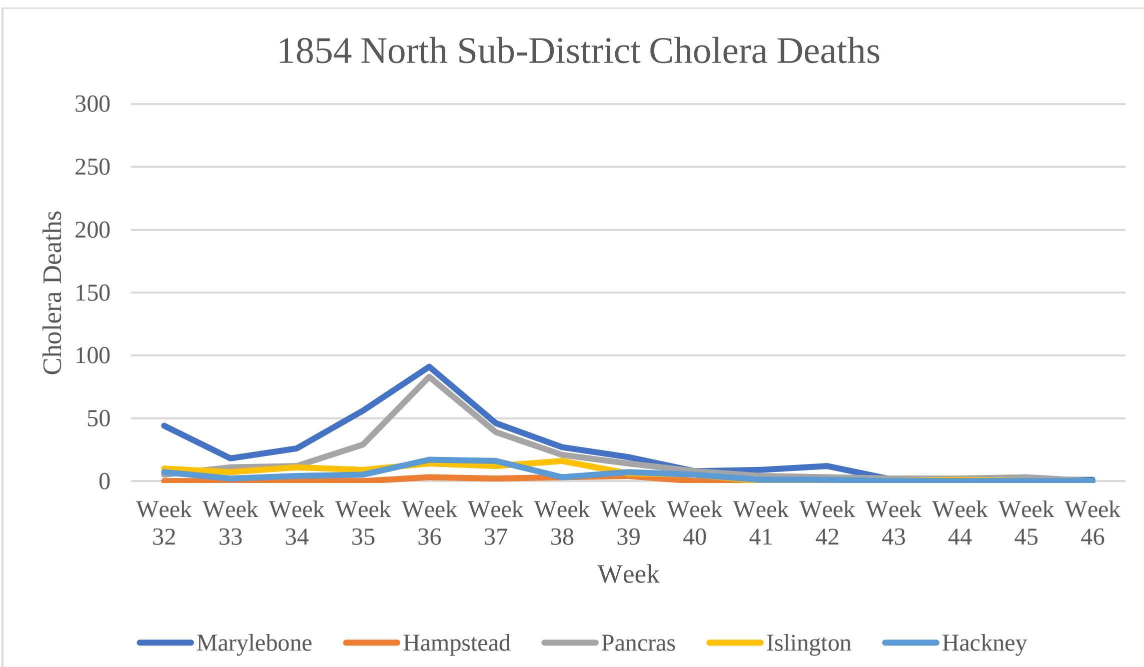
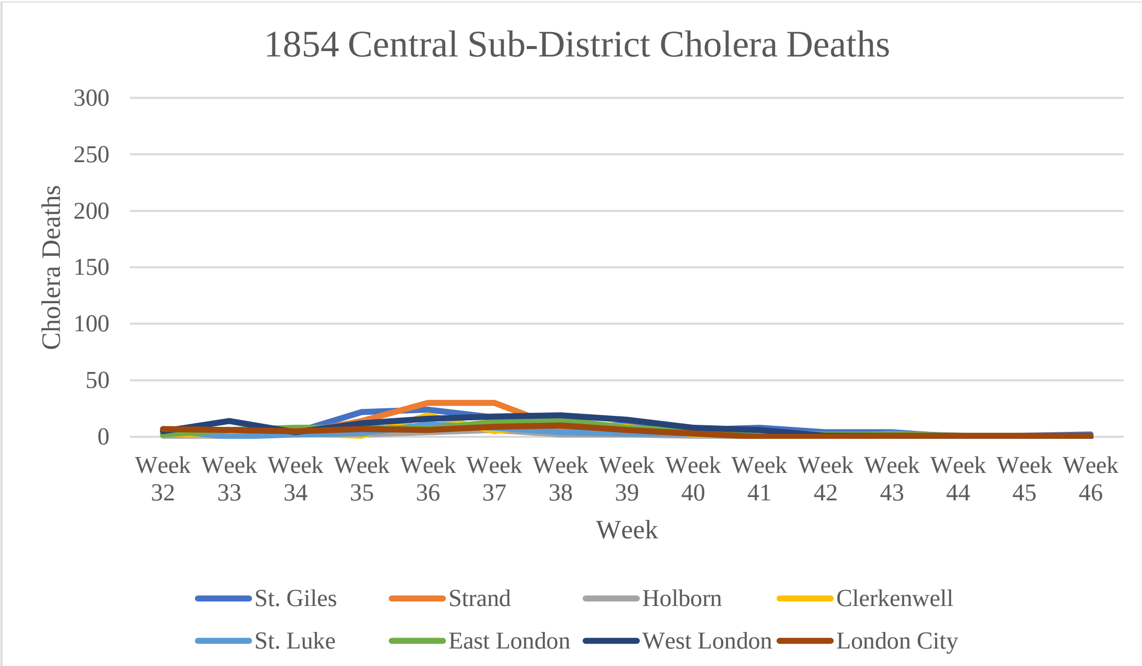
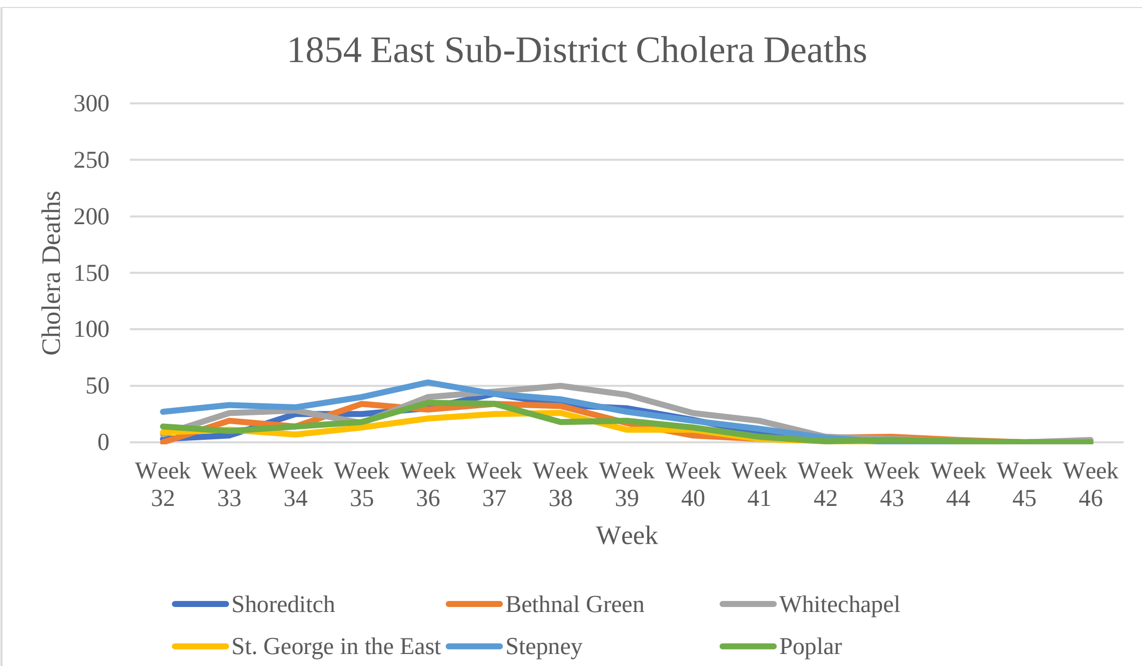


FIGURE 6.9 - Comparison of sub-district cholera deaths, divided into districts, Weeks 32-46, 1854






1854 Central Sub-District Cholera Deaths
Cholera Deaths
300
250
200
150
100
50
0
Week 32 Week 33 Week 34 Week 35 Week 36 Week 37 Week 38 Week 39 Week 40 Week 41 Week 42 Week 43 Week 44 Week 45 Week 46
Week
St. Giles
Strand
Holborn
Clerkenwell
St. Luke
East London
West London
London City


1854 East Sub-District Cholera Deaths
Cholera Deaths
300
250
200
150
100
50
0
Week 32 Week 33 Week 34 Week 35 Week 36 Week 37 Week 38 Week 39 Week 40 Week 41 Week 42 Week 43 Week 44 Week 45 Week 46
Week
Shoreditch
Bethnal Green
Whitechapel
St. George in the East
Stepney
Poplar

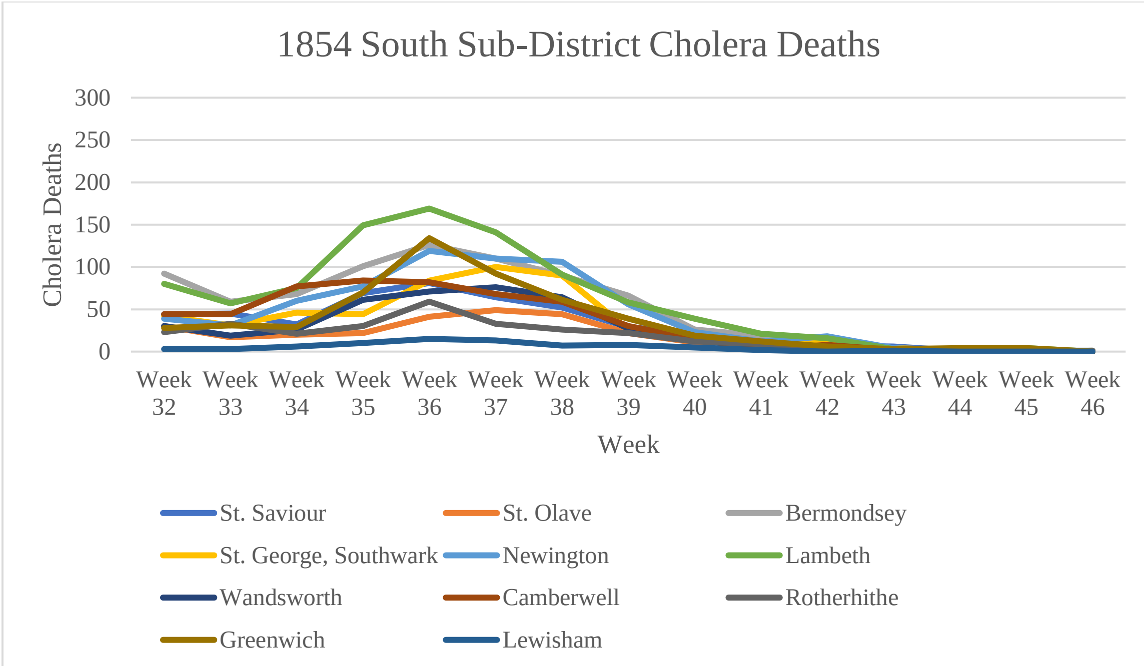

1854 South Sub-District Cholera Deaths
Cholera Deaths
300
250
200
150
100
50
0
Week 32
Week 33
Week 34
Week 35
Week 36
Week 37
Week 38
Week 39
Week 40
Week 41
Week 42
Week 43
Week 44
Week 45
Week 46
Week
St. Saviour
St. Olave
Bermondsey
St. George, Southwark
Newington
Lambeth
Wandsworth
Camberwell
Rotherhithe
Greenwich
Lewisham

FIGURE 6.17 - Week 36 street-level mortality in Berwick Street and Golden Square

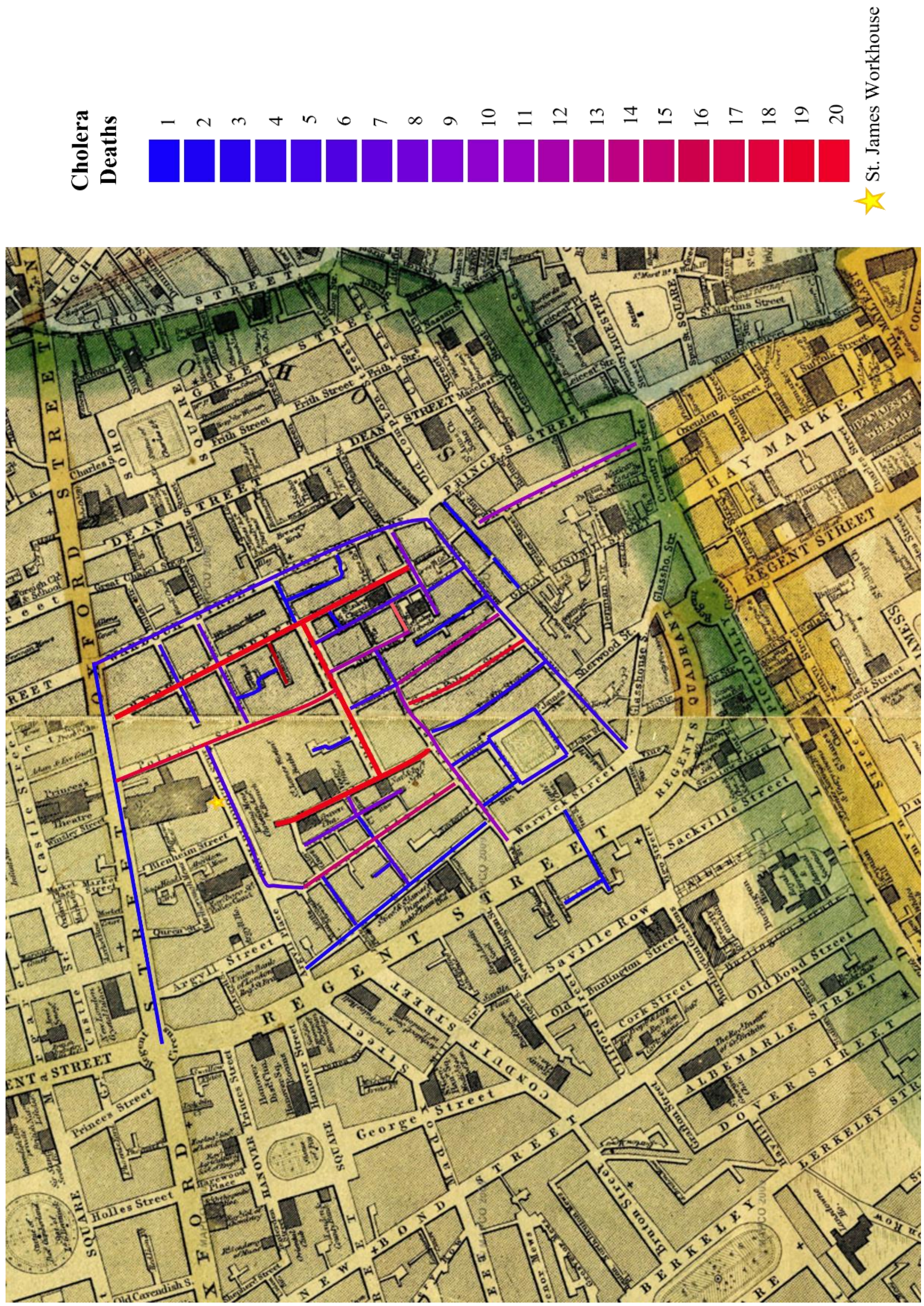
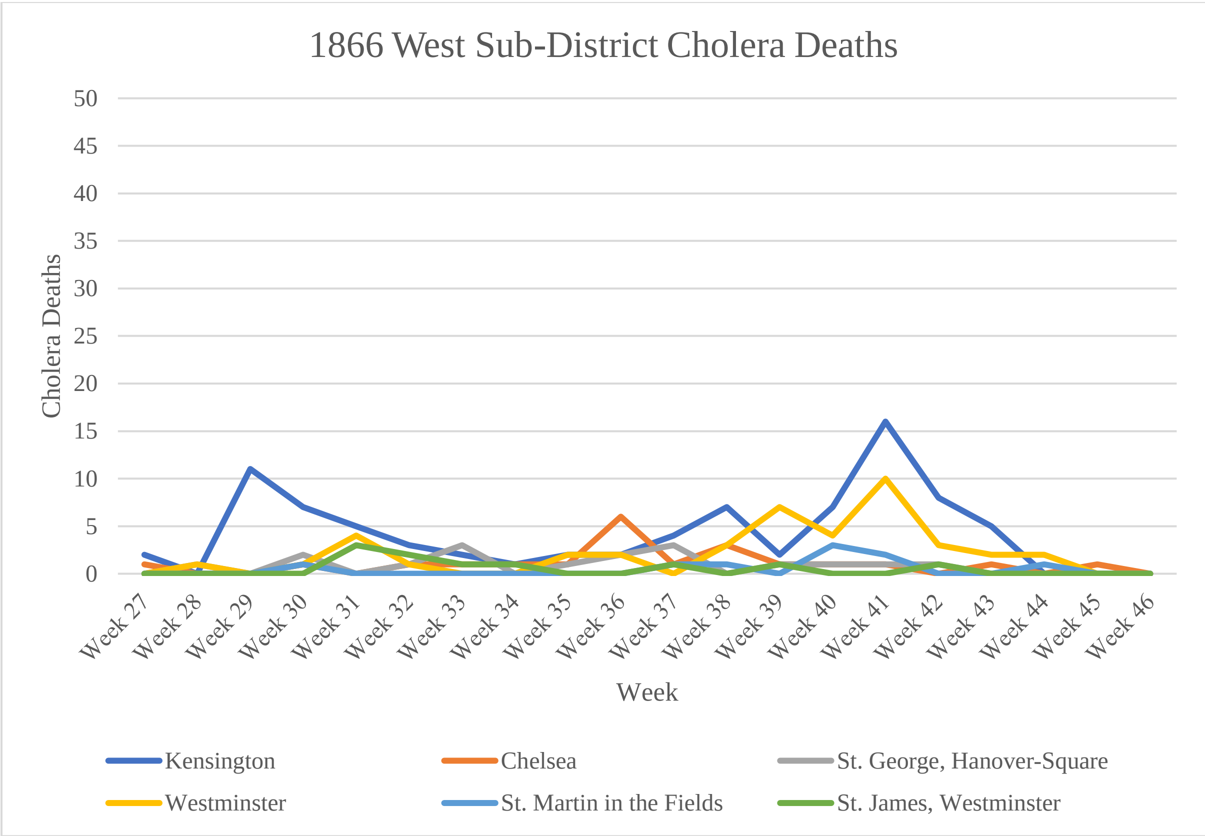
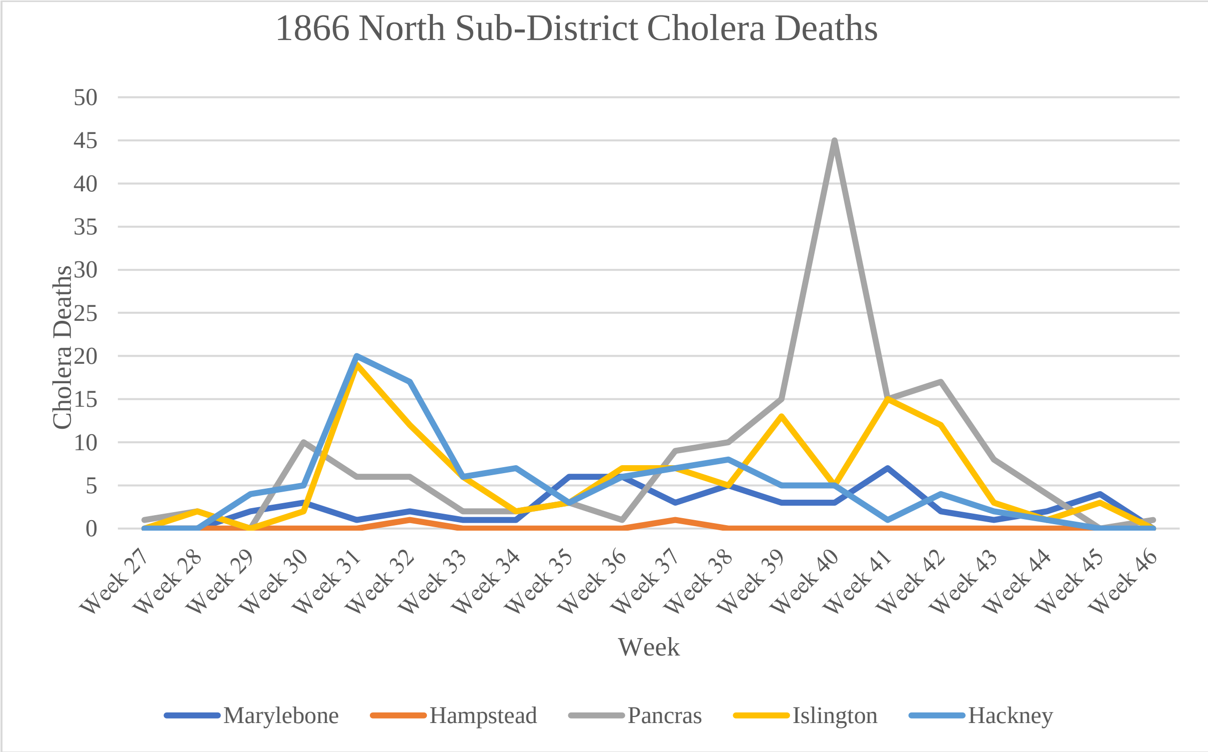
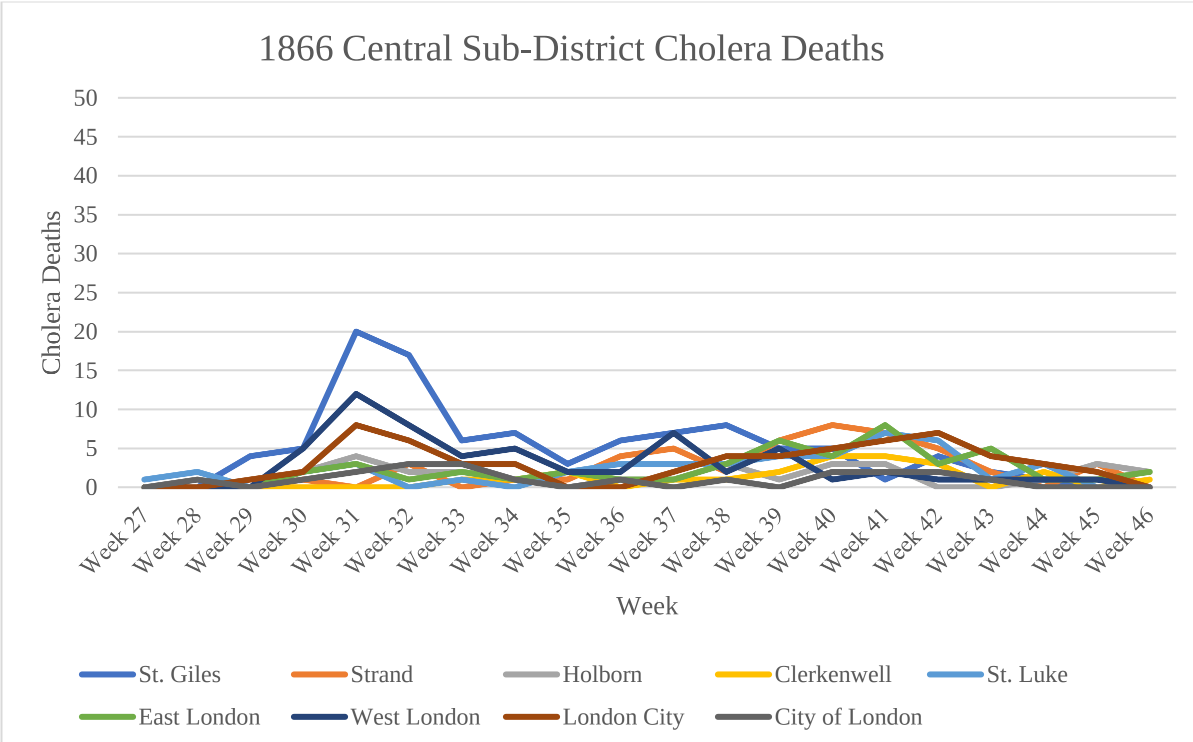


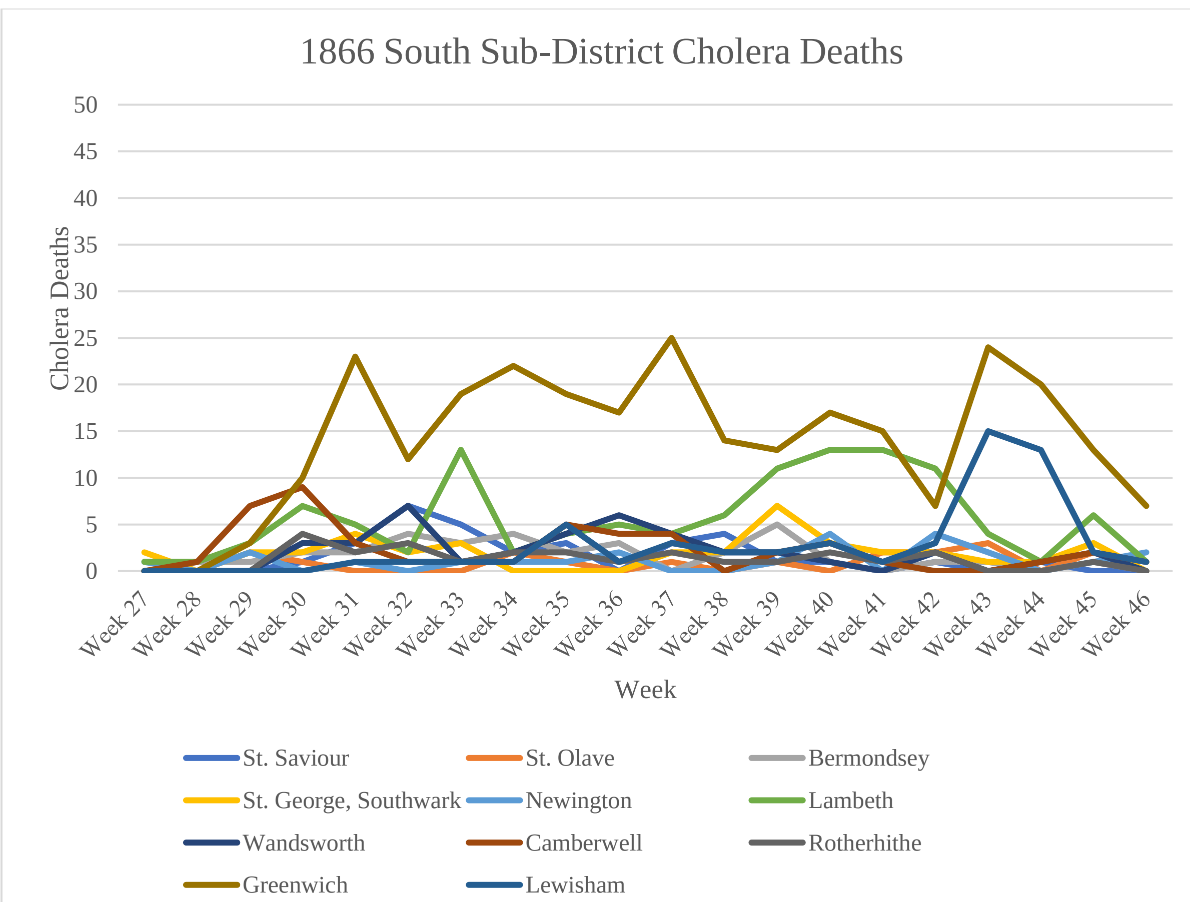
FIGURE 6.18 - Week 37 street-level mortality in Berwick Street and Golden Square

FIGURE 7.7 - Comparison of sub-district cholera deaths, divided into districts, Weeks 27-46, 1866






1866 Central Sub-District Cholera Deaths
Cholera Deaths
50
45
40
35
30
25
20
15
10
5
0
Week 27
Week 28
Week 29
Week 30
Week 31
Week 32
Week 33
Week 34
Week 35
Week 36
Week 37
Week 38
Week 39
Week 40
Week 41
Week 42
Week 43
Week 44
Week 45
Week 46
Week
St. Giles
Strand
Holborn
Clerkenwell
St. Luke
East London
West London
London City
City of London


1866 South Sub-District Cholera Deaths
Cholera Deaths
50
45
40
35
30
25
20
15
10
5
0
Week 27
Week 28
Week 29
Week 30
Week 31
Week 32
Week 33
Week 34
Week 35
Week 36
Week 37
Week 38
Week 39
Week 40
Week 41
Week 42
Week 43
Week 44
Week 45
Week 46
Week
St. Saviour
St. Olave
Bermondsey
St. George, Southwark
Newington
Lambeth
Wandsworth
Camberwell
Rotherhithe
Greenwich
Lewisham

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"A cholera victim with a typical facial appearance." Watercolour (by E. Schwarz?), after Robert Froriep, ca. 1831. Courtesy of Wellcome Images. Available online at: https://wellcomecollection.org/works/twee76wv.

"A design for a 'cholera belt'," 1882. Courtesy of the United Kingdom National Archives. Available online at: https://www.nationalarchives.gov.uk/education/resources/coping-with-cholera/. "A dispensing pot of Blue Pills, England," 1880-1930. Courtesy of Wellcome Images. Available online at: https://wellcomecollection.org/works/kjfzk6vp.

"A figure dressed in a cholera safety suit." Coloured etching after J. Petzl (?), ca. 1832. Courtesy of Wellcome Images. Available online at: https://wellcomecollection.org/works/nee3jsp3. "A map taken from a report by Dr. John Snow." Courtesy of Wellcome Images. Available online at: https://wellcomecollection.org/works/uxgfjt62.

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