SANITARY INVESTMENT AND THE DECLINE OF URBAN MORTALITY IN ENGLAND AND WALES, 1817-1914*

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Abstract

Previous authors have drawn attention to the role played by loan-financed public works in reducing mortality in England and Wales during the latter part of the nineteenth century. However, these arguments are largely based on the analysis of a limited set of loans and tend to focus on the period after 1870. This article considers a wider range of loans over a longer period. Although it tends to reinforce earlier arguments about the overall chronology of sanitary investment, it provides a much fuller account of the history of loan-financed sanitary expenditure than has hitherto been available. It also suggests that the new data may provide a much better foundation for examining the relationship between urban sanitary reform and the decline of mortality during this period.

Keywords: Sanitation; public health; mortality; water supply; urbanisation; England and Wales.

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One of the main influences on the pattern of mortality throughout the nineteenth century was the proportion of the population living in towns. In 1801, approximately 35 per cent of the population of England and Wales lived in towns containing more than 2500 inhabitants but this figure rose to just over 79 per cent on the eve of the First World War (Bennett 2012). However, although it was generally accepted that urban areas were less healthy than rural areas, aggregate mortality rates began to fall from the mid-nineteenth century onwards. The earliest improvements occurred among those aged 5-14 years and the greatest improvements, in percentage terms, affected those aged 5-24 years and 25-34 years (Floud, Wachter and Gregory 1990: 313-4; Wohl 1983: 329). Average life expectancy at birth rose from approximately 41 years at the start of the 1840s to approximately 53 years shortly before the outbreak of the First World War (Office for National Statistics 2015: 5).

McKeown (1976) identified five different ways of explaining these developments. These included (1) an autonomous decline in the virulence of infectious diseases; (2) an improvement in human beings' natural resistance to infection; (3) medical advances; (4) improvements in sanitation; and (5) improvements in diet and the standard of living. He argued that only the last two factors made substantial contributions to the decline of mortality during the second half of the nineteenth century and that, of these, the largest single contribution was associated with improvements in diet and living standards.

These arguments have been criticised on several occasions, including by Simon Szreter (1988). Szreter claimed that McKeown had exaggerated the role played by improvements in diet and the standard of living and that more weight should be attached to improvements in sanitation and public health provision. He based his arguments on a number of factors, including an analysis of the loans contracted by

local authorities for public works. He argued that the value of these loans increased substantially after 1870, and that this was also the period in which mortality rates really began to change.

This paper aims to build on Szreter's analysis by providing a much fuller account of changes in the value of the loans contracted by local authorities and other organisations throughout the period from 1817 to 1914. We then use some of these data to explore the relationship between municipal loans and the decline of mortality from a selected range of diseases in a small number of areas which the historical demographer, Robert Woods, identified as having made substantial and disproportionate contributions to mortality decline during the last four decades of the nineteenth century. Our aim is not to provide an exhaustive analysis of the causes of mortality decline across the country as a whole but to demonstrate the potential for these data to be incorporated in more detailed investigations in the future.

The remaining sections of the paper are organised as follows. We begin by providing a more detailed account of the debate over the causes of mortality change and the role played by loans to urban sanitary authorities in particular, before moving on to consider the loans themselves. Section 2 examines the loans which were provided by the Public Works Loans Board, and sections 3-4 consider the loans which were sanctioned by a range of central government health departments, including the General Boards of Health, the Privy Council, and the Local Government Board. We then provide a detailed account of the loans which were approved by Parliament under the heading of Local Acts before presenting a consolidated account of the total value of the loans provided for health-related purposes between 1817 and 1914. The final section then explores the relationship

between these loans and the decline of mortality from sanitation-related diseases in Woods' high-performing and high-contributing areas'.

1. The history of urban mortality change

As we have already noted, the second half of the nineteenth century witnessed significant improvements in Britain's mortality. These improvements were largely associated with declines in the relative importance of infectious diseases, including deaths from respiratory tuberculosis; diarrhoea and typhus; and scarlet fever and diphtheria (Woods 2000: 350-1). McKeown and his coauthors sought to understand these changes by distinguishing between 'airborne' and 'water- and food-borne' diseases (see e.g. McKeown and Brown 1955; McKeown and Record 1962; McKeown, Brown and Record 1972; McKeown 1976; Szreter 1988; Guha 1994; Szreter 1994). They also argued that trends in 'airborne' mortality were largely dependent on changes in the standard of nutrition and that improvements in sanitation were only likely to influence overall mortality if they led to reductions in mortality from water- or food-borne diseases.[1] In his most famous work, *The modern rise of population*, McKeown (1976: 54, 162-3) argued that approximately 44 per cent of the decline in mortality between 1848/54 and 1901 was associated with 'airborne' diseases and that 33 per cent was associated with water- and food-borne diseases, whilst only 23 per cent was associated with other causes. This led him to conclude that, even though improvements in sanitation played an important part in the process of mortality decline, this was ultimately secondary to the role played by improvements in diet and nutrition

[1] McKeown's formulation of the problem may help to explain the comparative neglect of the role played by airborne pollution in studies of nineteenth-century mortality. This topic has been highlighted recently by Beach and Hanlon (2017).

In his critique of these arguments, Szreter claimed that McKeown had underestimated the relative importance of the decline in water- and food-borne mortality and this had led him to underestimate the importance of the sanitary measures which helped to control them. He also argued that McKeown had failed to pay sufficient attention to the extent to which rapid and uncontrolled urbanisation had led to a deterioration in the disease environment. He concluded that there was a 'sound *prima facie* case that the decline in mortality, which began to be noticeable in the aggregate mortality statistics in the 1870s, was due more to the eventual success of the politically- and ideologically-negotiated movement for public health reform than to any other positively-identifiable factor' (Szreter 1988: 26; see also Szreter 1997).

The importance of municipal loans to the cause of public health reform was first noted by the Chief Medical Officer to the Local Government Board, Sir John Simon. In his *Annual Report* for 1874, Simon argued that 'the constantly-increasing annual amount of the loans contracted by local authorities for permanent improvement' demonstrated 'that progress … is being made in a considerable number' of English jurisdictions (Parliamentary Papers 1875: 11). The same point was also highlighted by Simon Szreter (1988: 25):

> A.S. Wohl has noted that Sir John Simon himself always regarded the extent of public works loans contracted by local authorities from the central government funds as the true barometer of social progress and real local activity. This was the system whereby local authorities were enabled to borrow long-term loans of cash at lower than market rates for provision of sanitary facilities and services. Between 1858 and 1870, only £11 million in such loans were requested, whereas between 1871 and 1897, £84 million was borrowed, £65 million of it by urban authorities.

The original distinction between urban and rural sanitary authorities was based on the Public Health Acts of 1872 (35 & 36 Vict. C. 79) and 1875 (38 & 39 Vict. C. 55). These Acts identified three types of municipal authority as urban sanitary authorities: boroughs created by the Municipal Corporations Act of 1835;

Improvement Act Districts created by Local Improvement Acts; and Boards of Health created under the Public Health and Local Government Acts. Areas which lay outside the boundaries of these areas were identified as rural sanitary districts, and were based on existing rural Poor Law Unions (Parliamentary Papers 1873: xxxix-xli; *ibid.* 1876: xli-ii). In 1880, the Local Government Board listed 963 urban sanitary authorities, of which 225 were described as municipal boroughs, 49 as Improvement Act Districts, and 689 as Local Government Districts. The size of these districts (based on 1871 census returns) ranged from the Liverpool suburb of Childwall (197) to the city itself (493,405). However, the vast majority (937 authorities) had populations of 1000 or more, and more than half (491 authorities) had populations of 5,000 or more. The mean population size was 11,934. The total population of these districts was 11,492,195 (Parliamentary Papers 1880). This was equal to 50.6% of the total population of England and Wales in 1871 or 59.1% of the population outside the London Metropolitan Area (Parliamentary Papers 1871: iii, 7).

The titles and definitions of the different types of sanitary authority were refined further by the Local Government Acts of 1888 and 1894. The first Act redefined 61 of the largest municipal boroughs, each with a population of more than 50,000, as county boroughs (51 & 52 Vict. C. 41, section 31 and Schedule 3). The second Act concerned the powers and duties of the large number of Local Government Act districts and Boards of Health. These were reconstituted as either urban or rural district councils and given additional responsibilities for the management of local highways (56 & 57 Vict. C. 73, section 25). This meant that, from 1894 onwards, all sanitary authorities were either county boroughs (with the same powers and duties as a county council), boroughs, or urban or rural district councils.

Although the initial designation of urban sanitary authorities was based on administrative criteria, it was normally assumed that these areas also possessed identifiably 'urban' characteristics. In its *Annual Report* for 1873/4, the Local Government Board explained that it had sanctioned the creation of 26 new urban sanitary authorities, but only after establishing 'that [each of] the proposed district[s] was really urban in its character, or rapidly becoming so, and that among the inhabitants there were the requisite elements for the constitution of an efficient local governing body' (Parliamentary Papers 1874a: xliii). Between 1872 and 1888, the Board sanctioned the creation of 210 new urban sanitary authorities and extended the boundaries of 72 authorities, whilst 32 authorities were either dissolved or diminished.[2] By November 1893, the total number of urban sanitary authorities had passed one thousand, with a total population (excluding London) of approximately 16.8 million (Parliamentary Papers 1893a: 3-14). This was equivalent to approximately 67 per cent of the population of England and Wales outside London, or 58 per cent of the population overall.[3]

As Table 1 demonstrates, the loans described by Szreter were originally authorised under a number of different headings. In addition to the loans associated directly with urban and rural sanitary authorities, they also included loans sanctioned under different Housing Acts, and a range of 'other' loans, excluding loans to the Joint Boards of United Districts. The combined value of the loans made under each of these headings corresponds to all of Wohl's summary figures with the exception of the figure for 1882, which probably reflects a small transcription error. Their total value, over the period from 1871 to 1897, was

[2] These figures have been obtained from the Appendices to the *Annual Reports of the Local Government Board* for 1872/3-1888/9.

[3] Shaw (1895: 14) reported that the total population of the urban sanitary districts of England and Wales was approximately 20.8 million, but this figure included London (see also Parliamentary Papers 1891: viii).

£84.5 million. However, Szreter underestimated the value of the loans for *urban* authorities over this period. The Chief Medical Officer only published summary figures for this category from 1873 onwards but the combined value of these loans between 1873 and 1897 was £75 million. This excludes the value of loans associated with housing as well as loans to joint districts.

Table 1. Value of loans sanctioned by Local Government Board, 1871-1897 (£)

	Urban	Rural	Housing Acts	Other	Joint Boards of United Districts	Totals				Printed	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
						(1)+(2)	(6)+(3)	(7)+(4)	(8)+(5)	ARLGB	Wohl
1871			0							267,562	267,562
1872			0							602,271	602,271
1873	959,203	20,950	0	0	0	980,153	980,153	980,153	980,153	980,153	980,153
1874	1,338,181	119,315	0	0	0	1,457,496	1,457,496	1,457,496	1,457,496	1,457,496	1,457,496
1875	1,835,797	137,308	0	0	2,500	1,973,105	1,973,105	1,973,105	1,973,105	1,973,105	1,973,105
1876	2,063,708	193,615	500,000	0	16,500	2,257,323	2,757,323	2,757,323	2,757,323	2,757,323	2,757,323
1877	3,080,144	196,792	1,103,433	0	115,000	3,276,936	4,380,369	4,380,369	4,380,369	4,380,369	4,380,369
1878	2,789,677	238,180	70,000	0	75,000	3,027,857	3,097,857	3,097,857	3,147,857	3,097,857	3,097,857
1879	2,870,601	269,885	167,546	0	260,059	3,140,486	3,308,032	3,308,032	3,568,091	3,308,032	3,308,032
1880	2,688,742	194,157	50,000	0	50,635	2,882,899	2,932,899	2,932,899	2,983,534	2,932,899	2,932,899
1881	2,264,622	249,194	12,374	0	195,000	2,513,816	2,526,190	2,526,190	2,721,190	2,526,190	2,526,190
1882	2,225,781	178,907	100,000	-19,400	66,350	2,404,688	2,504,688	2,485,288	2,551,638	2,485,288	2,458,288
1883	2,162,869	95,704	80,000	0	27,250	2,258,573	2,338,573	2,338,573	2,365,823	2,338,573	2,338,573
1884	2,324,258	135,988	0	0	108,220	2,460,246	2,460,246	2,460,246	2,568,466	2,460,246	2,460,246
1885	2,488,180	187,929	160,000	0	29,890	2,676,109	2,836,109	2,836,109	2,865,999	2,836,109	2,836,109
1886	2,158,187	160,407	0	0	28,880	2,318,594	2,318,594	2,318,594	2,347,474	2,318,594	2,318,594
1887	1,822,449	180,577	100,000	0	171,235	2,003,026	2,103,026	2,103,026	2,274,261	2,103,026	2,103,026
1888	2,083,287	201,560	0	5,050	31,500	2,284,847	2,284,847	2,289,897	2,321,397	2,289,897	2,289,897
1889	2,657,636	154,531	0	8,100	2,520	2,812,167	2,812,167	2,820,267	2,822,787	2,820,267	2,820,267
1890	2,560,028	185,464	4,000	77,804	88,475	2,745,492	2,749,492	2,827,296	2,915,771	2,827,296	2,827,296
1891	2,983,800	174,862	117,375	5,000	65,250	3,158,662	3,276,037	3,281,037	3,346,287	3,281,037	3,281,037
1892	3,868,177	261,040	211,360	0	76,310	4,129,217	4,340,577	4,340,577	4,416,887	4,340,577	4,340,577
1893	6,755,211	407,855	103,450	0	41,030	7,163,066	7,266,516	7,266,516	7,307,546	7,266,516	7,266,516
1894	4,829,803	468,139	24,389	0	84,692	5,297,942	5,322,331	5,322,331	5,407,023	5,322,331	5,322,331
1895	5,680,345	310,399	138,273	0	225,200	5,990,744	6,129,017	6,129,017	6,354,217	6,129,017	6,129,017
1896	5,196,267	298,986	50,150	0	76,452	5,495,253	5,545,403	5,545,403	5,621,855	5,545,403	5,545,403
1897	5,304,373	437,007	145,182	0	185,696	5,741,380	5,886,562	5,886,562	6,072,258	5,886,562	5,886,562
Total 1871-97										84,533,996	84,506,996
Total 1873-97	74,991,326	5,458,751	3,137,532	76,554	2,016,644	80,450,077	83,587,609	83,664,163	85,680,807	83,664,163	83,637,163
Total 1878-97	65,714,293	4,790,771	1,534,099	76,554	1,882,644	70,505,064	72,039,163	72,115,717	73,998,361	72,115,717	72,088,717

Sources: Cols. 1-10: Annual Reports of the Local Government Board, 1871-1897; Col. 11: Wohl 1983: 162.

A brief analysis of these figures demonstrates the importance of Szreter's argument but also its limitations. One of the limitations is that the loans outlined in Table 1 covered a wide variety of different items, many of which may not necessarily have been directly concerned with health or sanitary issues. Second, even though the figures provide a rough indication of the main trends in aggregate expenditure, they say little about geographical variation. Finally, although they indicate the value of the loans sanctioned by the Local Government Board, they say nothing about the other ways in which local authorities secured approval for borrowing. As the Local Government Board itself observed in 1877:

> The list of loans sanctioned by us includes the whole of the amounts which have been authorised to be borrowed under the Public Health Act, 1875, during the past year; but it must not be taken as by any means showing the full extent to which the sanitary authorities … have been empowered to contract loans during the year (Parliamentary Papers 1877: lvii).

The question of municipal loans has also been pursued by Frances Bell and Robert Millward (1998; see also Millward and Bell 1998) and, more recently, by Jonathan Chapman. Chapman (2018: 1) argued that infrastructure investment, as measured by the outstanding loan stock, explained up to 60 per cent of the decline in urban mortality between 1861 and 1900. However, although he was able to control for a wide range of variables, these results also raise further questions. One concern is that he was unable to distinguish different items of expenditure (and this might also explain why the 'impact' of investment appeared to decline after 1890).[4] A second is that his analysis was not based on the loans themselves but on the amount of money which had yet to be repaid, including both interest and capital. The disadvantage is that these statistics do not necessarily reveal either the value of

[4] In a previous version of the same paper, Chapman (2017: 1) argued that infrastructure investment explained 'up to 60% of the reduction in total urban mortality between 1861 and 1900 and 88% between 1861 and 1890'.

the original loan or the date on which it was contracted (see also Millward and Bell 1998: 272).

This paper brings together information from a variety of sources to provide a new account of the loans contracted by local authorities and (in some instances) other organisations from 1817 onwards. These sources enable us to identify the year in which a particular loan was either approved or sanctioned and, in many cases, the purposes for which it was sought. We begin our analysis in 1817 because this year marked the establishment of the Public Works Loan Board and enables us to develop a more long-term picture of loan-related activity over most of the nineteenth century. We have focused on urban areas because these were the areas with which the vast majority of the loans (by value) were associated and it is on these areas that most of the historical debate has focused. We have excluded London because it was not included in the lists of areas whose loans were sanctioned by the Local Government Board after 1870.

2. Loans for public works

The Public Works Loan Board (PWLB) was established in 1817. As Michael Flinn (1961: 85) showed, it was not the first attempt to use public loans to finance public works. Earlier initiatives had been designed either 'to assist in increasing liquidity' during periods of particular crisis or 'to promote specific public works which were unlikely or had failed to attract significant capital in the open market'. Flinn argued that the Act broke new ground by adding a third aim – 'the desire to raise the level of employment' – but there is little evidence to suggest that this was ever a major factor in the Board's decision-making and Flinn (1961: 90, note 1) himself argued that it played an even smaller role after the passage of the Poor Law Amendment Act in 1834.

Ian Webster (2015) has recently identified four major 'phases' in the history of the PWLB between 1817 and 1876. During the first phase, the Board acted primarily as a 'lender of last resort', with a particular focus on loans for mining and turnpike trusts. During the second phase, which ran from 1834 to 1848, more than half of all the money loaned was used to finance the construction of workhouses. It was this factor which prompted Flinn (1961: 90, note 1) to observe that public money was 'no longer … being used for the creation of employment but … for the incarceration of those for whom employment could not be found'. The third phase, which was initiated by the passage of the Public Health Act of 1848, saw a slow increase in loans for sewerage and water supply. The value of these loans accelerated following the establishment of the Metropolitan Board of Works in 1858 and the passage of the Public Works (Manufacturing Districts) Acts of 1863 and 1864, although their total value was never very high. The final phase followed the introduction of the Education Acts of 1870 and 1872 and the establishment of School Boards.[5]

As Webster (2015: 3) explained, the PWLB did not publish Annual Reports before 1876. He therefore obtained information about specific types of loan from the National Archives. However, the Board did publish details of earlier loans in three Parliamentary Papers (Parliamentary Papers 1851; 1858; 1872). These papers provide a more detailed picture of the development of public works loans between 1817 and 1870.

The 1872 paper listed the loans made in England, Scotland and Wales under 29 separate headings. It also included a further nine headings listing loans made in

[5] Our own analysis of the statistics which the Public Works Loan Board published in its Annual Reports suggests that loans towards the costs of schools in England, Scotland and Wales accounted for just over half (50.8%) of the total value of the loans provided by the Board between 1875/6 and 1879/80. Loans under the Public Health Acts accounted for 30.01 per cent of the total value of the Board's loans over the same period. See *Annual Reports of the Public Works Loan Board*, 1876-80.

Ireland. A full list of these headings can be found in Table 2. We have focused on those loans which had the closest connection with activities likely to have a direct bearing on public health. These included loans for waterworks, the improvement of towns and cities, baths and washhouses, local boards and boards of health, sewage utilisation, loans made under the Public Works (Manufacturing Districts) Acts, and loans for 'labouring classes' dwellings'. The Board made 739 loans under these headings during this period, with a total value of £3,761,523. However, the aggregate value of the loans made in the earliest years was very low and, even though it increased substantially during the 1860s, it never exceeded £600,000 in any one year (see Figure 1).

3. Centrally-sanctioned loans before 1871

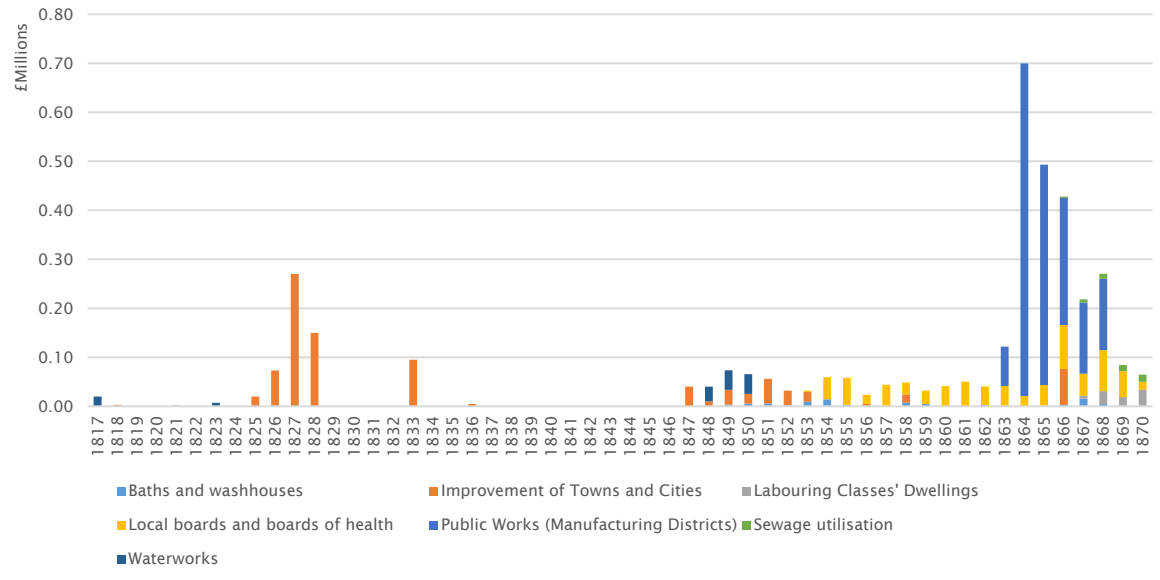
Although the Board played an increasingly important role, the major sources of funds for public works were insurance companies, banks and private investors (Webster 2015: 135). However, in order to secure these loans, local authorities had to seek approval from a central government department or establish their right to borrow by promoting a Local Parliamentary Act. There were also two Public Acts granting approval for capital spending in London, and in the three counties of Lancashire, Cheshire and Derbyshire (Webster 2015: 128). A number of local authorities also secured borrowing rights as a result of Provisional Orders. Our own research has identified 59 examples of local authorities obtaining borrowing rights for sanitary and related purposes via this route between 1859 and 1875 (see section 4 below).

Table 2. Headings used to describe loans made by the Public Works Loan Board, 1817-70

Great Britain			**Ireland**
Canals, rivers and drainage	Churches and parochial chapels	Sewage utilisation	Canals and harbours
Harbours and docks	Relief of parishes	Police Commissioners (Scotland)	Railways
Bridges and ferries	Colleges	South Wales Turnpike Trusts	Issues to the Railway Companies (Ireland) Temporary Advances Act, 1866
Waterworks	Law courts, gaols and other public buildings	Loans under the Harbours and Passing Tolls, &c. Act	Advances to Belfast and Co. Down Railway Company
Thames Tunnel	Baths and washhouses	Loans under the Public Works (Manufacturing Districts) Acts, 1863-4	Burial boards, Ireland
Fisheries	Lunatic asylums	Cattle Diseases Prevention Act	Waterworks
Roads	Workhouses	Labouring classes' dwellings	Sewage utilisation
Railways	Emigration	Issues to the Portpatrick Railway Company	Law courts and other public works
Improvement of towns and cities	Burial boards	Issues to the Lord Provost, Magistrates and council of the City of Edinburgh	Poor Law Union workhouses
Compensation for damages during riots	Local boards and local boards of health		

Source: Parliamentary Papers 1872.

Figure 1. Loans for public works, 1817-70 (current prices)



Source: Parliamentary Papers 1872.

As we have already noted, local authorities were able to borrow money from both private and public sources. In 1874, the House of Commons published a return showing the value of the outstanding loans made to 373 urban sanitary districts which were not also town councils. The average population of these areas, at the time of the 1871 census, was 7486, and they ranged in size from 432, in Little Crosby, to 55,652, in Croydon.[6] Approximately one-sixth (16.48 per cent) of the value of the original loans had been provided by the Public Works Loan Board but most of the money came from private individuals (38.34 per cent) or commercial insurance companies (38.9 per cent) (Table 3). We have been unable to locate a comparable source of information on loans to those sanitary districts which were town councils but it seems reasonable to suppose that commercial organisations would have accounted for a somewhat larger proportion of the loans contracted by these authorities.[7]

Table 3. Sources of outstanding loans to urban sanitary authorities (excluding towns councils acting as urban sanitary authorities) in 1874.

Lender	Amount (£)	Amount (%)
Assurance and insurance companies	2,306,539.49	38.90
Benefit societies	190,193.00	3.21
Private lenders	2,273,306.38	38.34
Public Works Loan Board	976,945.00	16.48
Other	182,741.49	3.08
Total	5,929,725.35	100.00

Source: Parliamentary Papers 1874b: 69-182.

[6] This excludes 26 areas whose populations have not been ascertained.

[7] Within the group of authorities whose loans were recorded in 1874, commercial insurance or assurance organisations were responsible for just under half (49.97 per cent) the total value of the loans made to authorities whose populations exceeded 20,000 at the time of the 1871 census.

The decision to apply for a loan was shaped by a number of factors, of which the most obvious was a growing willingness to acknowledge the importance of public health problems and to take action against them (see e.g. Wohl 1983: 166-79). The growth of a 'sanitary conscience' was facilitated by increases in rateable values and the profits generated through municipal trading (Waller 1983: 257; Millward and Sheard 1995: 507-9; Millward and Bell 1998: 269-71). Attitudes to municipal loans were also shaped by changes in the cost of borrowing. As Sidney Homer and Richard Sylla (2005: 196) have argued, 'the last decades of the nineteenth century could be called the golden age of easy money', and this period also saw significant increases in municipal borrowing for a range of purposes.

As Michael Flinn (1965) noted, the first half of the nineteenth century saw a growing appreciation of the importance of public health issues spurred, in part, by the outbreak of the first great cholera epidemic in the autumn of 1831. This provoked a flurry of investigations and reports, culminating in the passage of the Public Health Act in 1848. This Act permitted the creation of local boards of health and enabled them to 'borrow and take up at interest, on the credit of the rates authorised to be made or collected under the Act, any sums of money necessary for defraying any such costs, charges and expenses' (Public General Acts 1848: sections xii, cvii; see also sections cviii-cxiii).[8] This power was reinforced by the Local Government Act of 1858, and specific powers were also granted under the Public Works Act of 1863, the Public Works (Manufacturing Districts) Act of 1864, the Sewage Utilisation Act of 1865 and the Sanitary Act of 1866 (Public General Acts 1858: sections 3-5; 1863: section 3; 1864: section 4; 1866: section 3).

[8] The Public Health Act was also important for the provisions it did not contain. According to Hanley (2016: 75), 'the 1848 Public Health Act did not impose on local boards of health a duty to ensure that each district should, as near as may be, bear its own expenses'. This gave boards the opportunity to share the costs of drainage improvements over a wider area.

The period between 1848 and 1875 saw a number of changes in the identity of the central government departments charged with sanctioning these loans. The first such department was the General Board of Health, which was established under section iv of the Public Health Act of 1848 (Public General Acts 1848: section iv). This body was replaced by a second General Board of Health in 1854, and by the Medical Department of the Privy Council in 1858. This arrangement remained in force until the establishment of the Medical Department of the Local Government Board in 1871 (Harris 2004: 109-11). We have identified two sources of information regarding the value of the loans which these bodies sanctioned. In 1857, the second General Board of Health published a return showing the value of the loans obtained by local boards of health between 1848 and 1854 (Parliamentary Papers 1857). The return also recorded the date on which each board was established, but not necessarily the date on which loans were either sanctioned or obtained. We have therefore obtained our data from the unpublished papers in the UK National Archives. The data were arranged in eight alphabetically-ordered volumes covering the whole of the period from 1850 to 1871.

The volumes held by the National Archives detail the name of the local authority, the date on which each loan was sanctioned, the amount which the authority was authorised to borrow, and the purpose for which it was intended. These purposes were described in a variety of different ways but the most common categories included street improvements, water supply, sewerage and drainage. Over eighty per cent of the individual loans sanctioned by the central departments between 1850 and 1871 were associated with these functions, either individually or in combination with each other or other purposes (see Table 4).

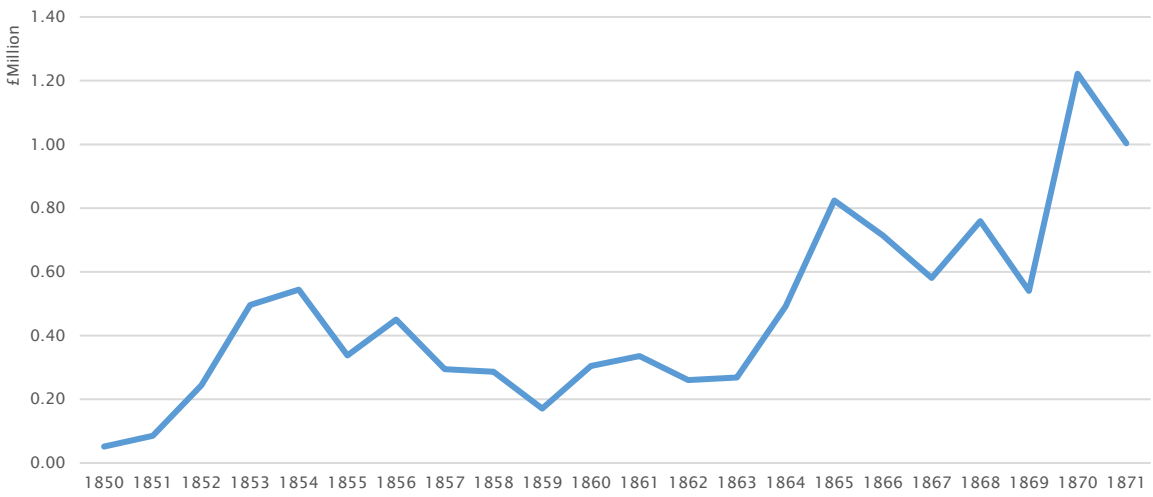
Table 4. Loans sanctioned by central government departments, 1850-71

Purpose	N	%	Purpose	N	%
Drainage	300	15.35	Street improvement and drainage	1	0.05
Drainage and other	11	0.56	Street improvement and other	16	0.82
Drainage and street improvement	19	0.97	Water supply	284	14.53
Drainage, street improvement and other	2	0.10	Water supply and drainage	113	5.78
Not stated	14	0.72	Water supply and other	8	0.41
Other	367	18.78	Water supply and sewerage	33	1.69
Sewerage	372	19.04	Water supply and street improvement	7	0.36
Sewerage and drainage	15	0.77	Water supply, drainage and other	3	0.15
Sewerage and other	6	0.31	Water supply, drainage and street improvement	3	0.15
Sewerage and street improvement	23	1.18	Water supply, sewerage and other	3	0.15
Sewerage, drainage and water supply	1	0.05	Water supply, sewerage and street improvement	5	0.26
Sewerage, street improvement and other	1	0.05	Water supply, sewerage, street improvement and other	1	0.05
Street improvement	345	17.66	Water supply, street improvement and other	1	0.05
			Total	1954	100.00

Source: TNA HLG15/1-8

It is also possible to use these data to show how the value of the loans sanctioned by central departments changed over the course of the period. As we can see from Figure 2, the total value of the *sanctioned* loans was substantially greater than the value of the loans *provided* by the Public Works Loan Board (see Table 3) over the same period. However, the overall values were still relatively low. There was an initial flurry of activity, following the establishment of the first General Board of Health, at the start of the 1850s, followed by a slow decline. This may have been related to the closure of the first General Board of Health and the removal from public office of its indefatigable Commissioner, Edwin Chadwick (Finer 1952: 453-74). However, loan values accelerated following the passage of the Public Works (Manufacturing Districts) Acts and there was a further increase just before the Local Government Board came into operation.

Figure 2. Centrally-sanctioned loans, 1850-71 (current prices)



Source: TNA HLG15/1-8.

4. Loans sanctioned by the Local Government Board

As we have already noted, the powers and duties of the Medical Department of the Privy Council were transferred to the Local Government Board in 1871 (Bellamy 1988). The new Board also acquired responsibility for the central management of the Poor Law. It therefore became the principal point of contact between central and local government in England and Wales. However, it was not directly involved in the management or administration of public education, and separate Boards were established for Ireland and Scotland in 1872 and 1894 respectively (Public General Acts 1871; 1872; 1894).

The Local Government Board published details of the sanction given to loans requested by local authorities under a variety of different headings. The largest single category of loans were those sanctioned under the general heading of the Public Health and Local and Confirmation Acts. These loans covered non-metropolitan urban and rural sanitary authorities throughout England and Wales

and accounted for the bulk of the loans whose value was reported in Table 1. However, the Board also sanctioned loans for which general approval had previously been given under Provisional Orders, as well as under a number of other Acts, including the Sewage Removal Acts, various Housing Acts, the Baths and Washhouses Acts, the Public Health (Interments) Act, the Public Libraries Act, the Allotment Acts, Electric Lighting Acts, Military Lands Act, Museums and Gymnasiums Act, Small Dwellings Acquisition Act, and Burial Acts.

The Board published details of the loans sanctioned under these measures from 1871 onwards. Our particular concern is with the loans sanctioned to urban sanitary authorities. The earliest figures covered the period from 1 August 1870 to 19 August 1871. The next set of figures covered the period from 20 August 1871 to 31 December 1871, and from 1 January 1872 to 31 December 1872. The figures for the period between 1873 and 1901 referred to calendar years. In 1912, the Board published a single set of figures covering the period from 1 January 1911 to 31 March 1912. The figures for the next two years described the loans sanctioned in the periods from 1 April 1912 and 1 April 1913 respectively. The published information included the name of the authority receiving the sanction, its county (except in 1905), the purpose or purposes for which loans were requested, their duration and their value.

The transcription and analysis of these data posed a number of challenges. The quality of the print was a little poor and some of the details are now quite hard to decipher. However, we have compared the total value of the transcribed data with the published totals and the overall differences are not very great (see Table 5). In 1905, when the Board omitted details of the counties in which different authorities were situated, it sanctioned loans requested by the urban district of Handsworth and the borough of Richmond, without indicating whether the first authority was in

Staffordshire or North Yorkshire, or whether the second authority was in North Yorkshire or Surrey. However, only six loans were made to these authorities and their total value was only £10,270, out of an annual total of more than £4.4 million. The biggest problem concerns the sheer number of terms and phrases used to describe the purposes for which loans were sought. The total number of different formulations exceeded four thousand.

We have approached the problem of categorising these items in two stages. We began by listing all the original purposes under sixteen main headings (see also Table 6). These included Cemeteries; Fire Brigade; Food; Gas, Lighting and Electricity; General; Hospitals; Housing; Leisure; Loan Repayment; Not Recorded; Refuse; Roads, Bridges, etc.; Sanitation; Streets and Street Improvements; and Water. We then reclassified the loans in each category under the headings of Hospitals; Housing; Sanitation; Water; Street Improvement; and Other. The second categorisation was designed to enable us to compare the value of the loans sanctioned by the Local Government Board to non-metropolitan urban sanitary authorities under the Public Health and Local and Confirmation Acts more directly with the health-related loans sanctioned by the General Boards of Health and the Medical Department of the Privy Council before 1871, and the loans sanctioned by the Local Government Board under other Acts after 1871. It also enabled us to compare the value of all these loans with those sanctioned under Local Acts from 1817 onwards.

Figure 3 illustrates the main changes in the value of this set of loans between 1871 and 1914. Loan values increased during the first half of the 1870s and again during the 1890s and early-1900s, before stabilising in the decade leading to the First World War. However, there were significant differences in the relative importance of the loans associated with different purposes. Hospitals made a

relatively minor contribution to these figures, with the exception of a brief period around the turn of the century. Housing was also a relatively minor factor, with the exception of the years immediately following the introduction of the Artisans' and Labourers' Dwellings Improvement Act of 1875, and loans for water accounted for less than ten per cent of all loans over the period as a whole. The most important categories were sanitation and street improvements. However, although there was an increase in the absolute value of loans associated with sanitation over the period as a whole, their relative contribution diminished from the mid-1870s onwards. This was mainly attributable to a disproportionate increase in the value of loans for 'other' purposes, including the improvement of gas supplies and the provision of electric lighting.

Table 7 illustrates the geographical distribution of the loans sanctioned under these Acts. Much of the initial growth in these loan values was driven by local authorities in the East and West Midlands (and especially Birmingham)[9] but, over the period as a whole, the lion's share of borrowing was associated with local authorities in Yorkshire, South-East England and the North West. This is still true even if we discount the value of loans associated with purposes which may have been less directly associated with public health issues.

The Local Government Board also sanctioned loans under a variety of other Acts, as noted previously. The list included a number of measures which might have been expected to have some bearing on public health, including the Sewage Removal Acts, various Housing Acts, the Baths and Washhouses Act, and the Public Health (Interments) Act. As Figure 4 demonstrates, the overall value of these loans

[9] During the period between 1875 and 1884, the Board approved plans for Birmingham to borrow £2,693,200, This figure included three loans, each worth £500,000, under the Artisans' and Labourers' Dwellings Act, in 1876 and 1877. The overall figure accounted for more than 73 per cent of the total value of all the loans sanctioned for West Midlands local authorities during this period. For a brief account of Joseph Chamberlain's role in driving Birmingham's municipal agenda, see Chandler 2007: 78-9.

was not very great but there was a significant increase in the value of housing-related loan values at the end of the nineteenth and start of the twentieth centuries.

Table 5. Comparison of calculated and published totals of loans to non-metropolitan urban sanitary authorities under the Public Health and Local and Confirmation Acts, 1871-1914

Year	Total for year in report (£)	Total for year from individual figures, as transcribed (£)	Published total - calculated total (£)	Difference as % of published figure	Year	Total for year in report (£)	Total for year from individual figures, as transcribed (£)	Published total - calculated total (£)	Difference as % of published figure	Year	Total for year in report (£)	Total for year from individual figures, as transcribed (£)	Published total - calculated total (£)	Difference as % of published figure
1871	1,462,802	1,441,888	20,914	1.43	1886	2,066,037	2,065,478	559	0.03	1900	6,304,717	6,317,865	-13,148	-0.21
1872	602,271	601,981	290	0.05	1887	1,787,674	1,775,886	11,788	0.66	1901	7,714,887	7,670,906	43,981	0.57
1873	941,207	917,090	24,117	2.56	1888	2,026,447	2,027,661	-1,214	-0.06	1902	7,383,116	7,377,871	5,245	0.07
1874	1,338,181	1,338,187	-6	0.00	1889	2,591,889	2,590,633	1,256	0.05	1903	7,067,807	7,039,635	28,173	0.40
1875	1,835,797	1,809,811	25,986	1.42	1890	2,560,028	2,567,201	-7,173	-0.28	1904	6,475,581	6,500,329	-24,748	-0.38
1876	2,563,708	2,557,248	6,460	0.25	1891	2,850,528	2,817,384	33,144	1.16	1905	4,413,402	4,413,517	-115	0.00
1877	4,182,627	4,177,481	5,146	0.12	1892	3,396,411	3,377,895	18,516	0.55	1906	4,472,424	4,462,156	10,268	0.23
1878	2,859,677	2,862,386	-2,709	-0.09	1893	5,713,173	5,669,070	44,103	0.77	1907	3,965,628	3,952,614	13,014	0.33
1879	2,870,601	2,871,191	-590	-0.02	1894	4,268,090	4,266,685	1,405	0.03	1908	4,075,977	4,065,577	10,400	0.26
1880	2,662,242	2,654,768	7,474	0.28	1895	4,961,170	4,990,232	-29,062	-0.59	1909	4,466,892	4,475,892	-9,000	-0.20
1881	2,194,885	2,230,886	-36,001	-1.64	1896	4,238,516	4,238,467	49	0.00	1910	3,701,557	3,706,976	-5,419	-0.15
1882	2,169,296	2,176,543	-7,247	-0.33	1897	4,194,957	4,187,420	7,537	0.18	1911/12	4,682,460	4,686,814	-4,354	-0.09
1883	2,108,097	2,117,831	-9,734	-0.46	1898	5,763,604	5,732,848	30,756	0.53	1912/13	4,650,604	4,651,043	-439	-0.01
1884	2,255,541	2,251,531	4,010	0.18	1899	6,184,108	6,162,455	21,653	0.35	1913/14	5,542,920	5,543,620	-700	-0.01
1885	2,448,142	2,469,264	-21,122	-0.86										

Source: See text.

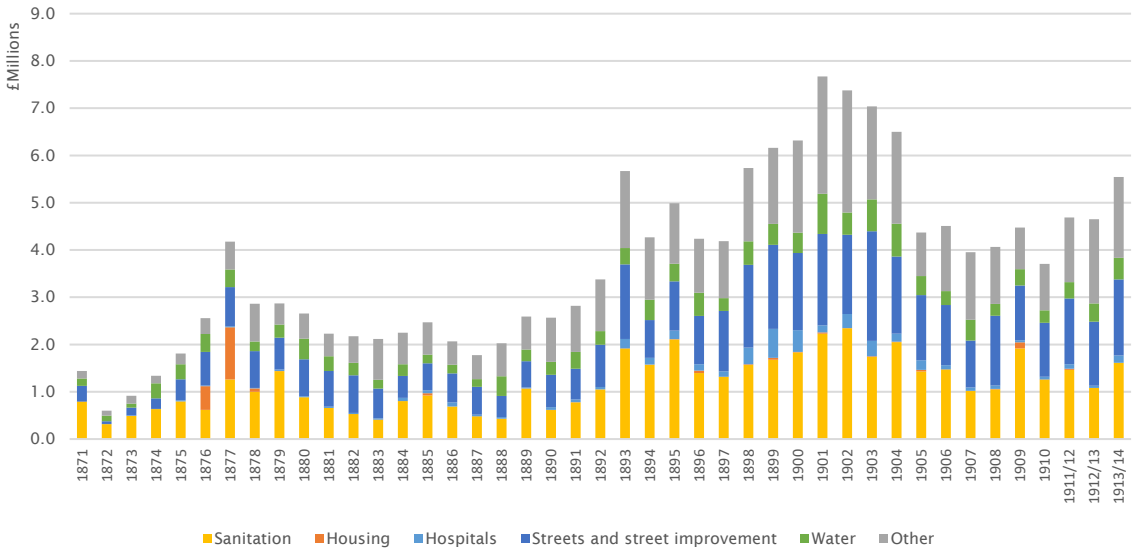
Table 6. Categorisation of loans to non-metropolitan urban sanitary authorities sanctioned by the Local Government Board under the Public Health and Local and Confirmation Acts, 1871-1914

Initial Category	Examples of relevant expenditures	Final category
Cemeteries	Burial grounds; cemeteries; mortuaries	Other
Fire brigade	Fire alarms; fire appliances; fire brigade purposes; fire station	Other
Food	Abattoirs; fish markets; slaughterhouses	Other
Gas, lighting and electricity	Gas; lamps; lighting; electricity supply undertaking	Other
General	Council offices; depots; extension and improvement of town hall; mixed purposes (e.g. 'enlarging cemetery and providing town hall, police courts, and public baths'); markets	Other
Hospitals	Hospital purposes; land for different types of hospital; ambulances	Hospitals
Housing	Houses; dwellings; cottages; purchase of insanitary buildings	Housing
Leisure	Parks; libraries; open spaces; leisure grounds	Other
Loan repayment	Repayment of loans for various purposes	Other
Not recorded	One instance of a loan whose purpose does not appear to have been printed (Manchester, 1911/12, £6280 over 12 years)	Other
Refuse	Refuse destructors; refuse tips; removal of domestic refuse; scavenging	Sanitation
Roads, bridges etc.	Construction of roads and bridges; promenades and sea walls; sea defences	Other
Sanitation	Sewage disposal; land for sewage disposal; sewerage; public conveniences; washhouses; water-closets and urinals; sanitary conveniences; surface water drainage	Sanitation
Streets and street improvement	Non-specific forms of street improvement; kerbing, channelling and asphalting; paving	Streets and street improvement
Water	Waterworks; hydrants; water supply; land for water supply	Water

Source: See text.

The majority of the loans sanctioned by the Local Government Board were associated with individual local authorities but the Board also sanctioned a smaller number of loans to the Joint Boards of United Districts. The majority of these loans were associated with the financing of hospitals, sewerage schemes and water supply but the combined value of the loans sanctioned on behalf of non-metropolitan districts never exceeded £300,000 in any one year and their value over the whole of the period from 1876 to 1914 was only just over £5,000,000 (Figure 5).

Figure 3. Loans to non-metropolitan urban sanitary authorities sanctioned by the LGB under the Public Health and Local and Confirmation Acts, 1871-1914



Sources: See text.

Table 7. Geographical distribution of loans to non-metropolitan urban sanitary authorities sanctioned by the Local Government Board under the Public Health and Local and Confirmation Acts, 1871-1914

All sanctioned loans

Year	Total (£)	East England (%)	East Midlands (%)	North East England (%)	North West England (%)	Not specified (%)	South East England (%)	SouthWest England (%)	Wales (%)	West Midlands (%)	Yorkshire & Humber (%)	Total (%)
1871-74	4,299,146	5.36	5.05	2.63	22.14	0.00	20.60	10.41	8.64	9.25	15.94	100.00
1875-79	14,278,117	3.21	10.01	3.35	18.83	0.00	15.02	4.79	4.17	23.56	17.06	100.00
1880-84	11,431,559	6.24	6.52	3.50	25.69	0.00	19.64	5.23	3.45	15.11	14.62	100.00
1885-89	10,928,922	8.01	7.66	3.50	25.39	0.00	21.38	6.80	3.21	9.27	14.78	100.00
1890-94	18,698,235	6.05	5.99	2.25	29.69	0.00	15.91	6.72	5.93	7.36	20.09	100.00
1895-99	25,311,422	8.81	6.80	2.09	26.65	0.00	19.10	6.89	6.11	7.94	15.60	100.00
1900-04	34,906,606	7.54	6.56	3.05	24.72	0.00	20.01	6.25	3.92	9.80	18.17	100.00
1905-09	21,374,507	6.91	5.52	3.87	23.36	0.05	18.60	7.33	4.66	9.77	19.93	100.00
1910-14	18,588,453	8.08	5.07	3.36	26.71	0.00	20.25	6.83	6.96	7.36	15.38	100.00
1871-1914	159,816,966	7.04	6.56	3.03	25.18	0.01	18.86	6.56	5.02	10.49	17.25	100.00

Excluding loans for 'other purposes'

Year	Total (£)	East England (%)	East Midlands (%)	North East England (%)	North West England (%)	Not specified (%)	South East England (%)	SouthWest England (%)	Wales (%)	West Midlands (%)	Yorkshire & Humber (%)	Total (%)
1871-74	2,528,858	6.99	3.99	2.68	24.32	0.00	25.81	12.10	4.52	5.60	14.00	100.00
1875-79	10,634,703	3.47	8.86	3.15	14.60	0.00	14.63	6.18	5.12	26.52	17.47	100.00
1880-84	9,164,998	6.36	8.30	3.83	31.05	0.00	18.25	5.59	4.40	9.06	13.14	100.00
1885-89	7,539,432	7.60	8.59	3.23	19.69	0.00	25.58	6.36	2.68	10.01	16.26	100.00
1890-94	11,695,597	6.69	5.89	2.52	32.25	0.00	16.78	5.96	5.26	6.90	17.76	100.00
1895-99	16,920,157	8.05	6.64	1.90	27.34	0.00	20.88	6.40	5.74	6.72	16.32	100.00
1900-04	23,970,108	8.87	8.20	2.84	23.03	0.00	20.56	8.25	3.85	6.86	17.54	100.00
1905-09	16,519,373	7.33	5.78	3.75	21.79	0.06	22.29	8.99	3.25	8.30	18.46	100.00
1910-14	16,341,436	8.04	5.39	3.13	23.61	0.00	20.06	7.00	6.00	8.24	18.53	100.00
1871-1914	115,314,661	7.37	6.99	2.97	24.17	0.01	20.11	7.23	4.59	9.41	17.14	100.00

Sources: *Annual Reports of the Local Government Board*, 1871-1914.

5. Local Act loans

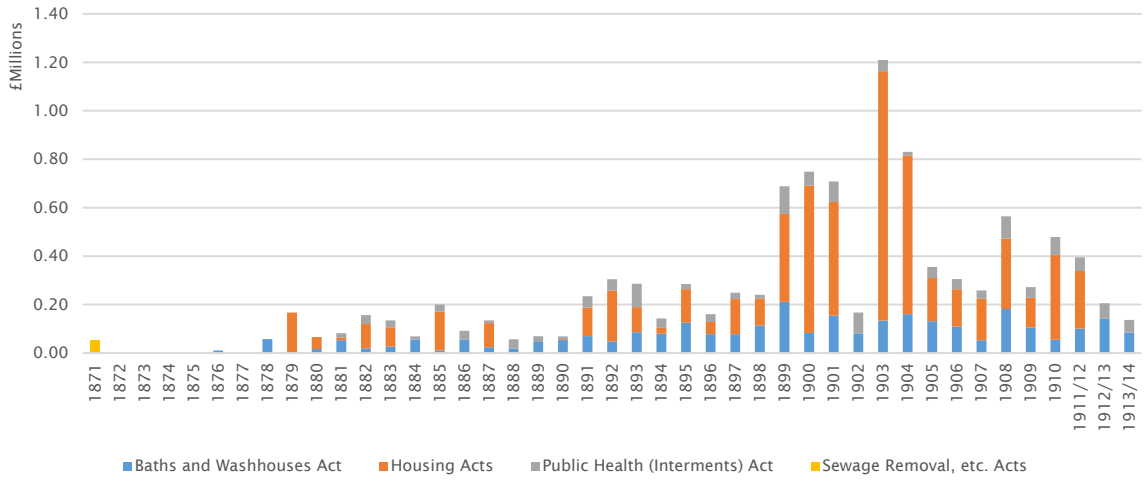
As we have already explained, local authorities had a number of ways to establish a legal basis for borrowing, without applying directly for the approval of a central government department. Many local authorities, and other bodies, also sought approval by promoting Local Acts but the history of these Acts has only recently begun to receive the attention it deserves (Morris 2017). We do not necessarily know all of the reasons why a particular local authority might choose one route over the other but Christine Bellamy (1998: 208) argued that many authorities preferred to seek Parliamentary approval because 'the balance of initiative and control over local powers lay more positively with the local authority than if the authorities had gone to the central administration' (see also Mooney 2015: 50). However, as our analysis will show, the authorities often used different routes to secure approval for loans for different purposes.

There are two major sources of information about Local Acts. From 1876 onwards, the Local Government Board published information about the value of the loans sought by individual local authorities in its *Annual Reports*. However, in order to obtain information about the value of the loans approved through Local Acts before 1876, it is necessary to consult the Acts themselves.

In 1949, the Statutory Publications Office published a detailed *Index* to the Local and Personal Acts approved by Parliament between 1801 and 1947. The Acts were listed in fifteen overlapping chapters with themes ranging from *Bridges, Ferries, Roads, Subways and Tunnels* to matters affecting the *Crown* (Statutory Publications Office 1949). We have focused on the Acts contained in the chapters dealing with *Local Government* and *Water* and, in the first category, we have paid particular attention to Acts listed under the sub-heading of 'Improvement' and matters related to this. We also examined all the Acts passed between 1817 and 1875 in the

chapter on *Drainages and Drainage Embankments*, but these Acts only accounted for a small minority of the total number of Acts and were largely concerned with the drainage of the Fens and similar areas. We looked at 1,639 separate measures in all (excluding Acts relating to Drainages and Drainage Embankments). This figure was equal to 13.5 per cent of the total number of Local and Personal Acts passed from 1817 to 1875 inclusive.[10]

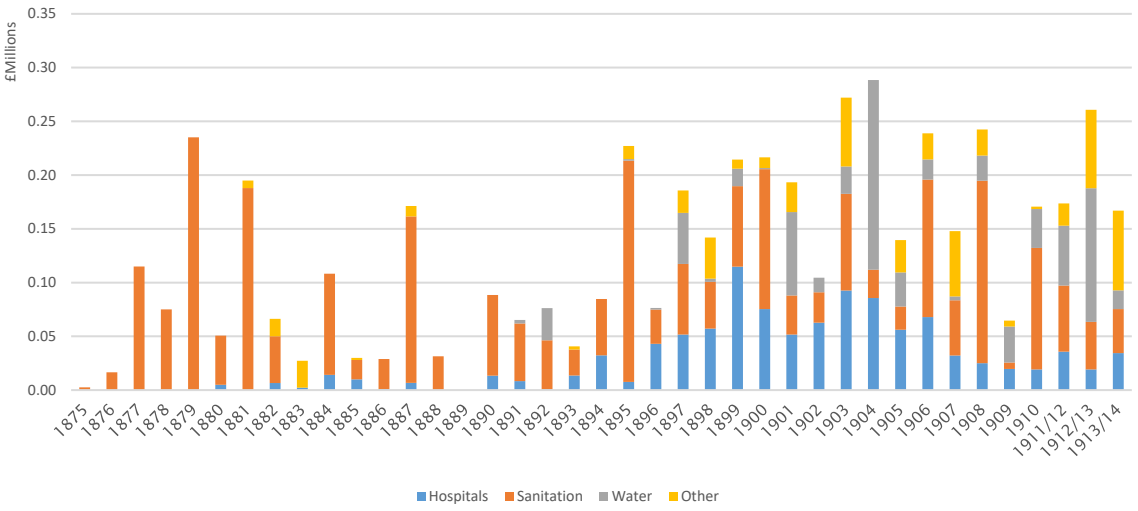
Figure 4. Other LGB-sanctioned loans (current prices)



Sources: See text.

[10] The indexes to the individual volumes for the period 1817-75 list 9,952 Local Acts and 2,151 Personal Acts, of which 1,603 were printed.

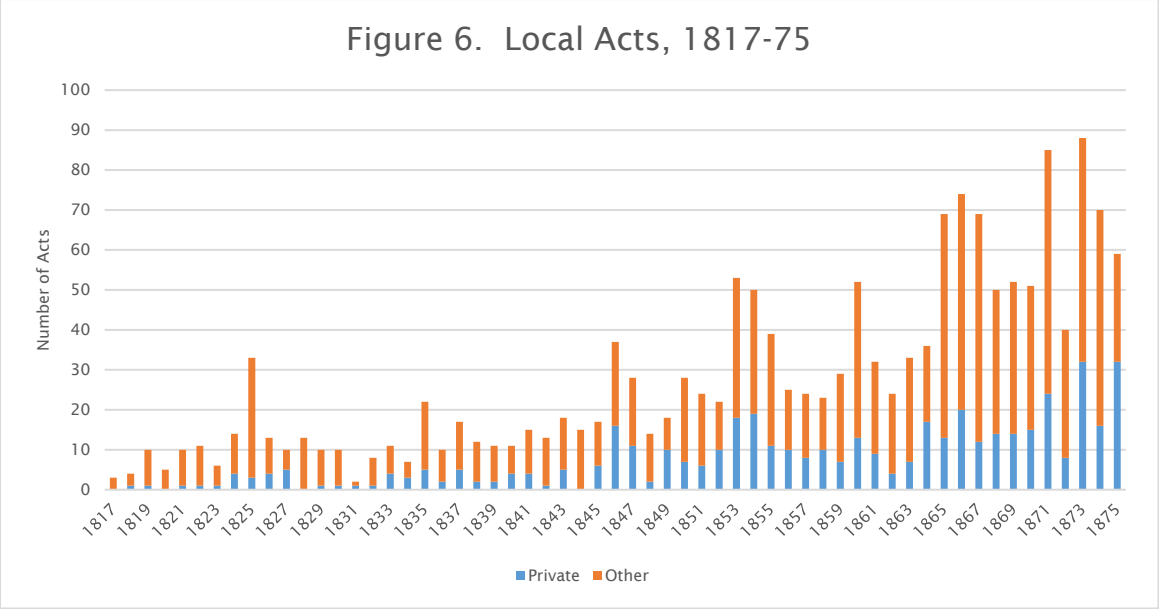
Figure 5. Loans to Joint Boards of United Districts, 1876-1914



Sources: See text.

As we have already seen, the Local Acts were used to confer borrowing powers on a wide range of both public and private bodies, including various sets of Commissioners, Boards of Health, Municipal Corporations and Town Councils, as well as private companies.[11] Our data suggest that the vast majority of privately-sponsored Acts were associated with the provision of local water supplies, and that private organisations were responsible for more than 70 per cent of such Acts over the course of our period. However, the data also show that local government organisations were responsible for the overwhelming majority of the Acts associated with 'improvement' and related issues. When the data are combined, private organisations accounted for just over 28 per cent of the Acts in our sample, and public organisations for just under 72 per cent (see also Figure 6).

[11] The complex variety of local municipal bodies is discussed by Davis (2000), and the role played by private companies in the supply of utilities by Millward (2000: 322, 326-7).



Source: See text.

The analysis of these Acts poses a number of challenges. As we can see from Table 8, not all of the Acts conferred borrowing powers and not all of the Acts which conferred borrowing powers specified their value. However, even where loan values were specified, their meaning was not always clear. In some cases, loan values were only specified in relation to the rateable value of a particular district, and in these cases no value was recorded.[12] In other cases, it was not entirely clear whether an Act was reaffirming existing powers or granting new ones but, in such cases, we erred on the side of assuming the powers were new. There were also a number of Acts which authorised an initial level of borrowing but then permitted the authority to reborrow up to the same amount once part of the original loan had been repaid. For example, the Liverpool Improvement Act of 1843 permitted the Commissioners for Paving and Sewering to borrow up to £50,000, but also 'to reborrow the same, and so *toties quoties*, but so nevertheless that there shall not be

[12] For example, in 1860 the Dorchester Board of Health obtained a Provisional Order which enabled it to borrow a sum equivalent to its annual rateable value plus £2,500 (23 & 24 Vic. C. 118).

owing … any more than £50,000 … at any one time' (6 & 7 Vic. c. lxxv: section XXX), in which case only the original sanction was recorded.[13]

Table 8. Local Acts conferring borrowing powers associated with different aspects of town improvement and/or water supply

	Borrowing powers		No borrowing powers	Total
	Specified	Not specified		
Local Acts*	901	95	379	1,375
Private Acts	1	1	3	5
Public General Acts*	27	11	221	259
Total	929	107	603	1,639

Note: * The total number of 'Local Acts' conferring borrowing powers was 996. This includes 63 Provisional Orders. The total number of 'Public General Acts' conferring borrowing powers was 38. This includes 36 Provisional Orders. Several Provisional Orders would have been included in a single Act.

Sources: See text.

One of the biggest challenges in analysing these Acts is the problem of establishing the precise purpose for which borrowing powers were requested. In a large number of cases, the intended purpose of the loans was only specified in quite general terms and other Acts sought loans for a number of different purposes. For example, in 1871 the Mayor, Aldermen and Burgesses of the City of Liverpool obtained permission to borrow up to £260,000, of which £75,000 was secured against the Parks rate and £40,000 was to be borrowed on the Water account, but the remaining funds covered a range of different purposes, including the construction and widening of streets, 'the further improvement and government' of the borough and 'other purposes' (34 & 35 Vic. c. clxxxiv). In our initial analysis, we identified a total of 40 separate headings and combinations of headings under which loans could be listed but it was clear that some of these were more likely than others to have a direct bearing on the quality of the urban

[13] In total, similar formulations were used to describe the borrowing powers granted to local authorities under Acts passed in 1843 (Liverpool), 1851 (St Helens), 1863 (Swansea), 1866 (Leicester, Middlesborough and Stourbridge) and 1867 (Brighton). The total value of the sums sanctioned when the powers were first approved was £143,000.

environment and its relationship to the population's health. We therefore constructed a second set of categories, namely 'Water', 'Health-Related' and 'Other' (Table 9).

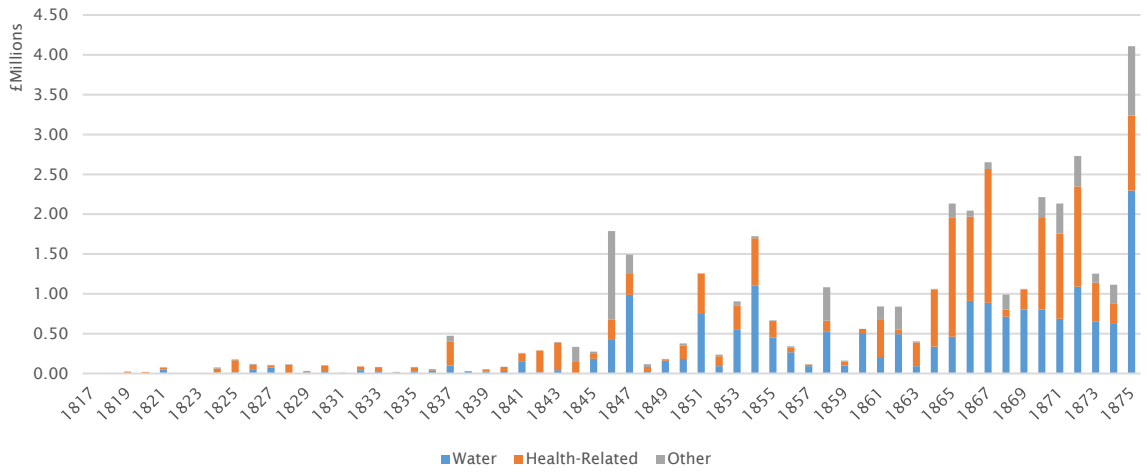
Table 9. Categorisation of loans approved under Local Acts, 1817-75

Initial categories [40]	Final categories [3]
Baths and washhouses; cemeteries; drainage; hospitals; housing; housing or infirmary; local board of health; paving; paving and sewering; sewers; sewerage and drainage; streets and street improvements; street fountains; general purposes [14]	Health-related [1]
Cattle market; churches; drainage and drainage embankments; ferries; gaols and houses of correction; gasworks; gas and lighting; gas and railway; harbour and/or pier; highways; irrigation works; land purchase; lighting; markets/markets and fairs; markets and slaughterhouses; parks and recreation; pier; police; railways; river improvements; sea walls; town hall and other public buildings; tramways; warehouses; wharves and passages [25]	Other [1]
Water [1]	Water [1]

Source: See text.

The main changes in the value of these loans are shown in Figure 7. There were limited increases in the value of the loans for both water and health-related purposes during the 1840s, followed by a sharp fall at the end of the decade. Loan values increased during the first half of the 1850s and again during the 1860s, but there were also significant differences in the composition of these figures. The initial increase in loan values during the 1850s was led by increases in the value of water-related loans, whilst loans for other health-related purposes grew more sharply during the 1860s. This reinforces John Hassan's (1985) account of the chronology of municipal expenditure on water and sanitation during this period.

Figure 7. Local Act loan values, 1817-75 (current prices)



Source: See text.

The analysis of the loans approved to non-metropolitan local authorities under Local Acts after 1875 is made considerably easier by the inclusion of these data in the Local Government Board's *Annual Reports*. In all, the reports listed 960 such Acts passed between 1876 and 1913. In 135 cases, the value of the loans was 'unascertained'. There were also 634 Acts which included a combination of 'ascertained' and 'unascertained' loans, and 191 Acts which only included ascertained loans.

The Reports also listed all the purposes for which borrowing powers were intended. A high proportion of these Acts were associated with multiple purposes, including two Acts – the Halifax Corporation Act of 1902 and the Rawtenstall Corporation Act of 1907 – which each listed fifteen different objectives. The total number of both ascertained and unascertained loans was 3,515, of which 1,290 were unascertained.

Table 10 provides more information about the distribution of these unascertained loans. The majority of these loans were associated with legal costs

and the second largest category was the purchase of gas and water undertakings. The majority of the remaining loans were associated with tramways and debt repayment. There were also 40 cases where the purpose of the unascertained loans was unspecified.

Table 10. Unascertained Local Act loans, 1876-1913

Category	Number of loans	Category	Number of loans	Category	Number of loans
Legal costs	832	Roads, bridges, etc.	26	Sewerage	4
Purchase of gas and water undertakings	135	Loans to other bodies	21	Market purchase	3
Tramways	83	Electrical works	7	Hospital	1
Debt repayment	70	Leisure (including libraries)	7	Purchase of light railway	1
Compensation payments	27	Waterworks	6	Unspecified/other	40
Land purchase	27				

Source: See text.

We can begin our analysis of the 'ascertained' loans by comparing them with the value of the loans sanctioned by the Local Government Board under the Public Health and Local and Confirmation Acts. Figure 8 shows that the most striking feature is that a much higher proportion of the loans approved under Local Acts were associated with the water supply. These loans accounted for 41 per cent of the value of the loans approved under Local Acts, but for only 9 per cent of the value of the loans to non-metropolitan urban sanitary authorities under the Public Health and Local and Confirmation Acts. However, the overall values of the sums approved via these routes were very similar. The total value of the loans to non-metropolitan urban sanitary authorities under the Public Health and Local and Confirmation Acts between 1871 and 1914 was £159,816,966; the value of the loans approved under Local Acts between 1876 and 1914 was £158,250,143.

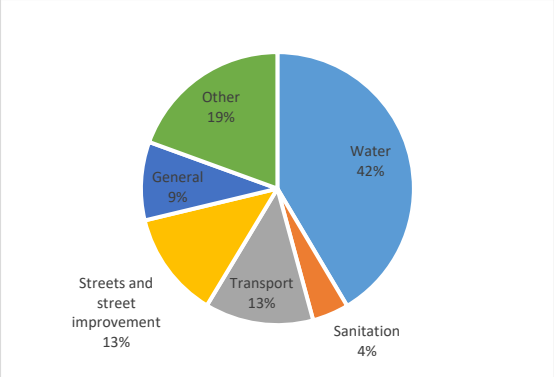


Figure 8A. Distribution of loans approved by Local Acts, 1876-1913

Source: See text.

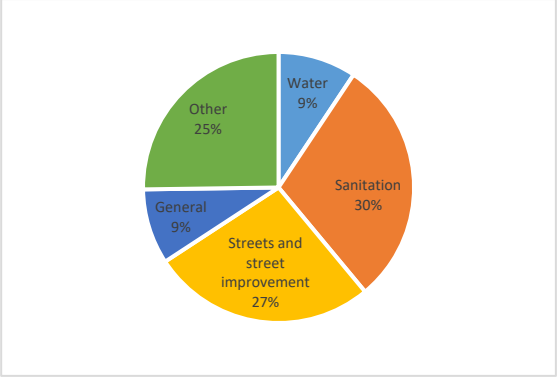
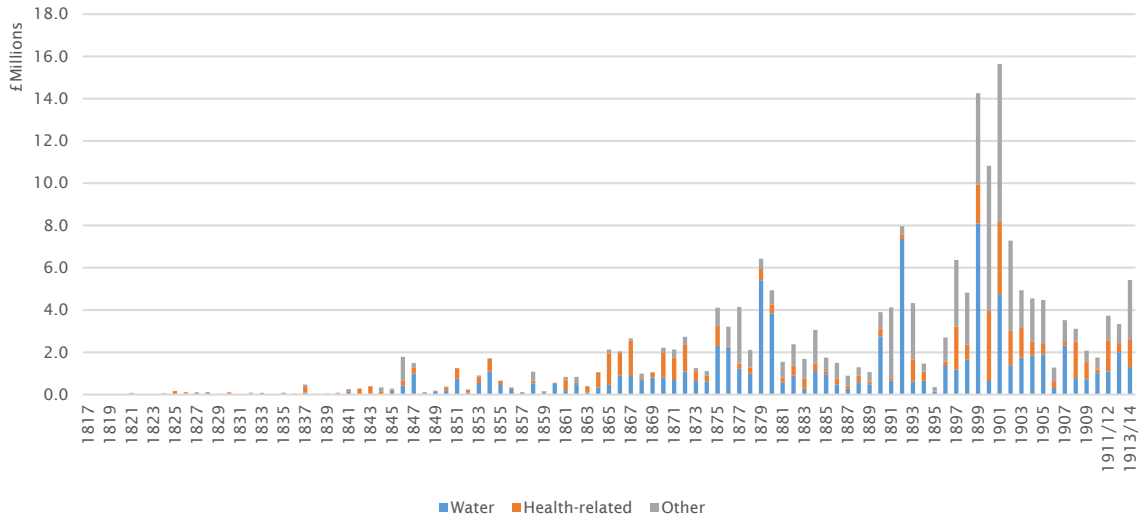


Figure 8B. Distribution of loans sanctioned to non-metropolitan urban sanitary authorities under the Public Health and Local and Confirmation Acts, 1871-1913

Source: See text.

We can also combine the information on loans approved under Local Acts after 1875 with the information obtained for the earlier period from the Local Acts themselves. In order to compare these data, we have reclassified the information in Figure 8 using the same 'major categories' as we used to examine the earlier data. This enables us to construct a continuous series of Local Act loans, distinguishing loans for water, health-related purposes and other purposes, for the whole of the period from 1817 onwards. The resulting series shows how the increase in water- and health-related loans was sustained during the second half of the 1870s and early-1880s. It then fell back during the remainder of the 1880s before increasing again at the start of the 1890s. The most dramatic increases occurred at the very end of the nineteenth century and the start of the twentieth century, although these were also fuelled by an increase in the value of loans for 'other purposes' (see Figure 9).

Figure 9. Local Act loans, 1817-1914



Sources: See text.

6. Assembling the jigsaw

It is important to remember that, whilst the Public Works Loan Board *provided* loans for sanitary and other purposes, the other sections of this paper have discussed loans which were either *sanctioned* by one of the Government's central health departments or *approved* under Parliamentary Acts. Although the PWLB only provided a small fraction of the loans which were either sanctioned or approved, it is reasonable to assume that it only provided loans which had been sanctioned or approved. The following analysis therefore focuses on the value of the loans sanctioned or approved via these routes.

There may also be a small degree of overlap between the loans sanctioned by the Local Government Board under the Public Health and Local and Confirmation Acts and those approved by Parliament under Provisional Orders and Local Acts, but neither the total number of such loans, nor their value when compared to the overall totals, is very great. We have identified one loan which was sanctioned by the Local Government Board under the Public Health and Local and Confirmation

Acts with reference to a Provisional Order before the end of 1875, but it was only worth £48. The Local Government Board also sanctioned a further 355 loans which had previously been approved, either in whole or in part, under an earlier Local Act. The combined value of these loans, over the whole of the period between 1871 and 1914, was £3,523,038, but this represented only 2.2 per cent of the value of all the loans sanctioned to non-metropolitan urban sanitary authorities under the Public Health and Local and Confirmation Acts during this period.[14]

The biggest challenge concerns the question of which loans to include. As we have already noted, the Local Government Board also sanctioned loans to local authorities under a series of other Acts, such as the Electric Lighting Act and the Military Lands Act, which have not been included in this paper. However, the lists of loans sanctioned under the Public Health and Local and Confirmation Act also included loans for these purposes, and many local authorities also sought approval for such loans under Local Acts. We have sought to identify such loans under the broad heading of 'other' in order to distinguish them from those loans which might have been expected to impact health issues more directly, but we have also sought to distinguish loans for water from loans for other health-related purposes. There are two particular reasons for this. In the first place, as Hassan (1985: 540-2) has argued, much of the initial investment in water was motivated by industrial rather than sanitary concerns; and there is also a separate debate about the hygienic value of investments in water which do not also address issues of water quality (Cutler and Miller 2005).

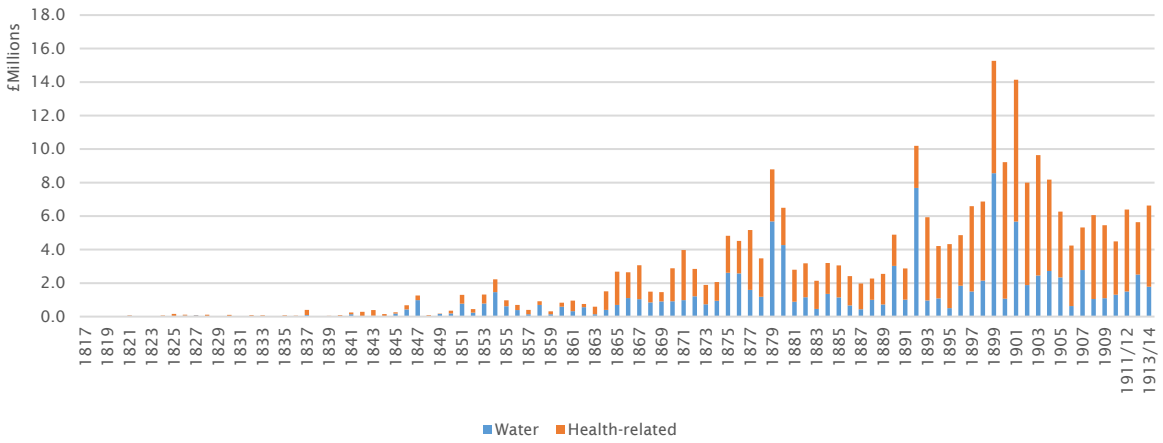
[14] The analysis of these loans suggests that some authorities continued to seek sanction for loans long after obtaining legislative approval for them. For example, in 1879, the Board sanctioned a loan of £18,650 under the Tunstall Improvement Act of 1847. This should be borne in mind when considering our Local Act time series which are based on the years in which the original Acts were passed.

By combining the results of our investigations into the loans which were either sanctioned by central government departments or approved under Local Acts, we can now obtain a fuller picture of the extent of the loans sought by local authorities and other bodies for investment in water- and health-related initiatives in the non-metropolitan areas of urban Britain during the nineteenth and early-twentieth centuries. Figure 10 shows the value of these loans in current prices, and Figure 11 displays the same data in constant 1900 prices, using the Rousseaux price index (see also Bell and Millward 1998: 235). The overall picture shows that there were periodic increases in loan activity during the 1840s and 1850s. This may reflect the initial impact of the sanitary awakening which was also reflected in the passage of the Towns Improvement Clauses Act of 1847 (10 & 11 Vic. C.34) and the Public Health Act of 1848 (11 & 12 Vic. C.63). There was a more sustained increase in loan values during the second half of the 1860s and early-1870s, with further peaks during the second half of that decade. However, loan values declined during the second half of the 1880s before rising again at the start of the 1890s, and the most dramatic increases occurred at the very end of the nineteenth century and the start of the twentieth.

The graphs also highlight some differences in the timing of increases in loan values for water and other health-related purposes. Although the overall value of the loans which were either sanctioned by a central government department or approved by Act of Parliament was relatively low before the 1860s, a high proportion of this activity was associated with water supplies. However, from the early-1860s onwards, a growing proportion of the value of such loans was associated with other health-related purposes. Our figures suggest that 'water' accounted for 56 per cent of the value of the loans for either water or health-related purposes between 1817 and 1859, compared with only 37 per cent of the much

larger amounts of money associated with loans which were either sanctioned or approved between 1860 and 1914.

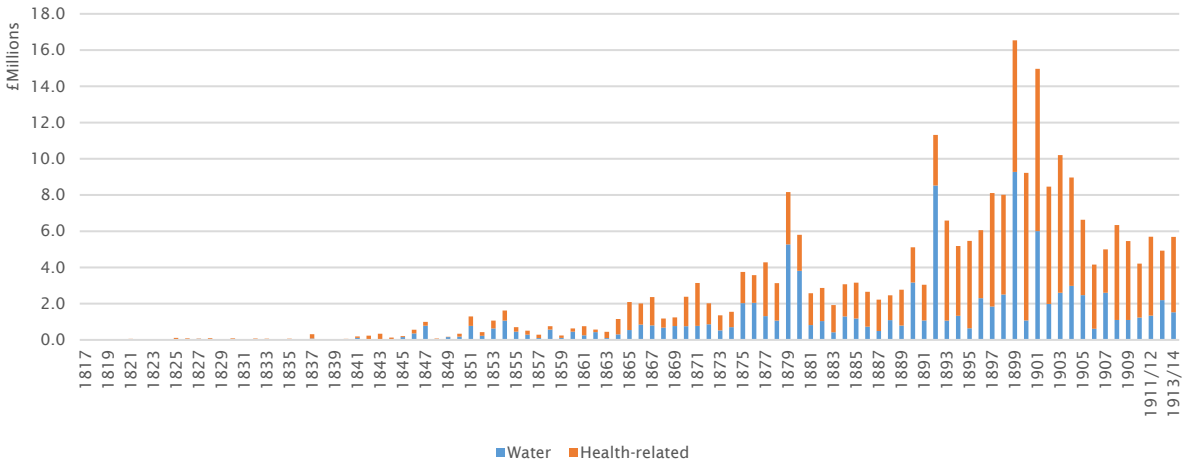
Figure 10. Water- and health-related loans, 1817-1914 (Current prices)



Notes: For loans sanctioned by the General Boards of Health and the Privy Council between 1850 and 1871, all loans which included references to water have been classified as 'water'. All other loans containing references to health-related issues such as sewerage, drainage and street improvements have been classified as 'health-related'. There were also a small number of loans whose purpose was not stated. These loans have also been allocated to the 'health-related' category. All of the loans sanctioned by the Local Government Board under the Public Health and Local and Confirmation Acts in connection with water supplies have been categorised as 'water'. Loans relating to hospitals, housing, sanitation and street improvements have been classed as 'health-related'. All of the loans sanctioned by the Local Government Board under the measures described in Figure 4 have been classed as 'health-related', other than loans under the Public Health (Interment) Acts, which were primarily concerned with cemeteries. The majority of the loans to Joint Boards concerned either water, hospitals or sewerage. Loans relating to the latter two have been classed as 'health-related'. The remaining figures have been derived from the data on Local Act loans in Figures 7 and 9.

Sources: See Figures 2-5, 7 and 9.

Figure 11. Water- and health-related loans, 1817-1914 (1900 prices)



Sources: See Figure 10. Loan values have been converted to 1900 prices using the Rousseaux price index.

Although the overall pattern of these figures may not be entirely unfamiliar, they are significant in two respects. In the first place, the inclusion of Local Act data has provided much more information about loans for water-related purposes than we could obtain from an analysis of centrally-sanctioned loans on their own. Second, it has also shown that the combined value of these loans, and therefore the scale of health-related activity, was much greater than an exclusive focus on centrally-sanctioned figures might suggest. The question is whether the overall scale of the borrowing was sufficient to help explain changes in mortality, or whether funds were being sought and utilised in the areas which experienced the greatest mortality change.

7. Sanitary intervention, municipal loans and the decline of mortality

Woods (2000: 354-9) identified diarrhoea and typhus as causes of death which were particularly amenable to sanitary intervention. He argued that the concentrated

nature of the decline in mortality from these diseases illustrated the value of sanitary activity.

This argument raises a number of problems. Woods identified thirteen non-metropolitan areas which made particularly notable contributions to the decline in mortality from these diseases between the 1860s and 1890s. He described these areas – Liverpool and West Derby; Manchester, Salford and Wigan; Newcastle-upon-Tyne and South Shields; Middlesborough; Leeds; Rotherham; Walsall, Swansea and Neath – as 'the high-performing and high-contributing areas in terms of Victorian public health initiatives' (Woods 2000: 356). However, one of the reasons why these areas were able to make disproportionate contributions to the overall rate of mortality decline was the fact that – in the majority of cases – they were also areas in which mortality rates had previously been much higher than elsewhere. Moreover, approximately half of the decline in mortality in these areas – and in other parts of non-metropolitan England and Wales – occurred between the 1860s and 1870s (see Table 11). There is also an important question around the causes of death which Woods highlighted. Although he described diarrhoea and typhus as the 'bundle of causes that is linked to the effects of the sanitary revolution and to public health policy interventions in general' (Woods 2000: 355), they are actually distinct. Diarrhoea is a water- and food-borne disease whereas typhus is a louse-borne infection. However, it was only distinguished from typhoid (or enteric fever) in the cause-of-death registers at the end of the 1860s (McKeown 1976: 59-61).

The initial failure to distinguish typhus from typhoid has a significant bearing on the comparison of these death rates across the two decades. During the 1870s, it was estimated that the average annual death rate from *typhoid* (or enteric fever) was 0.32 per thousand. If these deaths had been added to the figure for typhus,

the overall death rate from typhus, typhoid, dysentery and diarrhoea would have fallen by 29.4 per cent rather than the figure of 48 per cent suggested by the table.

Table 11. Death rates from diarrhoea, dysentery and typhus in 13 'high-performing, high-contributing' registration districts, 1861/70-1891/1900

	Deaths per thousand living					Index values (1861/70 = 100)				
	1861-1870	1871-1880	1881-1890	1891-1900	1901-1910	1861-1870	1871-1880	1881-1890	1891-1900	1901-1910
Guisborough & Middlesborough	2.352	1.216	0.759	0.740	0.974	100	52	32	31	41
Leeds	3.733	1.938	1.101	1.065	0.701	100	52	30	29	19
Liverpool	5.424	2.540	1.808	1.568	2.073	100	47	33	29	38
Manchester & Prestwich	4.250	1.994	1.156	1.332	1.113	100	47	27	31	26
Neath & Pontardawe	1.934	0.389	0.314	0.584	0.470	100	20	16	30	24
Newcastle-upon-Tyne	2.674	1.526	0.979	0.697	0.572	100	57	37	26	21
Rotherham	3.007	0.956	0.823	1.095	0.974	100	32	27	36	32
Salford	3.741	2.040	1.492	1.567	1.188	100	55	40	42	32
South Shields	2.685	1.461	0.907	0.881	0.685	100	54	34	33	26
Swansea	1.249	0.625	0.357	0.426	0.474	100	50	29	34	38
Walsall	3.071	1.416	1.108	1.365	1.049	100	46	36	44	34
West Derby	3.350	1.492	1.030	1.210	1.142	100	45	31	36	34
Wigan	3.712	2.014	1.127	1.085	1.259	100	54	30	29	34
England and Wales (excl. London)	1.842	0.964	0.660	0.708	0.557	100	52	36	38	30

Sources: Registrar-General's *Decennial Supplements*, 1861/70-1901/10.

Table 12. The classification of diseases in the Registrar-General's Decennial Supplements, 1851/60-1901/10

1851/60	1861/70	1871/80	1881/90	1891/1900	1901/10
Typhus	Typhus	Typhus	Typhus	Typhus	Typhus
Cholera, diarrhoea and dysentery	Cholera	Cholera	Cholera	Cholera	
	Diarrhoea and dysentery	Diarrhoea and dysentery	Diarrhoea and dysentery	Diarrhoea and dysentery	Diarrhoea and dysentery
		Enteric fever	Enteric fever	Enteric fever	Enteric fever
		Simple continued fever	Simple continued fever	Simple continued fever	

Sources: See text.

As these comments suggest, one of the major problems confronting any attempt to construct a consistent series of cause-specific mortality rates for this period is the problem posed by changes in the ways in which contemporaries identified and classified different diseases (Hardy 1994). As Table 12 shows, late-nineteenth and early-twentieth registrars used a number of different categories to classify what might now be regarded as 'water-borne diseases'. The authors of the *Decennial Supplement* for the 1850s constructed a single category of deaths from cholera, diarrhoea and dysentery. In the 1860s, cholera was separated from diarrhoea and dysentery and in the 1870s these two diseases were also distinguished from enteric fever and simple continued fever. In the first decade of the twentieth century, both cholera and simple continued fever were included under the general heading of 'Other causes'.

We have sought to address this set of issues by constructing a new series which includes cholera, diarrhoea, dysentery and typhus in the 1850s and 1860s; cholera, diarrhoea, dysentery, typhus, enteric fever and simple continued fever in the 1870s, 1880s and 1890s; and diarrhoea, dysentery, typhus and enteric fever in the first decade of the 1900s. The inclusion of these additional categories helps to clarify

the timing of decline in mortality in Woods' 'high-performing and high-contributing areas' but also demonstrates that some of them performed less well than he supposed. As we can see from Table 13, in all but one of these areas, mortality declined rapidly between the 1860s and 1880s, but levelled off between the 1880s and 1890s. In nine of these areas, the rate of decline was significantly faster than the rate of decline in non-metropolitan England and Wales as a whole. However, in Walsall and Newcastle, the rate of decline was much closer to the non-metropolitan average and in Guisborough and Middlesborough, and South Shields, it was below the average. If we extend the comparison to include the 1890s, mortality rates in Neath and Pontardawe, Newcastle, Liverpool, Leeds, Manchester and Prestwich, Swansea, and Wigan declined at above-average rates; mortality in West Derby, South Shields, Rotherham, and Guisborough and Middlesborough declined at around-average rates; and mortality in Walsall and Salford declined at below-average rates.

We can also compare these changes with the timing and value of the loans they sought to contract for water- or health-related purposes from 1850 onwards. The loan values have been expressed in constant 1900 prices and we have estimated values per head using the population estimates in the decennial census reports for the period 1851-1911.

These comparisons also pose a number of challenges. This is partly because of differences in the definition of the authorities which contracted loans under different schemes and at different points in time, partly because of changes in the boundaries of authorities which were otherwise the same, and partly because the administrative authorities which contracted loans were not always coterminous with the registration districts within which deaths were recorded. This problem was particularly serious in the case of West Derby, where the populations of the urban

sanitary authority and the registration district differed very widely.[15] However, the figures for the other areas do provide a rough indication of the extent to which these areas are likely to have witnessed investments in either water or sanitary infrastructure in the years before the decline in mortality from these diseases started to become apparent.

The 13 'high-performing and high-contributing areas' sought approval for a wide range of health-related (or potentially health-related) loans, including loans for the development of either private or municipal waterworks, sewage removal, the construction of sewerage systems, street improvements, the provision of baths and washhouses, and general improvement schemes. The earliest such loan was approved under a Local Act to improve the supply of water in Manchester and Salford in 1821 (1 & 2 G4.c.xlvii). The smallest single loan was a loan approved by the Local Government Board to the urban sanitary authority of South Shields for £150 for the construction of a water fountain in 1889, and the largest was a loan for £3.25 million, also for the improvement of Manchester's water supply, in 1879.

[15] In 1891, the population of the urban sanitary district was 38,291. By contrast, the population of the registration district was 444,365. The urban sanitary authority itself was abolished in 1894. See Parliamentary Papers 1891: 35, 49 and http://www.visionofbritain.org.uk/unit/10347555 (accessed 21 September 2018).

Table 13. Mortality from water-borne diseases in Woods' 'high-performing and high-contributing areas, 1851/60-1901/10

Deaths per thousand living	**1851-60**	**1861-70**	**1871-80**	**1881-90**	**1891-1900**	**1901-10**
Guisborough & Middlesborough	1.65	2.42	2.06	1.21	1.12	1.14
Leeds	3.35	3.78	2.53	1.45	1.30	0.85
Liverpool	4.28	6.08	3.18	2.13	1.85	2.21
Manchester & Prestwich	3.66	4.31	2.57	1.49	1.65	1.27
Neath & Pontardawe	2.46	2.79	1.09	0.64	0.79	0.55
Newcastle-upon-Tyne	3.81	2.77	2.05	1.24	0.81	0.60
Rotherham	1.94	3.08	1.78	1.19	1.38	1.13
Salford	3.37	3.80	2.64	1.90	2.01	1.43
South Shields	2.70	2.84	2.22	1.13	1.24	0.81
Swansea (incl. Gower)	1.46	2.06	1.36	0.70	0.58	0.51
Walsall	3.08	3.09	2.06	1.36	1.58	1.19
West Derby	2.32	3.61	1.99	1.31	1.55	1.26
Wigan	3.60	3.89	2.67	1.49	1.51	1.50
England and Wales (excl. London)	1.93	1.93	1.43	0.90	0.92	0.65
Deaths per thousand living (1861/70=100)	**1851-60**	**1861-70**	**1871-80**	**1881-90**	**1891-1900**	**1901-10**
Guisborough & Middlesborough	68.18	100.00	85.12	50.00	46.28	47.11
Leeds	88.62	100.00	66.93	38.36	34.39	22.49
Liverpool	70.39	100.00	52.30	35.03	30.43	36.35
Manchester & Prestwich	84.92	100.00	59.63	34.57	38.28	29.47
Neath & Pontardawe	88.17	100.00	39.07	22.94	28.32	19.71
Newcastle-upon-Tyne	137.55	100.00	74.01	44.77	29.24	21.66
Rotherham	62.99	100.00	57.79	38.64	44.81	36.69
Salford	88.68	100.00	69.47	50.00	52.89	37.63
South Shields	95.07	100.00	78.17	39.79	43.66	28.52
Swansea (incl. Gower)	70.87	100.00	66.02	33.98	28.16	24.76
Walsall	99.68	100.00	66.67	44.01	51.13	38.51
West Derby	64.27	100.00	55.12	36.29	42.94	34.90
Wigan	92.54	100.00	68.64	38.30	38.82	38.56
England and Wales (excl. London)	100.00	100.00	74.09	46.63	47.67	33.68

Sources: Registrar-General's *Decennial Supplements*, 1851/60-1901/10.

As we have already seen, one of the questions raised by the debate over the origins of mortality decline concerns the extent to which loans were taken out, or at least sanctioned, before declines in individual areas began to occur. In fact, as Table 14 demonstrates, this was the case in almost all of the areas which Woods originally highlighted. However, the value of the loans, expressed in terms of constant prices per head of population, varied considerably. The three northern cities of Leeds, Liverpool and Manchester had already received support for substantial loans by the end of the 1860s and they continued to borrow heavily during the 1870s and 1880s. These areas also achieved substantial reductions in mortality (see Table 13). However, other areas had different experiences. Both Salford and Middlesborough were authorised to borrow comparatively large amounts of money, relative to the size of their populations, but the rate of mortality decline was much closer to the non-metropolitan average.[16] Meanwhile, the Welsh borough of Neath experienced a rapid decline in mortality despite engaging in very limited borrowing.

It is important to emphasise that this does not mean that the investments made by cities such as Leeds, Liverpool and Manchester had no effect on their mortality, but the figures suggest that the relationship between loans and mortality decline may not have been a consistent one. A number of factors may help to explain this. In the first place, it is important to bear in mind that our data refer to the value of the loans which were either sanctioned or approved, but it does not necessarily follow that these loans were either obtained or spent. Secondly, it is also important to acknowledge that even when money was spent, it may not always have been spent wisely or in the most coordinated manner (see also Luckin 2000: 214).

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[16] The town of Middlesborough grew extremely rapidly in the second half of the nineteenth century and the relationship between loan values per head and mortality change in this area may be particularly complex. The decennial census returns suggest that the population of the urban sanitary authority area grew from 8,067 in 1861 to 44,486 ten years later.

Thirdly, some areas may have faced different challenges to other areas, especially if their populations were growing more rapidly. Some areas may have benefited indirectly from the initiatives taken by neighbouring authorities whilst other areas may have been adversely affected by them. Finally, it is also important to recognise that the cost of implementing changes is unlikely to have been the same for all areas, and that some areas may have had to spend much more than others to achieve the same benefits.

8. Conclusions

As we have already seen, there has been a long and vigorous debate over the impact of sanitary intervention (and other factors) on the decline of mortality in Britain during the late-nineteenth and early-twentieth centuries. One part of this debate has concerned the attempt to measure the extent of sanitary intervention using the loans which were sanctioned by the Local Government Board and other central departments from the late-1850s onwards. However, this debate has been hampered by the absence of detailed information on the value or purpose of these and other loans in different areas. We have attempted to address this shortfall by creating a new dataset which also includes the loans approved by Local Acts of Parliament from 1817 onwards.

Table 14. Loans for water- and health-related purposes in Woods' high-performing and high-contributing areas: £ per head per decade (1900 prices)

	1851-60			1861-70			1871-80			1881-90			1891-1900			1901-10		
	Water	Health	**Total**	Water	Health	**Total**	Water	Health	**Total**	Water	Health	**Total**	Water	Health	**Total**	Water	Health	**Total**
Guisborough & Middlesborough	0.00	5.75	**5.75**	0.00	1.01	**1.01**	0.38	1.16	**1.54**	0.63	0.10	**0.74**	2.31	0.52	**2.83**	0.31	1.65	**1.97**
Leeds	0.00	0.00	**0.00**	1.62	1.81	**3.43**	1.82	0.57	**2.40**	0.58	0.25	**0.83**	1.52	6.62	**8.14**	5.99	9.74	**15.73**
Liverpool	0.05	0.00	**0.05**	0.08	3.12	**3.20**	5.37	0.77	**6.14**	0.00	2.00	**2.00**	0.00	1.86	**1.87**	0.35	2.40	**2.75**
Manchester & Prestwich	2.22	0.71	**2.94**	1.90	1.04	**2.94**	8.06	0.91	**8.97**	0.76	1.47	**2.23**	0.95	3.70	**4.64**	3.52	4.70	**8.22**
Neath & Pontardawe	0.00	0.00	**0.00**	0.39	0.93	**1.32**	0.00	0.17	**0.17**	0.00	0.19	**0.19**	3.30	1.20	**4.51**	0.39	1.13	**1.52**
Newcastle-upon-Tyne	0.00	0.45	**0.45**	0.00	1.98	**1.98**	0.00	1.35	**1.35**	0.00	1.51	**1.51**	0.00	4.20	**4.20**	0.00	1.88	**1.88**
Rotherham	0.00	0.00	**0.00**	0.98	2.28	**3.25**	1.68	3.99	**5.68**	1.52	0.10	**1.62**	1.72	4.82	**6.54**	0.00	3.87	**3.87**
Salford	0.00	0.23	**0.23**	0.22	1.53	**1.75**	0.00	4.45	**4.45**	0.00	0.55	**0.55**	0.10	4.87	**4.97**	0.00	2.04	**2.04**
South Shields	0.00	0.44	**0.44**	0.00	0.57	**0.57**	0.00	0.45	**0.45**	0.00	0.51	**0.52**	0.00	4.77	**4.77**	0.00	0.85	**0.85**
Swansea	3.97	0.33	**4.29**	1.86	0.78	**2.64**	1.25	3.22	**4.47**	2.94	0.87	**3.81**	4.93	2.52	**7.45**	3.50	3.51	**7.01**
Walsall	0.00	0.00	**0.00**	0.00	0.00	**0.00**	0.00	0.50	**0.50**	0.00	1.07	**1.07**	0.00	0.95	**0.95**	0.00	0.85	**0.85**
West Derby	0.00	0.00	**0.00**	0.00	1.51	**1.51**	0.00	2.85	**2.85**	0.00	1.21	**1.21**	-	-	**-**	-	-	-
Wigan	1.88	0.65	**2.53**	0.91	0.00	**0.91**	0.19	2.12	**2.31**	0.00	1.16	**1.16**	0.42	3.48	**3.90**	0.09	2.28	**2.36**
England & Wales (excl. London)	0.29	0.18	**0.47**	0.30	0.47	**0.77**	0.87	0.88	**1.76**	0.47	0.76	**1.23**	1.13	1.88	**3.01**	0.78	1.77	**2.55**

Sources: See text. The loan values described in the text have been divided by the estimated populations of the urban sanitary districts listed in the table to calculate the average value of the loans per head in each location in each decade. The population figures have been derived from figures given in the census returns for 1851, 1861, 1871, 1881, 1891, 1901 and 1911.

Although previous authors have highlighted the relevance of municipal loans to the history of public health reform, they have tended to focus on the loans which were sanctioned by the Government's central health departments and, especially, those sanctioned by the Local Government Board after 1871. This paper has provided a much fuller account of the loans which were sanctioned by these departments together with an account of the loans approved under Local Acts of Parliament from 1817 onwards. This means that we now have a much more detailed account of the history of the loans which were sought by local authorities and private organisations over the period as a whole.

Jeffrey Williamson (1990: 267) once asked whether Britain underinvested in its cities during the nineteenth century. Our account provides new information about the extent and distribution of the investment which did occur. Although there was a brief flurry of activity during the period of the first General Board of Health between 1848 and 1854, the overall level of investment, as reflected in the loans contracted by local authorities and private agencies with official or Parliamentary approval, only really 'took off' during the second half of the 1860s. These investments were stimulated, initially, by the Public Works Acts of 1863 and 1864 and were designed, in part, to repair some of the economic damage caused by the US Civil War to Britain's textile-manufacturing districts (Webster 2017: 17; Morris 2017: 187), but they received additional impetus from the Sanitary Act of 1866 and the establishment of the Local Government Board five years later.

We have also attempted to compare the value of these loans with changes in mortality from selected diseases in areas which have previously been identified as making disproportionate contributions to the declines in mortality from these diseases in the late-nineteenth century. We have shown that many of these areas did experience increases in loan values before or during the period in which

mortality decline occurred and that some of these loans were quite substantial. However, there does not appear to have been a consistent relationship between loan values and mortality change in these areas. This highlights the need for further research into the way in which different local authorities used the loans they obtained and the different challenges they faced. Although it is clear that further investigation into the causes of mortality decline is still needed, we hope that this paper has demonstrated the ways in which a fuller analysis of the loans contracted by local authorities and other bodies throughout the nineteenth century might contribute to this.

Appendix. Loans for water and health-related purposes, 1817-1914

£	Water					Health related				
	Centrally-sanctioned loans				Local Acts	Centrally-sanctioned loans				Local Acts
	General Board of Health and Privy Council	Local Government Board				General Board of Health and Privy Council	Local Government Board			
		Public Health and Local and Confirmation Acts	Other Acts	Joint Boards			Public Health and Local and Confirmation Acts	Local Government Board: Other Acts	Joint Boards	
1817	-	-	-	-	-	-	-	-	-	-
1818	-	-	-	-	-	-	-	-	-	3,000
1819	-	-	-	-	3,000	-	-	-	-	20,000
1820	-	-	-	-	-	-	-	-	-	20,000
1821	-	-	-	-	50,000	-	-	-	-	24,885
1822	-	-	-	-	-	-	-	-	-	-
1823	-	-	-	-	-	-	-	-	-	-
1824	-	-	-	-	11,500	-	-	-	-	50,000
1825	-	-	-	-	14,000	-	-	-	-	151,500
1826	-	-	-	-	53,000	-	-	-	-	58,500
1827	-	-	-	-	75,800	-	-	-	-	19,500
1828	-	-	-	-	2,000	-	-	-	-	108,000
1829	-	-	-	-	13,000	-	-	-	-	16,000
1830	-	-	-	-	30,000	-	-	-	-	71,000
1831	-	-	-	-	10,000	-	-	-	-	-
1832	-	-	-	-	41,000	-	-	-	-	46,500
1833	-	-	-	-	19,000	-	-	-	-	60,000
1834	-	-	-	-	13,000	-	-	-	-	4,000
1835	-	-	-	-	20,668	-	-	-	-	57,500
1836	-	-	-	-	38,000	-	-	-	-	16,000
1837	-	-	-	-	97,500	-	-	-	-	305,480
1838	-	-	-	-	19,833	-	-	-	-	9,500
1839	-	-	-	-	25,308	-	-	-	-	17,500
1840	-	-	-	-	32,300	-	-	-	-	50,000
1841	-	-	-	-	146,000	-	-	-	-	105,500
1842	-	-	-	-	14,500	-	-	-	-	274,000
1843	-	-	-	-	42,248	-	-	-	-	347,000
1844	-	-	-	-	5,000	-	-	-	-	149,200
1845	-	-	-	-	185,000	-	-	-	-	69,000
1846	-	-	-	-	431,833	-	-	-	-	243,500
1847	-	-	-	-	987,306	-	-	-	-	272,000
1848	-	-	-	-	17,300	-	-	-	-	65,000
1849	-	-	-	-	159,497	-	-	-	-	18,400
1850	4,000	-	-	-	181,936	900	-	-	-	167,000
1851	23,000	-	-	-	746,800	21,700	-	-	-	503,000
1852	144,850	-	-	-	92,600	84,950	-	-	-	123,725
1853	232,491	-	-	-	547,267	234,037	-	-	-	301,500
1854	353,376	-	-	-	1,106,394	178,005	-	-	-	591,653
1855	169,320	-	-	-	454,334	141,582	-	-	-	205,000
1856	126,189	-	-	-	267,249	242,752	-	-	-	61,000
1857	50,292	-	-	-	92,100	235,409	-	-	-	20,900
1858	165,164	-	-	-	530,629	92,252	-	-	-	132,669
1859	37,175	-	-	-	100,430	125,536	-	-	-	49,628
1860	88,139	-	-	-	507,550	182,815	-	-	-	52,029
1861	115,911	-	-	-	206,950	157,672	-	-	-	473,350
1862	68,309	-	-	-	493,700	130,179	-	-	-	58,217
1863	45,937	-	-	-	91,600	161,132	-	-	-	297,100
1864	59,181	-	-	-	337,050	395,706	-	-	-	717,000
1865	235,028	-	-	-	462,300	497,759	-	-	-	1,491,433
1866	197,576	-	-	-	911,250	482,659	-	-	-	1,058,038
1867	151,696	-	-	-	887,650	351,226	-	-	-	1,680,000
1868	140,787	-	-	-	712,550	545,901	-	-	-	90,350
1869	99,192	-	-	-	804,450	309,757	-	-	-	246,200
1870	111,862	-	-	-	801,370	807,805	-	-	-	1,162,000
1871	135,852	157,179	1,850	-	686,000	747,033	1,124,987	51,841	-	1,070,000
1872	-	119,225	-	-	1,091,500	-	377,952	-	-	1,256,500

£	Water					Health related				
	Centrally-sanctioned loans				Local Acts	Centrally-sanctioned loans				Local Acts
	General Board of Health and Privy Council	Local Government Board				General Board of Health and Privy Council	Local Government Board			
		Public Health and Local and Confirmation Acts	Other Acts	Joint Boards			Public Health and Local and Confirmation Acts	Local Government Board: Other Acts	Joint Boards	
1873	-	85,917	-	-	650,500	-	663,598	-	-	489,565
1874	-	318,025	-	-	622,250	-	860,751	-	-	259,589
1875	-	315,607	-	-	2,297,100	-	1,265,627	-	2,500	941,000
1876	-	379,990	-	-	2,202,000	-	1,843,620	10,500	16,500	68,000
1877	-	375,360	-	-	1,215,000	-	3,213,397	-	115,000	253,527
1878	-	202,311	-	-	983,000	-	1,860,015	57,700	75,000	300,000
1879	-	277,584	-	-	5,403,000	-	2,144,427	167,546	260,059	539,954
1880	-	435,748	-	-	3,835,700	-	1,688,799	66,500	50,635	424,000
1881	-	308,887	-	-	580,500	-	1,442,003	65,211	188,000	216,500
1882	-	261,490	-	-	893,500	-	1,350,677	119,400	66,350	491,307
1883	-	185,663	-	-	276,000	-	1,069,720	106,344	27,250	472,000
1884	-	246,438	-	-	1,107,500	-	1,336,196	56,068	108,220	349,800
1885	-	182,394	-	-	960,500	-	1,602,640	170,450	27,990	115,500
1886	-	184,560	-	-	483,787	-	1,388,681	56,630	28,880	277,500
1887	-	164,821	-	-	275,000	-	1,104,445	123,875	161,585	146,700
1888	-	417,729	-	-	588,155	-	911,528	18,960	31,500	305,400
1889	-	247,432	-	-	480,100	-	1,648,184	45,631	-	133,000
1890	-	272,952	-	-	2,758,280	-	1,360,823	57,891	88,475	348,400
1891	-	355,768	-	3,250	654,034	-	1,486,658	187,450	62,000	125,000
1892	-	287,018	-	30,000	7,365,200	-	1,995,891	258,163	46,310	215,000
1893	-	344,339	-	-	616,000	-	3,696,532	189,639	37,650	1,049,165
1894	-	429,033	-	-	655,870	-	2,518,012	104,529	84,692	425,500
1895	-	372,012	-	1,437	136,000	-	3,338,156	263,819	213,419	-
1896	-	493,179	-	1,584	1,350,750	-	2,604,799	128,157	74,868	206,484
1897	-	272,746	-	47,537	1,180,948	-	2,709,199	223,016	117,345	2,042,263
1898	-	497,267	-	2,922	1,646,300	-	3,685,754	225,737	100,696	706,200
1899	-	443,139	-	16,091	8,102,091	-	4,107,916	574,250	189,783	1,833,593
1900	-	429,824	-	1,108	641,000	-	3,936,642	691,806	205,498	3,313,557
1901	-	846,949	-	77,632	4,754,262	-	4,340,558	623,684	88,016	3,413,686
1902	-	473,188	-	13,500	1,391,950	-	4,321,073	81,577	90,981	1,623,800
1903	-	673,833	-	25,492	1,757,708	-	4,396,986	1,163,509	222,596	1,401,537
1904	-	694,443	-	176,354	1,850,000	-	3,862,315	814,423	112,035	670,771
1905	-	401,785	-	31,750	1,902,850	-	3,047,283	309,838	77,745	496,846
1906	-	294,131	-	18,750	316,630	-	2,836,373	263,493	195,867	320,468
1907	-	439,947	-	3,495	2,331,576	-	2,085,372	224,351	83,566	156,931
1908	-	250,489	-	23,250	774,708	-	2,607,235	472,373	194,845	1,736,540
1909	-	343,707	-	33,466	722,628	-	3,249,392	228,037	25,612	850,686
1910	-	263,871	-	36,248	1,011,000	-	2,460,478	404,520	132,193	179,515
1911/12	-	346,938	-	55,787	1,099,599	-	2,974,018	338,752	97,191	1,474,656
1912/13	-	387,592	-	124,300	2,002,037	-	2,482,339	141,265	64,364	431,600
1913/14	-	457,250	-	17,440	1,306,451	-	3,375,851	84,504	75,401	1,310,356

Sources: See Figures 2, 3, 5, 7 and 11, and text.

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