

**Explaining geographical variations in English rural infant mortality decline using
place-centred reading**

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Abstract

Making effective use of digital texts is one of the major challenges facing the humanities. This paper explores a novel method of using a large corpus of British newspapers to help explain why three neighbouring rural districts in England showed very different patterns of infant mortality decline in the second half of the nineteenth century. Quantitative analysis does not reveal any major differences between these districts that might explain this. Repeatedly querying the corpus using different combinations of search-terms and place-names, we show significant differences in the quality of local government between these districts. We argue that place-centred reading, as we term this approach, can be used to help explain patterns found using conventional quantitative Geographical Information Systems (GIS) approaches.

Keywords: Infant mortality; corpora; newspapers; historical GIS; local government.

Introduction:

The increasing availability of digital data has led to a division that has become fundamental within the academy and whose fault-line runs through the discipline of history. On the one side are subjects such as quantitative history in which digital data have allowed computer-aided statistical analyses which allow large databases to be analysed in a manner that

identifies and summarises the patterns within and between their variables. This approach is very effective at describing patterns, but far less effective at explaining them because the source data are typically counts that are highly abstracted from the real-world conditions in which people lived and died. On the other side of the divide are paradigms whose main method relies on close reading of textual sources. This approach is better at developing a detailed understanding of the records under study but is limited in that close reading is slow and thus only relatively small amounts of material can be analysed. Its results are therefore highly selective. Until recently researchers using close reading have had little to gain from Information Technology (IT).

Recent developments in IT are making this divide increasingly untenable. Many large digital corpora are now available. Examples in Britain include the British Library's Nineteenth-Century Newspapers Collection, which consists of over two million pages of local and regional newspapers,¹ the Histpop collection, which consists of the printed reports that accompanied the UK's census and vital registration reports from 1801 to 1937,² and Early English Books Online (EEBO), which consists of virtually every book printed in English before 1700.³ Developing computational methodologies to analyse this material is now a major challenge within history and all other subjects that use textual sources. One obvious approach is to use keyword searching which allows the close reader to find the material he or she requires quickly and comprehensively but does nothing to speed up the process of reading itself. At the opposite extreme, techniques from corpus linguistics allow large corpora to be summarised to allow some of their meaning and content to be understood without having to close read any of the text (Adolphs 2006; Baker 2006; McEnery and Hardie 2012). Rather than replacing close reading, techniques from corpus linguistics are likely to be used together

¹ <http://gale.cengage.co.uk/product-highlights/history/19th-century-british-library-newspapers.aspx> (Viewed 12th Sept. 2014)

² <http://www.histpop.org> (Viewed 12th Sept 2014)

³ <http://eebo.chadwyck.com/home> (Viewed 12th Sept 2014)

with it to draw on the strengths of both. In Literary Studies this approach has become known as distant reading (Moretti 2005 and 2013) or macroanalysis (Jockers 2013), however historians have been relatively slow to adopt it. A third approach attempts to make use of the non-linear nature of digital sources, in other words the ability to move easily from one part of the text to another using hyperlinks (Cohen and Rosenzweig 2006). Again, however, only limited progress has been made with this within history.

The divide between quantitative and textual approaches is also found within geographical sources. Historical Geographical Information Systems (HGIS) (Gregory and Ell 2007; Knowles 2008) have allowed researchers to explore spatial patterns within quantitative sources on topics such as population, the economy and transport (Caruana-Galizia and Marti-Henneberg 2013; DeBats 2011; Gregory et al. 2013; Knowles and Healey 2006), however quantitative approaches have been much better at identifying patterns than explaining them. Until recently, textual sources could not be included within Geographical Information Systems (GIS) so they have been ignored. Lately, there has been some progress in including texts in GIS (Cooper and Gregory 2011; Yuan 2010) and in developing distant reading-type techniques to analyse them (Gregory and Hardie 2011). As yet, however, no major analyses have combined quantitative and textual GIS work to describe and explain geographical patterns.

This paper describes a method for bridging this divide. We explore an approach to understanding local geographical change based on establishing everything that we can that may be of relevance to that place from one or more corpora. The aim of this approach, that we term Place-Centred Reading (PCR), is to identify all of place-names within the localities of interest and all of the themes that may be relevant to understanding the research topic. These are then used to recursively query the corpus to build up a detailed understanding of what was said about the chosen themes in relation to the place or places of interest. In this

case study, we focussed on rural infant mortality decline in Victorian England to illustrate how PCR, used in combination with quantitative research, allows us to gain a stronger understanding of why changes showed the spatial patterns they did. This exploratory study illustrates the potential of this method, using the British Library's Nineteenth-Century newspapers collection: it does not attempt, to link the newspaper material with other local sources such as Medical Officer of Health reports and is also limited in that it is restricted to a small geographical area. The aim instead is to illustrate and understand the potential of this approach so that it can subsequently be applied to larger analyses in which PCR appears as one of a series of approaches that will probably also include quantitative and corpus linguistics-based methods.

Infant mortality decline in nineteenth-century England

Mortality decline in nineteenth-century England has received significant attention from historical demographers with infant mortality, deaths under the age of one year, attracting particular attention. Much of this research debates Thomas McKeown's hypothesis that mortality decline was primarily caused by the 'invisible hand' of rising living standards which, in turn, led to improved nutrition (McKeown 1976; McKeown and Record 1962). Much of this argument was based on quantitative sources, particularly on cause of death.

The completeness and accuracy of nineteenth-century British mortality data is high by international standards (Higgs 2004: p. 218) with good quality, geographically disaggregate data available decennially from the 1850s onwards. Unfortunately quantitative studies to research these data suffer from a lack of explanatory variables, particularly those available in consistent form over time. Woods, Watterson and Woodward (1989) examined the influence of women's education, fertility, poverty and population density, but only in a cross-sectional rather than longitudinal analysis. Lee (1991) discussed the influence of population density,

type of industry and overcrowding, but only at county level and without much enquiry into whether further causes might have stood behind the measurable ones he examined. Williams and Galley's (1995) quantitative analysis was more sophisticated, but led them to the view that few definite conclusions could be drawn about the causes of infant mortality decline beyond a need to look more closely at fertility and at the range of local factors facilitating or inhibiting change. Woods (2000: pp. 304-9), in the most thorough discussion of the issues, reiterated the conclusions of his earlier work with Watterson and Woodward, emphasising more strongly the problems with finding good data series for possible explanatory variables.

We agree. Robust series of geographically detailed data covering several decades on, for example, poverty, female literacy, nutrition, occupation, and breastfeeding, would be invaluable. The dearth of such firm statistical evidence, despite historians' efforts and ingenuity, explains, to an extent, McKeown's reliance on inferences made from changing causes of death. Some reasons for mortality decline may not even be quantifiable. Szreter (1988 and 2002), in contrast to McKeown, argues that the public health movement, implemented through civic engagement and local government, was more important than nutritional improvements in driving mortality decline. He argues that McKeown puts too much emphasis on improvements in technology and living standards and "misleadingly understates the effects of medical men, and human agency in general." (1988: p. 13). He further notes that looking at local areas, rather than the central government, could prove to be a profitable line of enquiry. The need for such work remains.

While much of this debate has taken place at the level of the national aggregate, other research emphasises geographical variations in mortality and has identified that there were major differences between urban and rural areas (Lee 1991; Williams and Galley 1995; Woods, Watterson and Woodward 1988 and 1989). More recently, Gregory (2008) makes use of GIS approaches to show that many rural areas were clearly experiencing infant

mortality decline in the mid-nineteenth century, decades before any improvements occurred in urban areas. Within rural areas there were significant geographical variations in the timing and degree of improvement. This was also an entirely quantitative analysis, but challenges the emphasis of much existing research such as Woods', which had concluded that change in national aggregate infant mortality was driven mostly by change in the urban sanitary environment and consequently ignore rural areas. Relatively few studies of rural infant mortality have been done (see, for example, Sneddon 2006) and those that have tend to focus on specific places whose broader relevance is hard to contextualise. Undoubtedly, a more comprehensive story is waiting to be told that explores why some rural areas improved earlier and faster than the national aggregate.

The study area

[Figure 1 – IMRs over time]

Gregory (2008) identifies rural parts of the south and east of England as having among the earliest and largest declines in infant mortality. Figure 1 confirms this by showing how the infant mortality trends for rural parts of the south-east, defined based on the same classification system as Gregory (2008), and for Suffolk, a predominantly rural county in the south-east, contrast with the aggregate pattern for England and Wales. Even in the 1850s, the earliest decade for which data are available, rural Suffolk's infant mortality rates (IMRs) were lower than the national rate. From this lower baseline, the IMR in rural Suffolk declined sharply and consistently from 140.3 infant deaths per 1,000 births in the 1850s to reach 109.8 by the 1880s, a decline that started well before either the national decline or the introduction of public health reform in the 1870s and 1880s. In the 1890s, rates rose slightly, mirroring the national pattern whose increase is usually explained by a series of long, hot summers in this

decade, before declining sharply in the 1900s. This pattern closely follow the more aggregate pattern for the whole rural south-east of England albeit at marginally higher rates.

[Figure 2 – the study area]

Our study area, shown in figure 2, focuses on three neighbouring registration districts (RDs) on the southern border of rural Suffolk: Risbridge, Sudbury, and Samford. Typically for rural RDs, their populations were small in comparison to urban RDs – respectively 17,000, 31,000 and 13,000 in 1861. Their locations, along the southern border of Suffolk, are indicated in figure 2. Suffolk, like much of the rest of the rural south-east of England at this time, had an economy that was primarily based on arable farming. In the second half of the nineteenth century it was affected by agricultural changes, particularly those associated with the improved connectivity to markets such as London brought about by the railways, and by the Agrarian Depression of the late nineteenth century. Demographically, the area was affected by out-migration driven by the relatively large employment opportunities offered by rapidly growing cities.

Our three RDs can be seen as representative of wider patterns in Suffolk and the wider rural south-east of England which experienced early and large declines in infant mortality. They also illustrate the complexity of mortality patterns. The specific reason for selecting these three adjacent districts is that two, Sudbury and Samford, had mortality trajectories that were broadly typical of Suffolk while one, Risbridge, showed a very different pattern. As figure 1 shows, Sudbury follows the pattern for rural Suffolk very closely whereas Samford started with a lower IMR but followed a pattern of decline that was typical of rural Suffolk as a whole. Risbridge, by contrast, started with an IMR of only 118.3, making it the lowest RD in Suffolk, but showed very little subsequent improvement; by the 1880s its IMR of 109.6 was almost identical to the aggregate rate for rural Suffolk. Moreover, in the 1890s,

Risbridge's IMR increased by 12.6% compared to the rural aggregate increase of only 3.2%. This then poses two questions: first, why did rural Suffolk's IMRs, as exemplified by Sudbury and Samford, improve so rapidly and second, why did Risbridge, an adjoining place with apparently very similar characteristics, start so well but perform so badly?

Quantitative characteristics

The traditional way to answer these questions would be to use quantitative sources. There are only a few sources of such evidence and this discussion draws most, if not all, of the major ones which include: the census which provides demographic and socio-economic information, the General Register Office (GRO) which provides mortality data, and other sources such as poor law and agricultural statistics.⁴

[Table 1: Population densities]

Table 1 shows the parish-level population densities in 1851 and 1881 of the three districts. It illustrates that each district had a similar composition of population densities within their parishes and rules out the possibility that differences in infant mortality resulted merely from differences in population density, as Lee showed that it can at county level. It is noteworthy, for example, that although Sudbury RD contained the largest 'town' (also called Sudbury, and having about 6,000 inhabitants in this period), it suffered no major urban penalty of higher infant mortality in comparison to the other RDs. The next largest settlement, Haverhill, with about 2,400 inhabitants, was in Risbridge, Samford had an even more rural character.

[Figure 3– demographic change]

⁴ Much of this data is available from the UK Data Archive (UKDA) (<http://www.data-archive.ac.uk>) as part of the Great Britain Historical Database.

A positive association between fertility and infant mortality has often been proposed (Woods, Watterson and Woodward 1989), and it is also reasonable to surmise that if a district was unhealthy for people of all ages, as shown by the all-ages crude death rate, its infant mortality would be higher too. Yet the fertility and mortality characteristics of Risbridge, Sudbury and Samford reveal no notable differences; indeed, figure 3 shows that all three districts had similar fertility and crude death rates. The explanation for their different IMR trajectories must lie elsewhere.

[Figure 4: Net migration]

Migration is another factor regularly considered as a possible influence on IMR, operating for example via differences in the health characteristics of mothers leaving, staying and arriving, or effects on population density (Woods 2000: p. 379). Figure 4 shows the net migration rates for each district calculated using census populations and inter-censal numbers of deaths. All three districts lost population due to migration for most of the period but, again, there is no notable difference that would suggest that Risbridge's population was behaving differently from the others.

Ideally, we would be able to include poverty as another explanatory variable however Victorian data make this hard to quantify. Data on proportions of the population receiving poor relief are available annually but only for the 1860s. Exploring these reveals that the three districts had similar proportions of indoor relief to outdoor relief, meaning that they all had similar percentages of people in the workhouse as compared to people on outside welfare. With around five percent of its population being on relief, Samford had a lower total percentage than the other two districts. Sudbury had a nearly identical percentage to Risbridge at around eight percent and there is little to suggest why Sudbury's IMRs should be

falling rapidly over this decade while Risbridge's rose slowly. If poverty did affect IMR, rates of poor relief are a poor guide to its relevance.

[Table 2: Agriculture Returns]

The Agricultural Returns for each parish are available for 1870, 1881, 1891, 1901 and 1911, providing detailed information on crop acreages and livestock numbers. The patterns were explored to see if there were any major differences over time or between the districts with the major trends being summarised in table 2. The table shows that wheat was the dominant crop in 1870 and, not unexpectedly, its importance declined over time as a result of competition from cheap imports from North America (Schwartz 2010). As a consequence the relative importance of barley in particular increases. There is not, however, a move away from crops and into livestock, indeed over time the number of animals declines in all three RDs compared to the area under crop. Sheep are by far the most numerous animals at both dates. Thus while there are some differences between the RDs there is little to suggest anything that could account for overall declines in IMRs.

[Figure 5: Causes of death]

As well as explore the districts' socio-economic characteristics for clues about the causes and patterns of mortality decline, we can also explore how causes of infant deaths changed. Figure 5 shows the top ten causes of infant death for each district between 1850 and 1890. Classifications of causes are problematic for two reasons: first, the 'other causes' class was always the most prevalent cause of infant death, and secondly, the classification scheme changed over time. Despite these difficulties, it is possible to establish approximate comparisons over time (Woods and Shelton 1997: pp. 21-25). It is clear from figure 5 that no one cause was responsible either for the overall decline in infant mortality in Samford and Sudbury, or for Risbridge's relative failure to improve. Risbridge had higher mortality in

several different categories but its infant deaths were caused by relatively similar proportions of diseases to the other two districts. This then does not suggest that any one factor was significantly more detrimental to infant health in Risbridge than elsewhere.

Two points emerge very clearly from the above discussion. The first is just how limited the quantitative record is. Despite the fact that we believe we have used the most likely variables from all of the significant quantitative sources available in digital form, there are major silences in the data on a wide range of important topics from sanitation and housing quality to health care and breast feeding. The second point is that the available data provide few clues to explain either why IMRs declined in Sudbury and Samford or why Risbridge lagged behind. The conclusion must therefore be that if we want to discover why infant mortality declined, and did so in different ways in different places, we must look to other sources.

Textual Evidence

Given the failure of the quantitative evidence to explain these patterns we now turn to see whether digital texts may be more productive. The main source that we use is the British Library's Nineteenth Century newspapers, a corpus of over two million pages of newspapers from 48 titles chosen by the British Library to be as representative as possible: details of their selection and criteria are provided on the website.⁵ These are accessible online with a search interface that allows articles to be extracted based on a range of criteria, including keyword, place of publication and year.

Newspapers share certain characteristics as a historical source. Editorial decisions about which stories to run are typically based on such factors as: owners' and editors' political and religious allegiance, the target audience and the concerns of potential advertisers. As with any other source, our information about actual events and conditions is filtered through this

⁵ <http://find.galegroup.com/bncn/> (Viewed 12th Sept 2014)

authorial perspective. The main sources for Suffolk in this collection are the *Bury and Norwich Post*, a paper described by a contemporary in the 1870s as ‘devoted rather to local questions and to agricultural and social improvements rather than to party objects’,⁶ and the *Ipswich Journal*, which described its viewpoint as Peelite Conservative.⁷

[Table 3: Major categories and keywords]

Place-centred reading is based on combining two types of keyword search: a search on place and a search on theme. To ensure the searches found all references to the RDs under study, all of the significant place-names within the three districts, together with probable variant spellings, were located using a variety of sources including gazetteers and parish-level data tables held in the GB Historical GIS (Gregory et al. 2002). In addition to the RD names themselves, place-names that occur frequently include Clare and Haverhill in Risbridge, Glemsford in Sudbury, and Chelmondiston and Chapel St. Mary in Samford. While place-name search-terms can be defined fairly easily, defining thematic search-terms relevant to infant mortality is a more iterative process. Initial choices were based on a knowledge of the literature on infant mortality and subsequently significantly enhanced in response to close reading of query results. Thus, for example, exploring the results of early searches associated with sanitary conditions using obvious search-terms such as ‘sewage’ and ‘drainage’ revealed the importance of ‘cesspits’ and ‘cesspools’ to this topic so they were added to the list of search-terms. Table 3 shows the most important search-terms grouped by the themes used in

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<http://find.galegroup.com/bncn/publicationSearch.do?serQuery=Locale%28en%2C%2C%29%3AFQE%3D%28jx%2CNone%2C23%29%22Bury+and+Norwich+Post%22%3AAnd%3ALQE%3D%28MB%2CNone%2C16%29%22BLN1%22+OR+%22BLN2%22%24&searchTerm=bury+and+norw&inPS=true&prodId=BNCN&userGroupname=unilanc¤tPosition=0&type=getIssues> (viewed 12th Sept 2014)

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<http://find.galegroup.com/bncn/publicationSearch.do?serQuery=Locale%28en%2C%2C%29%3AFQE%3D%28jx%2CNone%2C17%29%22Ipswich+Journal%22%3AAnd%3ALQE%3D%28MB%2CNone%2C26%29%22BLN1%22+OR+%22BLN2%22+OR+%22BRNY%22%24&searchTerm=ipswich+journal&inPS=true&prodId=BNWS&userGroupname=unilanc¤tPosition=0&type=getIssues> (Viewed 12th Sept. 2014)

the remainder of this discussion. It should be stressed that in place-centred reading, the search terms are used to provide a route to the relevant passages about the theme under study in the places of interest to allow close reading and qualitative discussion. This contrasts with other researchers who have argued for their use in quantitative analyses (for example, Nicholson 2012).

Sanitary conditions

The search terms for sanitary conditions shown in table 3 return vivid descriptions of the raw messes and turbid cesspits common in the nineteenth century. These issues were clearly not exclusive to any one region, rural or urban. In our area, Risbridge, Samford, and Sudbury all seem to have been plagued with issues of sewage conveyance and sanitation. The newspapers described some unusually stubborn problems in Risbridge, but all districts had similar issues: in Risbridge “injurious miasmas, and cesspools of putrid matter everywhere abound”;⁸ in Sudbury the “alarming quality of decomposing vegetable and animal matter brought down from the town drains”⁹ and in Samford a “catchpit ... full of liquid filth”¹⁰. There are, however, significant differences that emerge. First, most of Samford and Sudbury’s reports came from the sanitary authorities, while in Risbridge they tended to be in letters of complaint to the editor. Second, most of Samford and Sudbury’s reports ended with a summary of the course of action that would be taken to resolve the problem, while Risbridge’s reports often either vaguely demanded some kind of effort to abate the problem or lamented how nothing had been done for months or years. Many examples of such neglect could be cited, to take one example, in 1873, the Risbridge village of Burton-End was

⁸ The Bury and Norwich Post, and Suffolk Herald (Bury Saint Edmunds, England), Tuesday, September 12, 1865; pg. 7; Issue 4342.

⁹ The Essex Standard, and General Advertiser for the Eastern Counties (Colchester, England), Friday, July 25, 1856; Issue 1336.

¹⁰ The Ipswich Journal (Ipswich, England), Saturday, June 23, 1900, Issue 9756.

completely without public drainage: although a solution was agreed on, five years later it was in an even worse state, as noted in a report from an 1877 public inquiry.¹¹

While these accounts of district-specific sanitary conditions show that all three experienced concern about poor sanitation, they also provide a general clue that Sudbury and Samford were much more effective in taking action to resolve the issue than Risbridge. If this assertion is correct it poses the question of why this was the case. To explore this we turn to the role of the sanitary authorities.

Sanitary Authorities and Inspections

Sanitary inspectors had the duty of accounting for all ‘injurious nuisances’ within their district. They reported to the Local Board of Health or the Board of Guardians and would often communicate with landlords, surveyors and citizens about the issues of sanitary infrastructure and sewage from human and livestock sources. Articles on Risbridge yield some clear descriptions of a lax and incompetent sanitary inspection regime. In 1865, for example, a letter to an editor expressed, “It is an old maxim that the rulers’ sin and pestilence visits the people. The sanitary condition of this town unhappily affords another illustration of this common truth.”¹² In 1877 a former Guardian stressed “the utter indifference of the Guardians to sanitary matters ... letter after letter from the Local Government Board was evaded and shelved.”¹³ Surveyors were blamed for giving the “cold shoulder” about a long-standing cesspool effluvia (1858) and the Board of Guardians were deemed ignorant, ineffective and unreliable in at least six reports.

¹¹ The Bury and Norwich Post, and Suffolk Herald (Bury Saint Edmunds, England), Tuesday, August 28, 1877; pg. 6; Issue 4966.

¹² The Bury and Norwich Post, and Suffolk Herald (Bury Saint Edmunds, England), Tuesday, September 12, 1865; pg. 7; Issue 4342.

¹³ The Bury and Norwich Post, and Suffolk Herald (Bury Saint Edmunds, England), Tuesday, August 28, 1877; pg. 6; Issue 4966.

The ineffectiveness of Risbridge's Board of Guardians on sanitary measures led to a petition to the Local Government Board (LGB) in 1877 for the creation of a separate Local Board District for Haverhill. Speakers stressed the need for smaller divisions of local government to provide more localized attention and action. The LGB inspector who opened the meeting "presumed, from the large attendance, that considerable interest was felt in the matter" and the frustrations of citizens and authorities alike were represented in the report of this assembly. Important reasons for Risbridge's failing system were suggested in this article.¹⁴ First, while the Guardians had created a new sanitary board as they were supposed to under the Health Act of 1875, they had simply selected previous Board members for the undertaking. The community also felt that the Guardians were not representative of the population. They "excluded many useful and intelligent men; indeed it was a fact that no professional man in town, apart from a freeholder, was eligible to be a Guardian, and therefore a Sanitary Authority." It was also complained that the Board of Guardians met once a fortnight with no representation from the Highway Commission. The average attendance at these meetings was said to be nine, even though there were thirty-two Guardians. It was argued that there was only a single sanitary inspector in the district of Risbridge to oversee forty-nine parishes, leaving him "utterly unable to fulfil his duties." There was something in this: an 1873 Parliamentary return showed that while Samford and Sudbury each had their own Inspector of Nuisances, in common with eight other Suffolk RDs (some of which employed more than one each), Risbridge was the sole Suffolk RD sharing its inspector with another District.¹⁵

Two subsequent articles about Risbridge are particularly significant. In 1884, an article concerning a polluted river in Haverhill reported that there was a special committee

¹⁴ The Bury and Norwich Post, and Suffolk Herald (Bury Saint Edmunds, England), Tuesday, August 28, 1877; pg. 6; Issue 4966.

¹⁵ *Return of Appointments of Medical Officers of Health and Inspectors of Nuisances under General Sanitary Acts or Local Act*, Parliamentary Papers (1873), LV, pp. 96 and 107

overseeing the sanitary issue, but it did not have a plan of action for the situation even though the Medical Officer noted it as an urgent case in his Annual Report.¹⁶ The issue remained in the hands of the Risbridge's governors who were still delaying action regarding sanitary matters. In 1887, a lengthy report concerning a damaged sewer stated that because the Sanitary Authority had no power or finances to fix the problem "the chief purport of [the] report was that a local Board should be established so as to have the proper officers to deal with these sanitary matters."¹⁷ Those concerned with the sewer were also unconvinced that the local authorities in Risbridge would tend to the matter in a timely manner.

While a clear pattern of maladministration of sanitary responsibilities emerges for Risbridge, Samford and Sudbury maintained a different system and there was no newspaper evidence of frustration about the way that sanitation was overseen. Place-centred reading clearly shows how responsibilities in these districts were delegated to specialized committees. An article concerning Sudbury from 1866 cited the mayor, saying "The town should be thoroughly cleansed, the poorer residents instructed what to do if the disease broke out, and some fixed uniform plan resolved upon. A Committee (already appointed by the Corporation), who should, if necessary, take legal proceedings in any case where remonstrance and suggestion did not avail. The drains should be well seen to; disinfectants provided, to be given gratuitously to the poor..."¹⁸ Two years later an article stated, "The jurisdiction exercised by the authorities is somewhat divided in drainage and other kindred matters, being vested in the Town and Paving and Lighting Commissioners: but the 'local authority' in sanitary matters is

¹⁶ The Bury and Norwich Post, and Suffolk Standard (Bury Saint Edmunds, England), Tuesday, June 3rd, 1884; pg. 8; Issue 5318.

¹⁷ The Bury and Norwich Post, and Suffolk Standard (Bury Saint Edmunds, England), Tuesday, November 08, 1887; pg. 6; Issue 5485.

¹⁸ The Bury and Norwich Post, and Suffolk Herald (Bury Saint Edmunds, England), Tuesday, August 07, 1866; pg. 8; Issue 4389.

the Town Council, who can act as nuisance and sewer authority under the recent Sanitary and Sewage acts.”¹⁹

There are fewer articles concerning Samford, but the accounts that are available are the most scrupulous of all. In 1880, an article quoted the Officer of Health in the Samford Rural Sanitary District: “On March 25th, 1879, the Public Health (Water) Act came into operation and it gave powers to Rural Sanitary Authorities to enforce a proper supply of water in country districts, I have, during the year, visited and examined the water supply of a large portion of the district, with a view of reporting upon the same, under section 3 of the Act.”²⁰

The articles goes on to describe several specific parishes and groups of houses within them, describing their water supply and its proximity to possible nuisances. Water quality is analysed, what might be done to improve it is assessed, and residents notified about what should be done.

Taken together this suggests that local government’s attitude towards sanitary inspection was an important factor in improving sanitation. Risbridge, whose Board of Guardians was constantly criticised for negligence about sanitary matters, was said to have a significantly less effective system than Samford and Sudbury. Risbridge was less likely to initiate plans for sanitary improvement and hardly ever referenced specific committees or legislation acts.

Housing

Even in the countryside Victorian housing was often poor with large families were commonly crammed into damp houses with few beds and unsanitary conditions (Short 2000: p. 1247-8). Concerns over the state of cottages in all three districts were cited in newspaper articles over the time period, which often linked overcrowding with both illness and immorality. Reports

¹⁹ The Bury and Norwich Post, and Suffolk Herald (Bury Saint Edmunds, England), Tuesday, September 01, 1868; pg. 8; Issue 4497.

²⁰ The Ipswich Journal (Ipswich, England), Saturday, May 8, 1880; Issue 7842.

of inadequate housing were found in all three districts, but the differences between areas are revealing.

In 1864, an Anglican priest attending the Haverhill Agricultural Society Gala announced that “He was quite sure that there was nothing which tended to demoralize the poor more than imperfect cottage accommodation... and if they could increase that accommodation he thought they would do a great good.”²¹ In 1865, a letter expressed, “There is here a population of 3000 persons, and these, composed for the most part of large families, are densely packed together in houses of a small and miserable description. There is no system of drainage adequate to the requirements of this people.”²² The only reference to cottage inspections is in 1877, when an inspector said that after visiting various parts of Haverhill, “he had seen enough to say that the cottage property in Haverhill was in a disgraceful state.”²³ The article also established that rents were higher in Haverhill than in Sudbury and additionally argued that some newly built cottages were a disgrace, built without backdoors and situated on badly drained land. Thus housing appears to be another issue in which there was a lack of responsibility by Risbridge’s local government.

Although Samford was sometimes cited as having above-average cottages that were “well and healthily situated,”²⁴ specific cases of wretched homes were cited by the cottage inspector in 1879 after the examination of 1,560 houses.²⁵ Although this is an indication of poor conditions, it also signifies an advantage for the district because such inspections were at least taking place. Another specific report stated that half of the district’s houses were

²¹ The Essex Standard, and General Advertiser for the Eastern Counties (Colchester, England), Wednesday, November 09, 1864; Issue 1769.

²² The Bury and Norwich Post, and Suffolk Herald (Bury Saint Edmunds, England), Tuesday, September 12, 1865; pg. 7; Issue 4342.

²³ The Bury and Norwich Post, and Suffolk Herald (Bury Saint Edmunds, England), Tuesday, August 28, 1877; pg. 6; Issue 4966.

²⁴ The Ipswich Journal (Ipswich, England), Saturday, May 8, 1880; Issue 7842.

²⁵ The Ipswich Journal (Ipswich, England), Saturday, June 14, 1879; Issue 7744.

inspected in 1882.²⁶ Throughout the decades analysed, Samford had numerous detailed reports about specific cottages and the illnesses that were contracted there, followed up by measures that were taken to improve the situation. Similar reports seem never to have occurred in Risbridge. Sudbury was also reported to have had house-to-house visitations. In 1855, a priest speaking on behalf of the Sudbury Agricultural Society, argued that building better cottages was a priority and, although he was aware that cottage building was not a profitable business, he believed that the improved dwellings would lead to “improved feelings and habits of the labouring population - giving them not only more airy dwellings, but (what was of far greater importance) removing them from the immoral influence of the towns.”²⁷ Similarly, a report from 1888 referenced the exact number of cottages unfit for habitation, the number of those which were being mended, the number of which were vacated, and the state of the occupiers who lived in them.²⁸

Housing, therefore, seems to provide further evidence that effective local government was improving conditions in Samford and Sudbury, but was missing in Risbridge. Samford and Sudbury had more numerous and more detailed accounts in the newspapers about the condition of cottages and the measures taken to improve housing. Interestingly, the reports draw explicit links to the health advantages of improving housing conditions, in a way that reports about sanitation do not.

Local Government

Thus local government emerges as seeming to have been an important factor in determining the variation in effectiveness of social improvement. The British government encouraged localized government systems throughout the Victorian Era. Nearly a dozen government acts

²⁶ The Ipswich Journal (Ipswich, England), Saturday, March 24, 1883; Issue 8079.

²⁷ The Bury and Norwich Post, and Suffolk Herald (Bury Saint Edmunds, England), Wednesday, November 07, 1855; Issue 3828.

²⁸ The Bury and Norwich Post, and Suffolk Standard (Bury Saint Edmunds, England), Tuesday, February 21, 1888; pg. 7; Issue 5500.

were initiated between 1850 and 1910 to define and refine the role of local government. Although these were mainly directed towards urban areas, rural areas were also reformed. The main authority in rural areas, from 1834, was the Board of Guardians, originally established to administer the Poor Law. The 1848 Public Health Act allowed, but did not require, the creation of Local Boards of Health with powers over sewers, nuisances and roads: their functions could in practice be exercised by Boards of Guardians in rural areas. From 1872 every place had to have a public health authority, and in rural areas these were the new Rural Sanitary Authorities which became Rural District Councils in 1894 (Hasluck 1936; Lipman 1949).

Place-centred reading allows us to follow the activities of these bodies from the perspective of the editors. Overt party or denominational bias is not detectable in the reporting, which mainly purports to bring factual reports of what was said at meetings. What is detectable, however, is a clear impression of the different structures and effectiveness of local government. In Risbridge, local government was dominated by the local Board of Guardians and there was no Local Board of Health. The Public Health Act of 1875 declared that all districts must hire a Sanitary Inspector, but even then these new local inspectors seemed ineffective as they lacked the ability to distribute finances. Close reading of the articles returned reveals that the systems for allocating finance within Risbridge were frequently described as hierarchical and even corrupt with apparent difficulties in bringing issues to the attention of the district-level authorities. There also seem to have been problems concerning a lack of communication between the Board of Guardians and other authorities such as the Highway Commission and the clergy. Clergy were cited as having concerns with the condition of the parishes or the district, but did not play active roles as agents of change. Records of clerical meetings are rare, but a report from a party honouring a fifty-year resident priest of Risbridge cited that, while he was graciously expressing his gratitude for the

celebration, he made it a point to add, “I may, however, mention that we have three important matters in hand - the restoration of the church, the cemetery, and the drainage and improvement of the Town. To have these well done we must consult together.”²⁹

It has already been noted in the discussion of Risbridge’s sanitary inspectors that many desired better local governance: “...showing the abominable state of things existing in Haverhill, he entirely agreed with him that no place required a Local Board more.”³⁰ There were also numerous other published instances where other aspects of the government of Risbridge were bluntly lamented. In 1865, a letter to the editor blamed the authorities for failures: “In the name of humanity why this supineness and neglect? Where are the Magistrates and men of influence - are they dormant? Where are the parish authorities? Where are the Guardians of the Poor, those parochial economists? Are not their hearts reached through heavy rates entailed by sickness, to say nothing of the duties of that office which the name implies? Where the philanthropists - the social well-being of the people nothing to them?”³¹

Samford and Sudbury made use of the 1848 public health powers, having Local Boards, whereas in Risbridge all was regulated by the Board of Guardians. In addition, the Church was influential, with many newspaper articles recording meetings of the clergy, laymen and parishioners. A particular article from 1887 clarified that the role of the church, although concerned with the health and policy of the district, was not a political body. Instead, Sudbury’s clerical task was to instil religious beliefs in the agricultural labourers who “shut

²⁹ The Bury and Norwich Post, and Suffolk Herald (Bury Saint Edmunds, England), Tuesday, December 05, 1865; pg. 8; Issue 4354

³⁰ The Bury and Norwich Post, and Suffolk Herald (Bury Saint Edmunds, England), Tuesday, August 28, 1877; pg. 6; Issue 4966.

³¹ The Bury and Norwich Post, and Suffolk Herald (Bury Saint Edmunds, England), Tuesday, September 12, 1865; pg. 7; Issue 4342.

out from books, [were] ignorant of everything beyond the parish in which he lived.”³² The job of the clergy was to make religion relevant to the parishioners through education. “The Church is not merely an institution for teaching people how to attain heaven after death, but a great society of which the people themselves are members, whose object is to promote their well-being in this world, as well as that which to come.” In both Samford and Sudbury, with slightly differing emphases, people stressed the role of the Church of England in social welfare as well as in matters of private religion.

Citizenship and Labour

Searching for keywords relating to local government (table 3) revealed interesting differences between the three districts and also suggested more keywords relevant to the citizens who made up these civil bodies. The men who served in local government and the clergy were frequently mentioned in published reports and meeting minutes. All three districts had references to concerns about the progress of their citizens’ financial, moral and social well-being and some direct quotations from the newspapers leave strong impressions about the quality of labour, enterprise and civic responsibility in each district. Speakers reported in the press often felt that social welfare in a district was a matter of community sentiment as well as of local government quality.

In Risbridge there was a perception that people abstained from public involvement. A letter to the editor from 1865 denounced the general lack of initiative of men in Haverhill stating, “Unfortunately for Haverhill, men shrink from public duty, whether through covetousness or

³² The Bury and Norwich Post, and Suffolk Standard (Bury Saint Edmunds, England), Tuesday, October 18, 1887; pg. 7; Issue 5482.

fear, through the cost of such neglect is tenfold in sickness, widowhood, and orphanage...To keep pace with the times the people of Haverhill must be up and doing.”³³

Meetings of Samford’s Rural Deanery were reported frequently in the newspapers. The Rural Deanery and the clergy’s conversations were recorded and often they had to do with the morality of the people. The clergy presumed there was a causal relationship between morality, productiveness, and health. One report from 1898 quoted the Rural Dean’s topic of “Morals and Sanitation.” “He contended that it was essential that efforts should be made to raise the standard of morality amongst the [higher] classes, before it would be possible to contend against immorality amongst those lower down the social ladder.”³⁴ On a number of occasions, the labourers of Sudbury were praised for their unparalleled work ethic. For example, an article from 1859 said, “in no county in any part of the kingdom were there more good and honest labourers who took pride and pleasure in their work than the deserving labourers of that district.”³⁵ The Sudbury Agricultural Society often celebrated its labourers who had exceptional “enthusiasm and energy,” and were “proud and honest.”³⁶

Overall, these articles give the notion that Risbridge had more problems with civic motivation and morals than its neighbours. Labourers and the public in Samford and Sudbury were applauded more frequently, both for their industry and for their contributions to local government systems.

Conclusions

Risbridge had a different pattern of infant mortality rate decline from Samford and Sudbury. Its infant mortality rate was lower than theirs in the 1850s, but barely declined during the

³³ The Bury and Norwich Post, and Suffolk Herald (Bury Saint Edmunds, England), Tuesday, September 12, 1865; pg. 7; Issue 4342.

³⁴ The Ipswich Journal (Ipswich, England), Friday, April 1, 1898; Issue 9647.

³⁵ The Bury and Norwich Post, and Suffolk Herald (Bury Saint Edmunds, England), Tuesday, October 18, 1859; Issue 4034.

³⁶ The Ipswich Journal (Ipswich, England), Saturday, October 31, 1868; Issue 6757.

remainder of the century, and displayed a significantly worse response to the hot dry summers of the 1890s. This suggests that Risbridge's environmental or social conditions were not improving. From the quantitative evidence, the three districts had comparable population densities, demographic changes, poor relief and agricultural patterns. They also had similar proportions of mortality from different diseases. No evidence could be found from the quantitative historical records to explain either why infant mortality declined generally across these three districts, or why Risbridge's declined less.

Place-centred reading, where a detailed list of place-names and an evolving range of keywords were used to identify relevant articles from a very large corpus of newspapers, allowed us to shed some light on the different patterns of mortality decline. The first stage of the analysis, focussing on sanitation, revealed that all districts felt they had major sanitary problems. Risbridge's problems were rarely addressed in a timely manner, while Samford and Sudbury's were. Samford and Sudbury clearly had thorough inspectors who took detailed records of their parishes. Risbridge's reports were general and did not inform the public about imminent improvements. Local government was also analysed, revealing even more obvious differences. Risbridge never made use of powers provided in the 1848 Public Health Act, only acquiring a public health authority when compelled to by the 1872 Act. Instead it operated under a Board of Guardians, which was unable to competently fulfil all of the public duties with which it was charged. Samford had an energetic parish-level clergy which took a strong interest in sanitary and other public matters. Both Sudbury and Samford operated the local boards of health, separate from the Board of Guardians, which the 1848 legislation permitted, and assigned specific roles to different sub-committees. Beyond this, there also seems to have been a perception that parishioners within Risbridge were lazy while Samford and Sudbury's working classes received attention for having energetic labourers and an active clergy that looked after the districts' morals.

Could Samford and Sudbury's more impressive improvements in infant mortality be attributed to their strong local government and civic pride? Could Risbridge's less-than-impressive health improvements correlate with its less-than-impressive government and civic initiative? As with many types of quantitative analysis, inferring direct causality from place-centred reading is difficult however the newspaper evidence is certainly suggestive, and receives further support both from contemporary observers such as Sir Arthur Newsholme and modern researchers such as Szreter (2002) who stress the importance of local government for reducing mortality. The two districts that contemporaries regarded as having effective local government saw significant improvements in infant mortality while the other district lagged behind. While this is not conclusive evidence for the importance of local government, it is certainly suggestive. Further research could be done either in local, qualitative, terms by examining what sanitary measures were taken in Samford and Sudbury but not in Risbridge, or in quantitative terms using a larger or national sample of RDs and looking for correlation between (for example) use of the optional 1848-72 public health powers and improvements in mortality in that period.

By leading us quickly to the relevant local textual sources place-centred reading has led to the hypothesis about local government being an important factor in improving infant mortality rates in these RDs. There are, however, weaknesses with this approach. As with any source, there are silences and biases in the data. Slowly rising living standards are a possible cause of infant mortality decline, but do not feature in newspaper reports and thus remain invisible from both the quantitative and qualitative evidence. Similarly, little could be discovered about topics such as employment change, post-natal care of infants, and mothering practices such as breast-feeding, despite relevant searches being undertaken. Whether this is because little of interest occurred within these subjects or whether newspapers simply did not report on them is unclear. Third, while the newspapers do provide interesting evidence on why

Risbridge failed to match Samford and Sudbury's levels of mortality improvement, they say nothing that helps explain why Risbridge was so much healthier at the start of the period. Fourth, some authors have criticised the use of large corpora that have been captured using Optical Character Recognition (OCR) technology which is inevitably error prone (Hitchcock 2013). Clearly, OCR errors may have resulted in us missing some articles that should have been found but it seems unlikely that this would seriously bias or undermine our conclusions. In fact, we would argue the opposite: that the use of large corpora and careful definition of search-terms makes historians far less selective in choosing what to close read and makes the selections more justifiable.

Although this is a pilot study into the utility of place-centred reading, it does suggest that local government practices did have a significant effect on infant mortality through improving, or failing to improve, sanitation and housing conditions. This finding is beyond the scope of quantitative sources and means that, at a minimum, place-centred reading adds new types of information to our knowledge of the past. To take this further we could widen the search area to cover a more places. Two obvious questions present themselves: do other parts of the rural south-east exhibit similar patterns, and do we find different issues in urban areas or areas of the rural north and west that did not experience the same rates of mortality decline found in the south-east. We could also use additional corpora such as the *House of Commons Parliamentary Papers*, the *Histpop* collection, or the *Medical Officer of Health* reports. It is important to note, however, that place-centred reading should not be used in isolation. It can be used to complement studies that use corpus linguistics or traditional quantitative GIS approaches. Both of these allow us to identify and describe broad trends, and the exceptions to them, within large textual and statistical sources respectively. Place-centred reading allows us to move towards a more detailed understanding of what happened within places that corpus linguistics and statistics reveal as interesting and worthy of further study.

In turn, the broader approaches can help us contextualise the findings from place-centred reading.

- Adolphs, S. 2006. *Introducing Electronic Text Analysis*. London: Routledge.
- Baker, P. 2006. *Using Corpora in Discourse Analysis*. London: Continuum.
- Caruana-Galizia, P. and J. Marti-Henneberg. 2013. European regional railways and real income, 1870-1910: a preliminary report. *Scandinavian Economic History Review* 61: 167-196
- Cooper D. and I. N. Gregory. 2011. Mapping the English Lake District: A literary GIS. *Transactions of the Institute of British Geographers* 36: 89-108.
- Cohen, D., and R. Rosenzweig. 2006. *Digital History: A guide to gathering, preserving, and presenting the past on the web*. Philadelphia: University of Pennsylvania Press.
- DeBats, D. A. 2011. Political consequences of spatial organization: Contrasting patterns in two nineteenth-century small cities. *Social Science History* 35: 505-541.
- Gregory, I. N. 2008. Different places, different stories: Infant mortality decline in England & Wales, 1851-1911. *Annals of the Association of American Geographers* 98: 773-794.
- Gregory, I. N., and Ell, P. S. 2007. *Historical GIS: Technologies, methodologies and scholarship*. Cambridge: Cambridge University Press.
- Gregory, I. N. and A. Hardie. 2011. Visual GISTing: Bringing together corpus linguistics and Geographical Information Systems. *Literary and Linguistic Computing* 26: 297-314.
- Gregory, I. N., et al. 2002. The Great Britain Historical GIS: From maps to changing human geography. *Cartographic Journal* 39: 37-49.
- Gregory, I. N., et al. 2013. *Troubled Geographies: A spatial history of religion and society in Ireland*. Bloomington: Indiana University Press.

- Hasluck, E. L. 1936. *Local Government in England*. Cambridge: Cambridge University Press.
- Higgs, E. 2004. *Life, Death and Statistics: civil registration, censuses and the work of the General Register Office, 1836-1952*. Hatfield: Local Population Studies.
- Hitchcock, T. 2013. Confronting the digital, or how academic history writing lost the plot. *Cultural and Social History* 10: 9-23.
- Jockers, M. L. 2013. *Macroanalysis: Digital Methods and Literary History*. Urbana: University of Illinois Press.
- Knowles, A. K. 2008. GIS and history. In *Placing history: how maps, spatial data and GIS are changing historical scholarship*, edited by A. K. Knowles, 1-26. Redlands, CA: ESRI Press.
- Knowles, A. K., and R. G. Healey. 2006. Geography, timing, and technology: A GIS-based analysis of Pennsylvania's iron industry, 1825-1875. *Journal of Economic History* 66: 608-634.
- Lee, C. 1991. Regional inequalities in infant mortality in Britain 1861-1971- Patterns and hypotheses. *Population Studies* 45: 55-65.
- Lipman, V. D. 1949. *Local Government Areas 1834-1945*. Oxford: Basil Blackwell.
- McEnery, A. M., and A. Hardie. 2012. *Corpus Linguistics: Method, theory and practice*. Cambridge: Cambridge University Press.
- McKeown, T. 1976. *The Modern Rise of Population*. New York: Academic.
- McKeown, T. and R. G. Record. 1962. Reasons for the decline of mortality in England and Wales during the nineteenth century. *Population Studies* 16: 94-122
- Moretti, F. 2005. *Graphs, Maps, Trees: Abstract models for literary history*. London: Verso.

- Moretti, F. 2013. *Distant Reading*. London: Verso.
- Nicholson, R. 2012. Counting culture; or, how to read Victorian Newspapers from a distance. *Journal of Victorian Culture* 17: 238-246.
- Schwartz, R. M. 2010. Rail transport, agrarian crisis, and the restructuring of agriculture: France and Great Britain confront globalization, 1860-1900. *Social Science History* 34: 229-255.
- Short, B. 2000. Rural demography, 1850-1914. In *Agrarian History of England and Wales Volume 7*, edited by E. J. T. Collins, 1232-1396. Cambridge: Cambridge University Press.
- Sneddon, S. 2006. A double penalty? Infant mortality in the Lincolnshire Fens, 1870-1900. In *Infant Mortality: A continuing social problem*, edited by E. Garrett, C. Galley, N. Shelton and R. Woods, 79-98. Aldershot: Ashgate.
- Szeter, S. 1988. The importance of social intervention in Britain's mortality decline c. 1850-1914: A reinterpretation of the role of public health. *Social History of Medicine* 1: 1-38.
- Szeter, S. 2002. Rethinking McKeown: The relationship between public health and social change. *American Journal of Public Health* 92: 722-725.
- Williams, N. and C. Galley. 1995. Urban-rural differentials in infant mortality in Victorian England. *Population studies* 49, 401-420.
- Woods, R. and N. Shelton. 1997. *An Atlas of Victorian Mortality*. Liverpool: Liverpool University Press.
- Woods, R., P. Watterson, and J. Woodward. 1988. The causes of rapid infant mortality decline in England and Wales 1861-1921. Part I. *Population Studies* 42: 343-366.
- Woods, R., P. Watterson, and J. Woodward. 1989. The causes of rapid infant mortality decline in England and Wales 1861-1921. Part II. *Population Studies* 43: 113-132.

Woods, R. 2000. *The demography of Victorian England and Wales*. Cambridge: Cambridge University Press

Yuan, M. 2010. Mapping text. In *The Spatial Humanities: GIS and the future of humanities scholarship*, edited by D. J. Bodenhamer, J. Corrigan, and T. M. Harris, 109-123. Bloomington: Indiana University Press

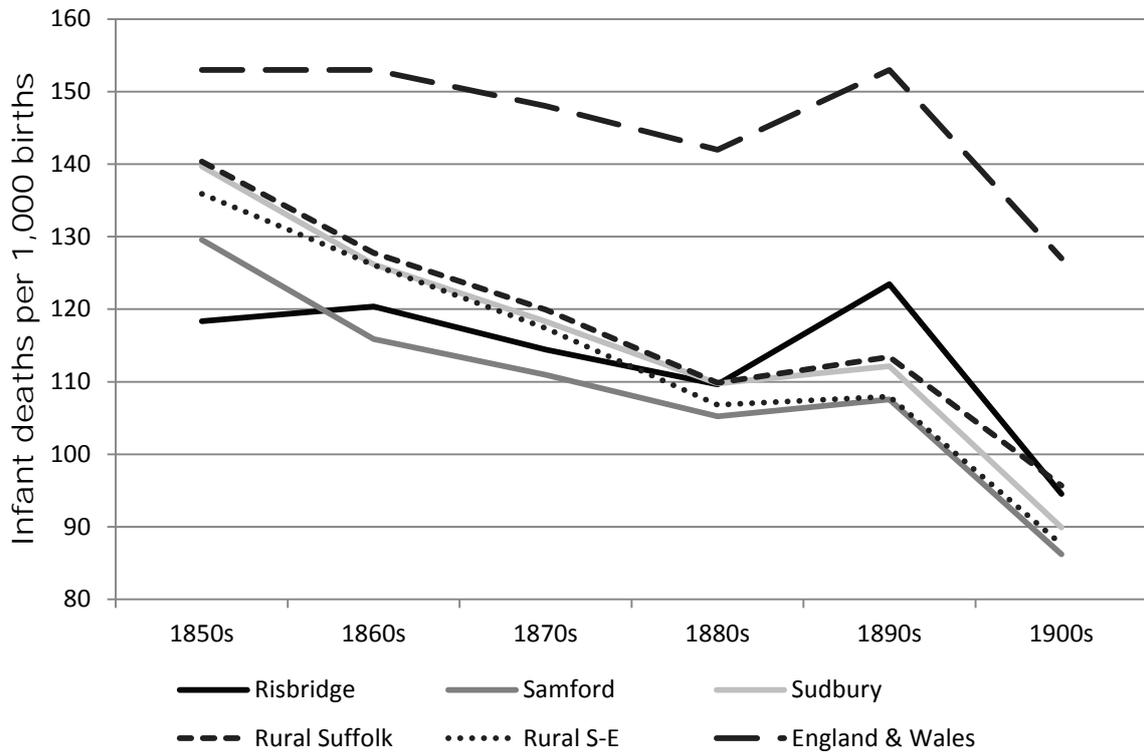
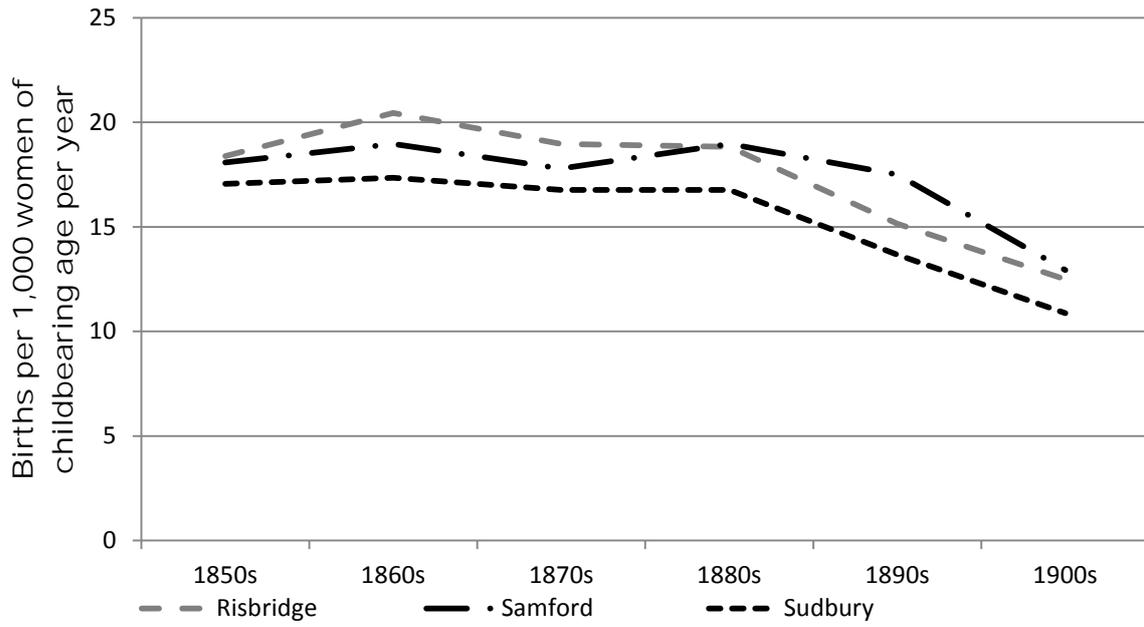


Figure 1: Decadal infant mortality rates in the three districts of Suffolk and how they compare to more aggregate trends. “Rural Suffolk” refers to all of Suffolk except for the RD of Ipswich. Rural S-E refers to rural districts in the south-east of England. These are defined as being within 150km of central London and having a population density in the three lowest classes of eight nested means.³⁷ Source: Decennial Supplements to the Registrar-General’s Annual Report.

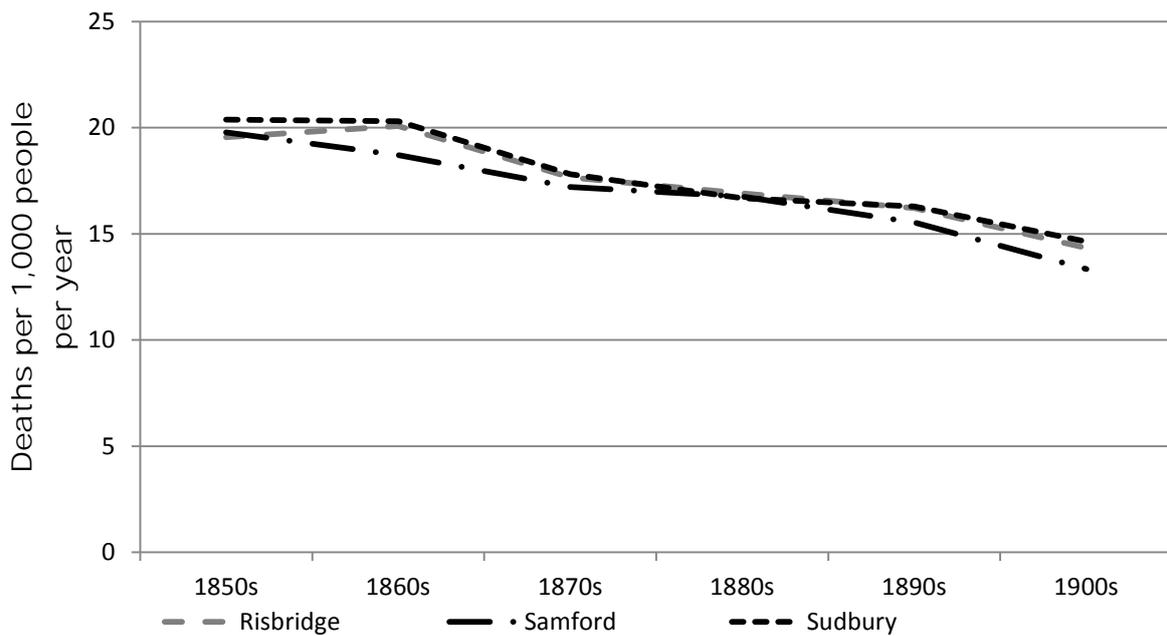
³⁷ Eight nested means are created by first separating observations above the mean from those below it giving two classes. Each class is then divided using its mean to give four, and this is repeated again to give eight (Gregory 2008).



Figure 2: Location of the three registration districts used for the study



a. Birth rates



b. Crude death rates

Figure 3: Demographic change in the three districts showing (a) birth rates (births per 1,000 women of child bearing age) and (b) crude death rates (deaths per 1,000 people).

Source: As for figure 1

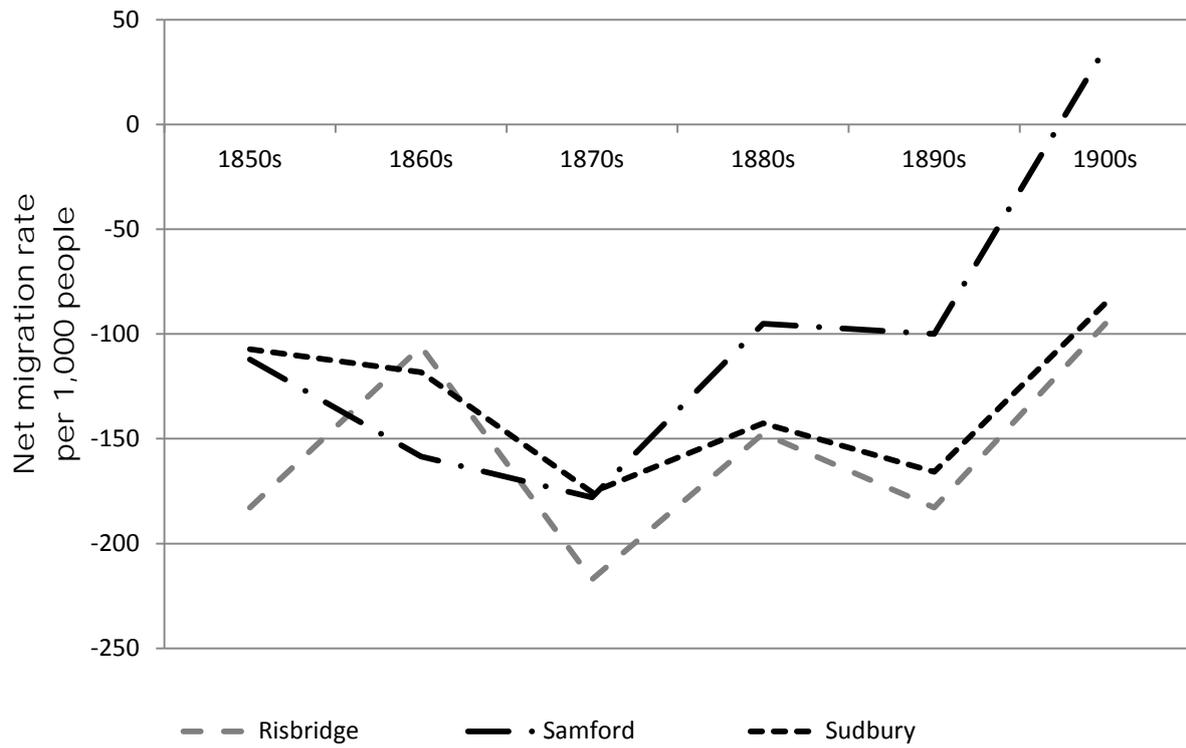


Figure 4: Net migration rates in the three districts. Source: Calculated from the Census and the Decennial Supplements to the Registrar-General's Annual Report.

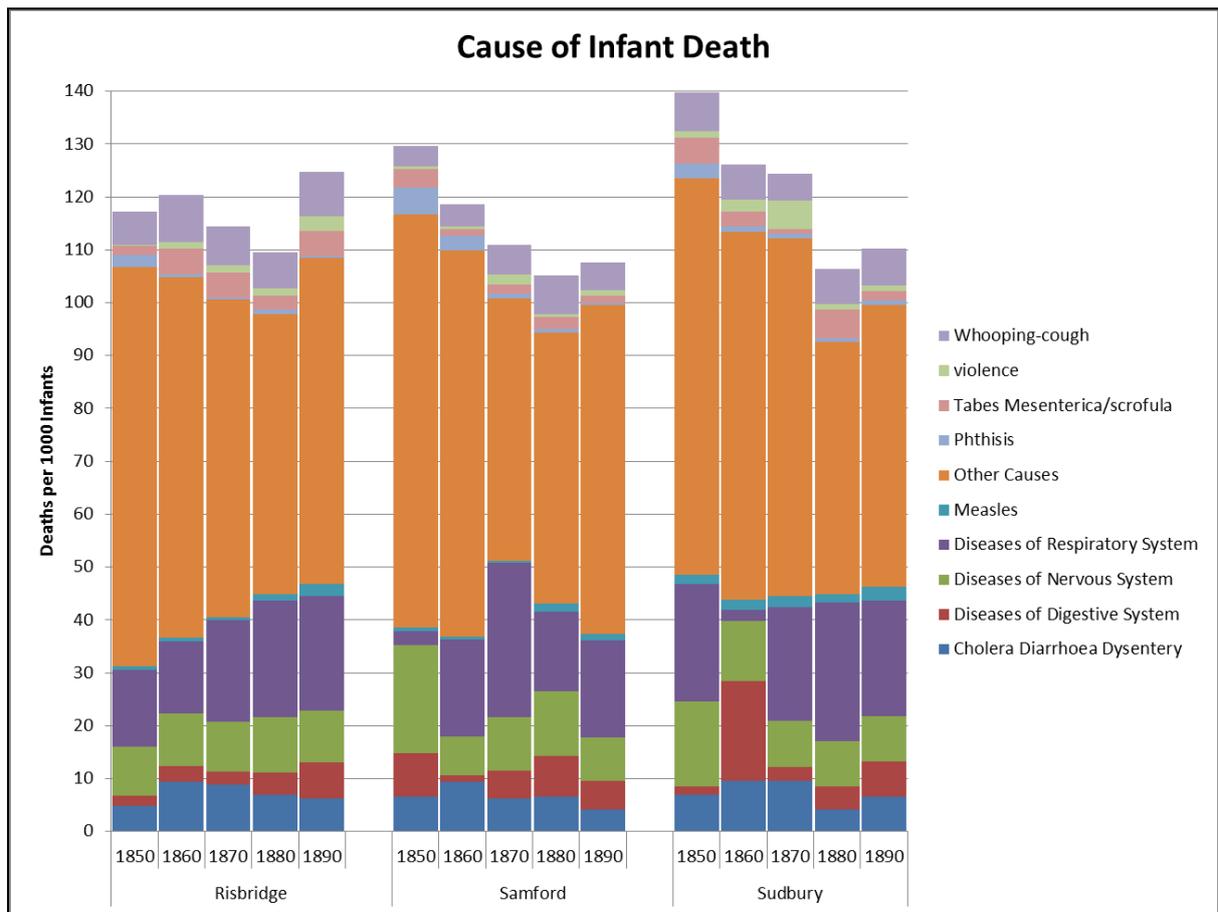


Figure 5 Changing cause of death in the three districts, 1850s-1890s. The top nine causes are shown with the remainder being grouped under 'other causes'. Source: as for figure 1

		n	Min	Lower Quartile	Median	Upper Quartile	Max
Samford	1851	28	0.08	0.17	0.24	0.33	0.49
	1881	19	0.12	0.16	0.20	0.31	0.53
Risbridge	1851	27	0.04	0.23	0.27	0.31	0.99
	1881	30	0.00	0.19	0.23	0.30	1.73
Sudbury	1851	41	0.13	0.21	0.27	0.35	4.78
	1881	43	0.03	0.19	0.24	0.30	5.35

Table 1: Parish-level population densities for the three districts from the censuses of 1851 and 1881. ‘n’: number of parishes (this changes over time due to boundary changes). The table shows the population density of the least and most densely inhabited parish, the median parish and the parish at the lower and upper quartile of the ranked distribution. Densities are in persons per acre. Source: Census reports

			% of total area of crops under:		% of total livestock animals:	
		Ratio of livestock to acres of crops	Wheat	Barley	Sheep	Pigs
1870	Risbridge	2.56	34.6	27.3	67.9	14.6
	Samford	2.78	32.1	27.0	70.9	12.2
	Sudbury	2.95	33.2	28.4	64.9	13.6
1911	Risbridge	1.59	22.2	31.4	73.6	14.2
	Samford	1.41	23.2	24.6	63.4	18.2
	Sudbury	1.71	18.7	28.2	71.4	13.3

Table 2: Comparison of the three districts' agriculture in 1870 and 1911. The two most prevalent types of crop and livestock are listed. The 'ratio of livestock to acres of crops' is calculated as the total number of animals listed divided by the total area of land under crops. It provides some indication of the relative importance of crops and livestock.

Subject	Search-terms
Sanitary conditions	Sewage, sewerage, nuisance(s), ditch(es), drain(s), foul, pit, cesspit(s), cesspool(s), stench, manure, pollut[ion/ing]
Sanitary authorities and inspections	Inspector(s), inspection, sanitary inspector(s), inspector(s) of nuisances, sanitation committee(s), authorit[y/ies], Board of Guardians, surveyor(s), landlord(s), responsibility[y/ies], sanitation board, Rural Sanitary Authorit[y/ies]
Housing	cottage(s), farmhouse(s), yard, roof ,floor, seep(ing), crowd(ed), structure, build(ing), construction, home(s), visit(ation), inspect(ion)
Local Government	Local Government Board, Chancellor, Board of Guardians, boundar[y/ies], divided parishes, boundary act, rural district, west Suffolk, legislation, Parliament, commissioners, committee, chair(s), parochial, deanery, church
Citizenship and labour	citizen(s), labourer(s), labour, employ(ment), employees, dut[y/ies], moral(s/ity), ethic(al/s), pride, improve(ment), civil, civilian, parishioner(s)

Table 3: A selection of the search-terms used to explore different themes. Round brackets indicate a letter or letters added the end of the word in addition to the word itself, square brackets indicate that one of the following letter sequences was added to the end of the word. Thus searches under sanitary conditions included ‘cesspool’, ‘cesspools’, ‘pollution’ and ‘polluting’.