

Infant mortality in three East Midland towns: similarities and differences, 1890-1910

By Dr Denise Amos

‘Grandmother, grandmother
Tell me the truth
How many years am I
Going to live?
One, two, three, four....’¹

Until the end of the nineteenth century the problem of infant mortality was still an area which was mainly regarded as a problem of the home circumstances that the child were born into. Interfering in an individual’s life was abhorrent to the status quo, so little was done to investigate the problem and it was only at the beginning of the twentieth century that a real interest began to take place. Several reasons can be attributed to this; firstly the shocking results of the Boer War recruits showing what an unhealthy population Britain was producing; secondly there was a serious reduction in the birth rate, thirdly a growing concern by governments as to why the death rate for the population as a whole was falling whilst the death rate for infants was increasing and fourthly the nascent interest in social intervention. Infant Mortality was a conundrum then and, still fascinates today, given the still unacceptable high rates in certain parts of the world. This article will argue that the study of the three Midland towns highlights that infant mortality was a difficult problem to solve but that the practices put in place at the end of the nineteenth and early twentieth centuries were correct and moving in the right direction.

The great value of a study of child mortality is as an index to the state of the environmental conditions, both public and private, social facilities and health in a particular area. ² Edward Seaton, Nottingham’s first Medical Officer of Health commented, ‘It is on the lives of infants that unhealthy influences have their deadliest

¹ Victorian Street Game

² Richard Titmuss, *Birth, Poverty and Wealth. A study of Infant Mortality*, (London:Hamish Hamilton Medical books, 1943), 24.

effects.’³ C Killick Millard, Medical Officer of Health for Leicester in 1901 made a similar comment, “Infant mortality is rightly regarded as an important index of sanitary conditions of a locality”⁴ Sir George Newman, the first Chief Medical Officer of Health to the Ministry of Health in England, pioneer in public and child health and author of “Infant Mortality: a Social Question” acknowledged that many infant deaths must be preventable, “...to discover the means whereby the heavy annual tribute of infant life can be reduced...is one of the great sanitary *desiderata* of the age”.⁵ Commenting some years later, Dr Newsholme, Newman’s successor, said, “Infant Mortality is the most sensitive index we possess of social welfare and of sanitary administration, especially under urban conditions.”⁶

This article aims to explore the problem of infant mortality in three Midland boroughs – Nottingham, Leicester and Derby over a twenty year period, 1890-1910, a time span when infant mortality was at its highest, to see what local factors may have impacted on infant mortality; such as the role of the mother or the social conditions or the child’s environment. A comparative approach provides a useful way of distinguishing the unique from the more general.⁷

There have been a number of studies carried out, both contemporaneous and subsequent, into infant mortality which affirms its continuing fascination to the modern researcher. In the late 1980s and early 1990s a raft of articles were published on this subject.⁸ This composition will draw on some of these articles when

³ Edward Seaton, *Report on the Sanitary Conditions of the Borough of Nottingham*, (Nottingham, 1873), 40.

⁴ *(A)nnual (R)eport of the (M)edical (O)fficer of (H)ealth, Leicester*, 1901.

⁵ Sir George Newman, *Infant Mortality: a Social Question* (London:Methuen, 1906); HMSO, 1868: xxiv-xxv.

⁶ *(A)nnual (R)eport of the (M)edical (O)fficer of (H)ealth, of the(L)ocal (G)overnment (B)oard*, Thirty-ninth Report, PP.1910, Cd5263 (XXXIX), supplement on Infant and Child Mortality, Report of Dr Arthur Newsholme.

⁷ N Williams and G Mooney, ‘Infant mortality in an ‘Age of Great Cities’: London and the English provincial cities compared, c. 1840-1910’, *Continuity and Change*, 9, 2 (1994), 208

⁸ Deborah Dwork, *War is good for Babies and other young Children* (London: Tavistock Publications 1987); Patricia A Watterson, ‘Role of the environment in the decline of Infant Mortality: an analysis of the 1911 Census of England and Wales’, *Journal of Biosocial Science*, 18 (1986), 457-468. PA Watterson, ‘Infant Mortality by father’s occupation from the 1911 Census of England and Wales’, *Demography*, 25, 2 (1988), 289-306. RI Woods, PA Watterson and JH Woodward, ‘The causes of rapid Infant Mortality decline in England and Wales, 1861-1921, Part I’, *Population Studies*, 42 (1988), 343-365. RI Woods, PA Watterson and JH Woodward, ‘The causes of rapid Infant Mortality decline in England and Wales, 1861-1921, Part II’, *Population Studies*, 43 (1989), 113-132. Naomi Williams, ‘Death in its season: class, environment and the mortality of infants in nineteenth century Sheffield’, *Social History of Medicine*, 5, 1 (1992), 71-94.

considering the issues surrounding what caused such high infant mortality in the period 1890-1910. For example, Titmuss's study of infant mortality, examining birth, poverty and wealth,⁹ Dyhouse considered working class mothers and their employment¹⁰; Woods et al looked at the number of women who breast fed their infants¹¹; Deborah Dwork, P J Atkins, Ben Mephram and Denise Amos all considered the relationship between contaminated milk and the spread of diarrhoea¹²; Knodel and Kinter examined the higher mortality of children born illegitimately¹³; CH Lee and Watterson have examined the link with urban living and infant mortality; whereas Williams has thrown the net wider and considered the socio-economics and the climatic conditions.¹⁴ More recently a book dedicated to Sir George Newman's book, 'Infant mortality: a social problem'¹⁵ in its centenary year, has once again looked at the various reasons for the uncomfortably high rates of infant deaths. The authors own research on the three towns, Nottingham, Leicester and Derby will argue that despite the three towns having some similarities such as poor living conditions and the fact that women were employed in industries, particularly Nottingham and Leicester, each town or part of a town was different from its neighbour and that as a result the causes of infant mortality were also varied and operated at a local level and that there is no one single reason to account for the deaths. There has been minimal research on the three towns and so the present findings increases the knowledge of factors influencing infant mortality.

Primary sources for these towns are limited, relying mainly on Medical Officers of Health Reports in relation to the actual number of infant deaths and the reasoning behind these. Obviously these have elements of bias and stereotyping but when put into context with the other material on maternal care, housing, overcrowding, sewerage collection and disposal a more rounded view will be available. However the strength of the material lies in the fact that the documents are

⁹ Titmuss, *op.cit.* (note 2) .

¹⁰ Carol Dyhouse, 'Working class mothers and infant mortality in England 1895-1914, *Journal of Social History*, 12, (1978), 248-267.

¹¹ RI Woods, PA Watterson and JH Woodward, *op.cit.* (note 8) 113-132.

¹² Dwork, *op.cit.* (note 8), Denise M Amos, 'Working-class health and diet in Nottingham 1850-1939', (Unpublished PhD thesis University of Nottingham, 2000).

¹³ J. Knodel and H. Kinter, 'The impact of breast feeding patterns on the biometrics analysis of infant mortality, *Demography*, 14, 4 (1977), 391-409.

¹⁴ CH Lee, 'Regional inequalities in infant mortality in Britain, 1861-1971. Patterns and hypotheses', *Population Studies*, 45 (1991), 55-65. Watterson, *op.cit.* (note 8) and Williams, *op.cit.* (note 8).

¹⁵ George Newman, *op.cit.* (note 5).

complete for the period covered, 1890-1910 for all three towns, thus giving a good comparable set of information. The evidence for Derby is based on Nolan's PhD thesis written in 1982¹⁶ which has remained unchallenged since it was written and that there are similarities between the conclusion of Nolan's thesis and the article "Health Visitors and 'Enlightened Motherhood'" in Derbyshire contained in Garrett's book make it a useful piece of research.¹⁷

Since the general death rate was declining in the last two decades of the nineteenth century and continued downwards in the twentieth century, (see Graph 1) the fact that the death rate among infants remained much higher and only began to show a substantial decrease after 1905 (Graph 2) raised questions about the effectiveness of improvements in public health, such as water supply, adulteration of food, housing, in relation to infant life and forced the authorities to consider new initiatives. Infant mortality was reduced in each of the case study towns by the second decade of the twentieth century but for apparently differing reasons. Leicester underwent a transformation in the way it removed its waste by introducing the water-carriage method, this coincided with a fall in infant mortality. Nottingham failed to follow suit and in fact had to be forced into changing its method of waste removal as late as 1920. Nevertheless infant mortality began to fall around 1910.¹⁸ Nolan believed that in Derby the introduction of health visiting in the borough probably made the greatest single contribution in reducing infant mortality.

¹⁶ G M Nolan, 'Infant Mortality 1890-1939 with special reference to Derby', (Unpublished PhD thesis: University of Nottingham, 1982).

¹⁷ Alice Reid "Health Visitors and 'Enlightened Motherhood'" in E Garrett, C Galley, N Shelton and R Woods, (eds), *Infant Mortality. A continuing social problem*, (Hampshire: Ashgate, 2006), 191-210.

¹⁸ Amos, *op. cit.*(note 12), conclusion.

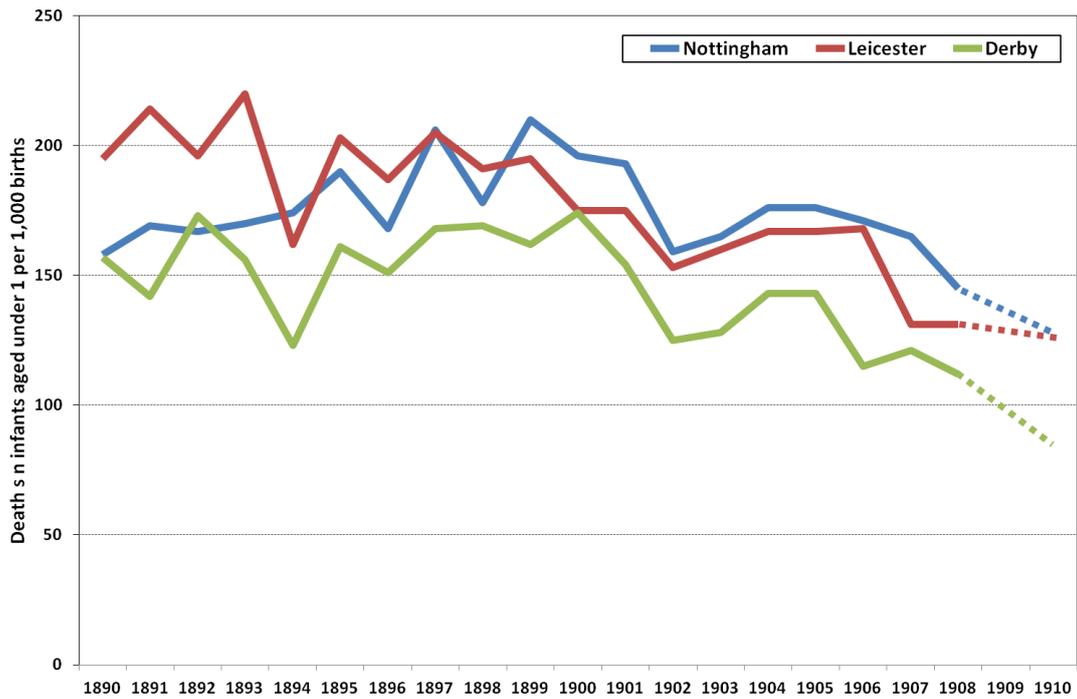


Figure 1. Infant mortality rates in Derby, Leicester and Nottingham (1890-1910)

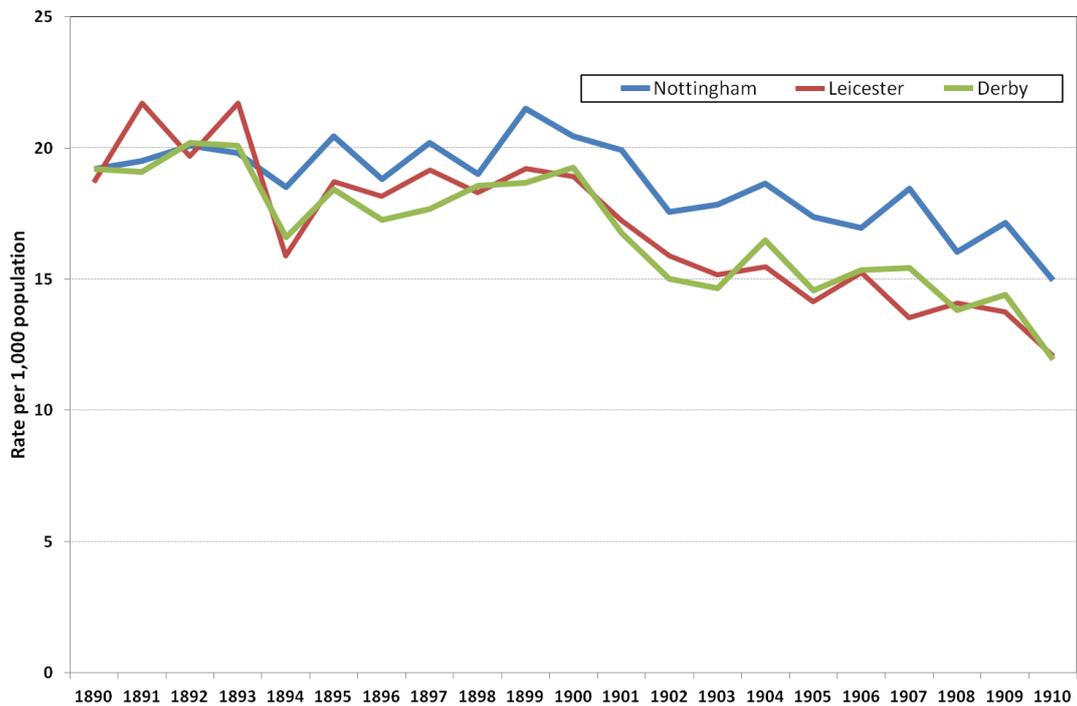


Figure 2. General death rate defined as deaths per 1,000 population.

One of Newman’s beliefs was that infant mortality was more prevalent in built up, industrialized environments,¹⁹ so by concentrating on the three boroughs, it will become evident whether it was the environment connected to the local industries

¹⁹ Newman, *op.cit.* (note 5) Chapter II.

or other factors such as social conditions which had the greater impact.

Nottingham's industry was chiefly textiles (lace and hosiery), Leicester's was boot and shoe manufacture as well as hosiery; both of which employed a high proportion of female labour, whereas Derby's industry was based around engineering and the railway workshops in the borough. It also supported a large printing company, Bemrose, which was appointed printer to the Midland Railway. Much of this work was heavy engineering and would have been undertaken by men.

Nevertheless there was some textile work and the town was also recognized as a regional centre for farming, so in comparison to the other two boroughs, Derby would have employed less female labour. It was also noted that it did not have violent fluctuations of trade and there was less poverty than most towns of the same size.²⁰ All three towns in 1895 had high rates of infant deaths which corresponded to those in England and Wales for the same period. There was a decline the following year, 1896, in each of the towns, followed by a substantial rise in 1897 and then a gradual decline towards the end of the period. The decline in Leicester is quite dramatic over the 10 year period, whilst Nottingham shows a significant decline at the end of the period. Derby, on the other hand improves after 1900 only to show a rise in the final two years of the period.

One of the problems facing many industrial towns was the congregation of people within a restricted area coupled with a lack of decent sanitation. In terms of space Derby had a slightly larger acreage than Leicester suggesting that there was greater living space for people living in the borough. Nottingham covered a considerably larger area which was the result of the Greater Nottingham development in the 1880s, but the centre of the town was highly populated with one particular area showing 510 persons to an acre. In a period of ten years Nottingham's spatial growth had not increased despite a growth in population. **Table 1** shows that Derby had the lowest population of the three towns, approximately half that of Leicester in 1891 and two fifths that of Nottingham. However by 1911 the populations in both Leicester and Derby had increased considerably. Leicester's population was only just behind Nottingham and Derby was half that of Nottingham.

²⁰ William J Howarth, 'The influence of feeding on the mortality of infants', *The Lancet*, 22 July 1905, 210.

Table 1- Population and acreage figures for 1891,1901 and 1911 for Nottingham, Leicester and Derby

Year/Town	Nottingham		Leicester		Derby	
1891	213877		174624		94146	
1901	239743	10935 ac.	211579	3121 ac.	105912	3449 ac.
1911	259904	10935 ac.	227222	3121 ac	123410	3449 ac.

Source: Census Returns for 1891, 1901 and 1911.

The causes of infant mortality can be divided into three groups. First, respiratory diseases such as pneumonia and bronchitis, but including measles and whooping cough; since nearly all fatal cases of these diseases closely followed pneumonia and bronchitis. Second, epidemic diarrhoea and enteritis. Third developmental diseases and malformations occurring from some defect already present at birth.²¹ The problem with the nomenclature is that the records were often unclear ; symptoms and causes were often confused. For instance infantile convulsions was twice referred to by Dr Philip Boobbyer - Nottingham's Medical Officer of Health, 1889-1929 - as being the 'symptom of disease ' and not the recorded cause of death. Investigations by the Medical Research Council at the beginning of the twentieth century, discovered that convulsions were usually considered as a symptom of disease and one of the committee, John Brownlee suggested that convulsions were more a pathological entity (ie caused by another disease) than commonly regarded.²²

Infant mortality causes can be further sub-divided into pre-natal and post-natal conditions. In his study of infant mortality, Titmuss made the distinction between pre-

²¹ William Brend, 'The relative importance of pre-natal and post-natal conditions as causes of infant mortality, Part II, ', in A K Chalmer, W A Brend, L Findlay, J Brownlee, '*The mortalities of birth, infancy and childhood*', Medical Research Committee, (Special Report Series), 10, (1917), 18 and G F McCleary, *The early history of the Welfare Movement*, (London:Lewis and Co. 1933) 22. (A)nnual (R)eport of the (M)edical (O)fficer of (H)ealth for Nottingham, 1910 and 1911. See also John Brownlee, 'The changes in the physiological processes of the developing child as shown by its response to different diseases', in Chalmer *et al op.cit.* 79; Titmuss, *op.cit.* (note 2), 47 fn. 1.

²² Titmuss, *op.cit* (note 2).

natal, and post-natal deaths.²³ As with other infant deaths, pre-natal deaths are multifarious but they tend to be quite different in character to those operating after the birth and are mostly have more to do with congenital factors such as the health of the mother and the nursing care available both before and during the pregnancy than with the environment.²⁴ Post-natal causes are ones which normally arise from environmental conditions and these are the causes which this article will concentrate on.

Table 2. Influences on post-natal deaths

Proportion of legitimate births to illegitimate births
Quality of help given at birth
Poverty and social conditions
Extra domestic employment of women
Urban and rural conditions of life
Domestic and municipal sanitation
Conditions of housing
Ignorance and fecklessness of mothers

Source: ARMOHLGB, 1909-1910, Supplement on Infant Mortality

Epidemic diarrhea and enteritis are probably the main killers but these can be accentuated by respiratory diseases as well as measles and whooping cough. Diarrhoea and enteritis are caused by a variety of actions - eating inappropriate food, as in the case of very young children being fed 'adult' food, which will cause them to vomit; infection getting into the gut through a lack of personal hygiene during eating and drinking, which will cause the frequent passing of stools or just classic food poisoning caused when food taken into the body is of an impure standard. As has previously been explained respiratory diseases are very often linked to measles and whooping cough and all three can be affected by poor diet, overcrowding and poor housing conditions. One of Newman's beliefs was that infant mortality was that it was more prevalent in built up, industrialized environments,²⁵ so by concentrating on the three boroughs, it may be possible to see whether it was the environment connected to the local industries or other factors such as the mother and social

²³ Pre-natal occurs before and up to one month after birth and post-natal occurs between one and twelve months of life.

²⁴ Titmuss, *op.cit.* (note 2) 77 and 81.

²⁵ Newman, *op.cit.* (note 5) Chapter II.

conditions which had the greater impact.

Table 2 shows a list of the influences on post-natal infant deaths as set out in the Annual Report of the Medical Officer of Health to the Local Government Board in 1910. The table is written by officials and factors such as ignorance and fecklessness are subjective, but overall the list suggests some of the most influential factors on deaths in infancy. To ensure an accurate comparative base, which can be applied to all three towns, the following topics will be examined in more detail; 1) employment of women, 2) ignorance of mothers in terms of feeding, 3) illegitimacy and 4) local environmental conditions notably excrement removal. The ignorance and fecklessness of the mother was widely used to indicate that infant mortality was a problem rooted in the family home and therefore not something that the government should or would interfere in. The mother was blamed by the commentators at the time for going out to work, for leaving the child with unsuitable baby-minders, for failing to provide a home life suitable for a young child, for not suckling her baby, and for not providing decent living conditions for the child to grow up in. The only factor over which she had little control was excrement removal. Most early investigations referred to the fact that the mother's behavior was central to the problem although it was also accepted that she had to contend with a variety of negative factors beyond her control, such as excrement removal.²⁶ At the time of this thinking motherhood was considered the most important role for a woman. Contemporaries stressed that the woman must be confined to her "proper sphere" – household duties.²⁷ In the absence of major schemes to alleviate poverty and improve housing conditions the education and support of mothers was seen as a major influence on the survival of children.²⁸ Newman stressed the importance of motherhood²⁹ and stated that the problem of infant mortality is... "not one of sanitation alone, or housing, or indeed poverty as such, *but is mainly a question of*

²⁶ (*A*)nnual (*R*eport of the (*M*edical (*O*fficer of (*H*ealth to the (*P*rivy(*C*ouncil, Fourth Report, PP.1861, 179 (XXII), Appendix V, Dr Greenhow's report on the circumstances under which there is excessive mortality of young children among certain manufacturing population, 191. Seaton, *op.cit.* (note 3) 40-1. Dr Hugh Jones, 'The perils and protection of infant life', in *Journal of the Royal Statistical Society*, LVII, March, (1894), 3.

²⁷ Letter to the Editor *Nottingham Journal* Tuesday 13 September 1864 and Dyhouse, *op.cit.* (note 10), 260.

²⁸ Garrett et al, *op.cit.* (note 17) 46.

²⁹ Garrett et al, *op.cit.* (note 17) 33.

motherhood.”³⁰ Mothering, feeding of infants and employment are all interlinked.

Employment of women and feeding of infants

In Nolan’s thesis on infant mortality in Derby,³¹ she says that the two consecutive Chief Medical Officers of Health, Newman and Newsholme were both of the opinion that the mother was the key dynamic in infant mortality. Newman saw the ignorance of mothers as the main issue, whereas Newsholme argued that, “... the most injurious influences affecting the physical condition of young children arise from the habits, customs and practices of the people themselves, rather from the external surroundings or conditions. The environment of the infant is its mother. Its health and physical fitness are dependent primarily upon her health, her capacity in domesticity and her knowledge of infant care and management... The principal operating influence is the ignorance of the mother and the remedy is the education of the mother.”³²

It was standard form in Victorian and Edwardian England to blame the mother and her skills as a child nurse on the survival or not of the child.³³ The Medical Officer of Health’s First Report for Nottingham was critical of the mother’s ability to raise her child properly. He suggested that the employment of married women in factories led to the neglect of infant care which, compounded by unhealthy home conditions curtailed their frail life.³⁴ Other contemporaries were equally critical, claiming that the ‘majority of the perils of infant life must be in the home.’³⁵ However, the number of women with children who worked either in factories or at home is difficult to estimate. In the census returns during the nineteenth century the recording of female employment was often neglected or ignored, especially if the

³⁰ Newman, *op.cit.* (note 5), 257.

³¹ Nolan, *op.cit.* (note 16), 3. Although a secondary source this has been chosen because of its wide use of primary material.

³² *ARMOHLGB*, Forty-second Report, PP.1913, Cd6909 (XXXII), Second report on infant and child mortality.

³³ *ARMOHPC*, Fourth Report, PP.1861, 179 (XXII), p. 191; *SCR*, 1862.

³⁴ Seaton, *op.cit.* (note 3), 40-1. The 1907 Annual Health Report reported that ‘women were extensively employed in factories.’

³⁵ W S Jevons, ‘Married Women in Factories’, *The Contemporary Review*, 41 (Jan.1882), 37-53 and Dr H Jones, ‘The perils and protection of infant life’, *Journal of the Royal Statistical Society*, LVII (March 1894), 3.

woman worked as an outworker for the lace industry ³⁶and therefore make interpreting the censuses difficult. It is likely that many women who worked do not appear in any contemporary statistics. This would be particularly so for women who on becoming pregnant were often dismissed from their employment and had to find other employment in the hidden economy.

Table 3. Numbers of women aged between 15-45 years engaged in occupations in 3 towns

1901	Nottingham	Leicester	Derby
Unmarried	21566	20345	7493
Married	14484	13350	3359
Total	36050	33695	10852
1911			
All	40164	38571	12937

Source: Census Returns, 1901 and 1911.

The details extracted from the 1901 and 1911 census returns illustrated in **Table 3** show this as they are merely classed as Unmarried, married or All, there is no indication as to whether they have children or not. In Nottingham approximately 15% of the population of the town were women of child bearing age and were engaged in employment; in Leicester in 1901 15%, but by 1911 this number had risen to 16%; whereas in Derby the figure was around 10% for both years. The difficulty with interpreting these figures is whether the women had children and if they went out of their home to work. This is something that we may never be able to ascertain, but we can speculate that in this era some women would have had children married or not.

In 1901 the greatest employer of female labour was the textile fabric industry in all three towns, employing both married and unmarried women. In Leicester the Boot and Shoe industry also employed a substantial amount of women. By 1911 textiles was still the major employer but in all three towns, office and service employment were then also important employers. George Newman was greatly concerned with the occupation of mothers and suggested measures to prevent the employment of women within four weeks of childbirth. Without the modern childcare options available many mothers in the nineteenth and early twentieth centuries had to

³⁶ Sir Edward Higgs, *Making sense of the census. The manuscript returns of England and Wales 1801-1901* (London:HMSO, 1989), 81 and 92.

supplement their inadequate income through working either from home or going out to work. Even in rural areas the employment of mothers whether on land or in factories invariably had a detrimental impact on infant feeding and health care.³⁷ However, in Nottingham during 1909 and 1910 the number of mothers who were registered employed seem to be few indeed. Statistics available for the time suggest that only 100 out of 2,055, or 5 per cent were employed away from their homes before their confinement and they intimated that they intended to resume work as soon as they were legally and physically able to do so. These figures have to be taken with some degree of caution as many women were probably employed in work which was not registered. However, this small percentage would seem to have been in line with the rest of the country as Miss Anderson, the Principal Lady Inspector of Factories, told the enquiry into Physical Deterioration that only 9 per cent of the total female population of England above ten years of age came under her preview.³⁸ In Leicester, enquiries revealed that only one third of those questioned went to work regularly and the MOH, HGH Monk, commented in 1898 that a mother's place was at home and not out at work leaving the care of the infants to others.³⁹ Derby too had a low percentage of married or widowed women in employment at the beginning of the twentieth century, between 9 and 10 percent.⁴⁰

The employment of women, particularly those with babies received much criticism because of their alleged poor infant management and negligence and exposure of the children to injurious influences.⁴¹ There appeared one lone voice in favour of women working as they saw it as a safeguard for virtue; women wearied with honest toil do not seek after vice!!⁴² So was female employment as numerous as the authorities made out? Research on Nottingham showed that in 1909 the Sanitary Inspector for Nottingham had interviewed over 2000 women regarding the feeding arrangements for their new born children. Of these one hundred, had been industrially employed in various employments around the town (see **Table 4**) and were intending to resume work as soon as possible. These figures are just a snapshot but give an

³⁷ Sam Sneddon, 'A double penalty? Infant mortality in the Lincolnshire Fens, 1870-1900 in Garrett et al, *op.cit.* (note 17), 95.

³⁸ *Report of the Inter-Departmental Committee on Physical Deterioration*, PP. 1904, CD.2210 (XXXII), Q. 1424 to Miss Anderson.

³⁹ *ARMOH*, Leicester, 1897 and 1898.

⁴⁰ Nolan, *op.cit.* (note 16), 187.

⁴¹ Newman, *op.cit.* (note 5), 262.

⁴² Letter to the Editor *Nottingham Journal* Tuesday 13 September 1864.

indication of the types of work available to women. Of the one hundred, forty three acknowledged their child was illegitimate. Fifty three of the babies born in the investigation, 2.6%, had died before the Inspector's visit. The cause is not disclosed other than they were not still-born.⁴³

Table 4. Employment trades of women in Nottingham, 1909

Trade	No. employed	Trade	No. employed
Blouse hands	4	Packer	1
Box makers	5	Paper sorter	1
Brass bobbin winders	5	Picture gilder	1
Cane worker	1	Pressers (cycle)	2
Cigar hands	5	Printer	1
Charwomen	7	Seamstress	1
Cop winders	3	Silk sampler	1
Hosiery sorters	2	Slip winders	3
Lace-dressing hands	13	Tailoress	1
Lace warehouse hands	21	Upholsterer	1

Source: ARMOH, Nottingham 1909

The lace trade in Nottingham needed female workers but unlike the towns in the cotton areas of Lancashire and Yorkshire, most women worked not within a factory but at home finishing off the lace.⁴⁴ A report from the Factories and Workshops Inspector noted that, “a considerable volume of home work is done ...in connection with the lace trades... Most unsatisfactory...houses are totally unsuitable...In the summer time it is possible to see in the courts and back yards of the slum districts heaps of lace at almost every door.”⁴⁵ One male resident recalled bundles of lace being transported in prams by the women to their homes where it was clipped and scalloped.⁴⁶ Home work may have reduced the need to farm out children but there was still the problem of caring for them adequately while the mother was otherwise occupied with her ‘homework’.⁴⁷ Dyhouse cites the case that in South

⁴³ (A)nnual (R)eport of the (M)edical (O)fficer of (H)ealth , Nottingham, 1909, 141.

⁴⁴ Seaton, *op.cit.* (note 3) 41 and ARMOH, 1893.

⁴⁵ *Annual Report of the Chief Inspector of Factories and Workshops*, Reports and Statistics, Cd.3036 (1906), Report of Inspector Parkes, 102.

⁴⁶ Interviews Nottinghamshire County Council Oral History, (NLSL), A34, male born 1891

⁴⁷ See Julie O’Neill, ‘Family life in the twentieth century’, in J V Beckett, (ed.), *A Centenary History of Nottingham* (Manchester:Manchester University Press), 513-32.

Wales and Durham, areas where very few women took jobs outside the home, infant mortality rates were still higher than in the textile trades suggesting other factors were involved.⁴⁸

Despite the above negative comments from the Medical Officers of Health, the evidence thus far tends to point towards a relatively low proportion of women with children going 'out' to work, even if many took in 'home' work to supplement the family income.⁴⁹ The belief that mothers left their children to their own fate needs to be tempered. Nevertheless, contemporaries believed there was a link between infant mortality, working mothers and maternal ignorance. There is insufficient evidence to make a strong argument for occupational hypothesis; that a working mother's child was more likely to die than those whose mother did not work and stayed at home. However, as Mooney and Tanner have shown, vital connections linking employment in general, feeding methods and infant mortality can be made.⁵⁰

Ignorance and fecklessness in the care of infants by their mother were seen by many contemporary middle class medical men as serious contributors to the high rates of infant mortality. However, the two words should be treated separately as one shows a lack of knowledge and the other, feckless suggests an inability or the lack of interest to understand, which are two very different ideas. Unfortunately the mothers were lumped together which created a one sided view and we do not have the thoughts of the women on this matter. Newman himself wrote, "...it is the ignorance and carelessness of mothers that directly causes a large proportion of infant mortality..."⁵¹ To be able to raise a child successfully during the first year of life was a skill which had to be acquired. Given the inadequate domestic conditions which prevailed in many poorer homes in the three towns, such as a lack of cooking facilities and implements⁵² this skill was not easily gained but it was believed possible to raise the standard of 'mother craft' by means of *education* of the mothers and it was to these ends that the efforts of welfare workers were concentrated at the

⁴⁸ Dyhouse, *op.cit.* (note 10), 25.

⁴⁹ Howarth, Derby and Nottingham see earlier, Leicester?

⁵⁰ G Mooney and A Tanner, 'Infant Mortality, a Spatial Problem: Notting Dale Special Area in George Newman's London', in Garrett et al, *op. cit.* (note 17), 179.

⁵¹ Newman, *op. cit.* (note 5), 221

⁵² For accounts on cooking facilities see chapters in Robert Roberts, *The classic slum*, (Manchester:Manchester University Press, 1971); Ellen Ross, *Love and Toil: Motherhood in outcast London, 1870-1918*, (Oxford: Oxford University Press, 1993) and Anna Davin, *Growing-up Poor: home, school and street in London 1870-1914*, (London:River Oram, 1996).

beginning of the twentieth century. Newman was a great advocate of employing lady health visitors and at the time of writing his book, the numbers of health visitors around the country was increasing.⁵³ All of the MOsH for the three towns set about trying to influence how mothers cared and fed their babies. They did this in a variety of ways but all concentrated on getting women to be seen by Lady Health Visitors or at Clinics.

To avoid many of the problems associated with infant mortality it was considered that women should stay at home with their infants and breast feed them. Many medical men were keen to promote breast feeding because it was considered to be the most natural and best way to feed an infant; “Nine months to bear the child, and nine months to suckle it.”⁵⁴ Mother’s milk provided the child with immunity to micro-organisms which it would face in later life.⁵⁵ “A single ounce of milk well digested, will nourish more than double the quantity when it oppresses the still feeble stomach.”⁵⁶ Modern research during the 1980s has shown that there is no substitute for mother’s milk when certain conditions prevail, ie ignorance about hygiene and poor domestic facilities when given to infants thus reducing the chances of gastro-intestinal infections.⁵⁷ During infancy the gut is working at full capacity in order to absorb the nutrients required for rapid growth. If there are any adverse influences on this process, it will affect digestion and absorption and will ultimately affect growth.⁵⁸

It was around this time, the early 1900s that Nottingham’s Medical Officer of Health, Philip Boobbyer, (1889-1929) conducted a survey (see **Table 6**) into how prevalent breast-feeding was amongst the women who came to the Mother and Babies Welcomes,⁵⁹ the first being opened in 1908 in the Charlotte Street area, a well known slum housing area of Nottingham. The trained visitor and inspector for Nottingham was Miss Winifred Hudston, who visited many families and in her first year

⁵³ Dyhouse, *op. cit.* (note 10), 248-267

⁵⁴ F J Brown, “The first food of infancy” in *Journal of Public Health and Sanitary Review*, (1856), 60.

⁵⁵ R Buchanan, ‘Breast-feeding - Aid to infant health and fertility control.’ *Population Reports*, J4, 52.

⁵⁶ T H Barker, “Nursery government in its sanitary aspects”, in *Journal Public Health and Sanitary Review*, (1856), p. 145

⁵⁷ A S Wohl, *Endangered lives. Public Health in Victorian Britain*, (London:Dent, 1983), 21.

⁵⁸ G J Ebrahim, ‘The problem of under nutrition’ in R J Jarrett, (ed.) *Nutrition and Disease*, (1979), 66.

⁵⁹ These were the forerunner to Baby Clinics.

interviewed 1,192 mothers. Over half of those interviewed promised or professed to feed their infants entirely from the breast, a tenth, for various reasons, fed them almost from the beginning entirely by hand, 67 partly at the breast and partly by hand.⁶⁰ This can be seen as a positive sign, with approximately 90 per cent of women interviewed claiming to breast-feed., nevertheless we have to be cautious because it would have been difficult for the women to have said otherwise to the health visitor as it would have reflected adversely on the mother. During the next six years, the results showed that at least three-quarters of the women interviewed had the intention of breast-feeding. Of course, these figures are only speculative because we do not know how many of the women did actually breast-feed their children and for how long. Nevertheless, even the shortest period of breast-feeding would ensure some immunity to diseases.⁶¹ For employed women the normal period of breast-feeding, which could continue as long as nine months, would be curtailed particularly prior to legislation which outlawed women returning to work in any factory or workshop within four weeks of giving birth. The mothers had to rely on local women who acted as baby-minders⁶² who were often poorly educated and only interested in 'looking-after' as many children as possible to supplement their income. There were unexplained cases of babies dying at the hands of their minders. By repute the minders relied on opiates to keep the children quiet⁶³ and would feed them on totally inappropriate food, such as mashed up remains of the adults' food.⁶⁴ HGH Monk said that crèches where children would be looked after by a trained nurse, could sometimes be found in towns with a relatively high level of female labour was employed but there were none in Leicester.⁶⁵ Tanner and Mooney show that local authority welfare clinics were biased against working mothers whereas the independent crèches tended to accept the need for some mothers to go out to work.⁶⁶ The figures for Nottingham, however, seem to indicate that for a majority of women

⁶⁰ *ARMOH, Nottingham, 1908.*

⁶¹ See also Nolan, *op. cit.* (note 16), 198-199 on length of time that infants were breast fed in Derby.

⁶² The first Mother and Baby Welcome centre in Nottingham, was opened in 1908.

⁶³ W S Jevons, *Married Women in factories, The Contemporary Review*, 41 (Jan 1882), 46; Sneddon, *op. cit.*(note 37), 96.

⁶⁴ *ARMOHPC, Fourth Report, PP.1861,179 (XXII), 659.* See also comments by *ARMOH Leicester, 1897, 1898 and 1899.*

⁶⁵ *ARMOH, Leicester, 1898.* See Tanner and Mooney's discussion of crèches in Notting Dale Special Area, *op.cit.* (note 17), 183-189.

⁶⁶ G Tanner and A Mooney, 'Infant mortality, a Spatial Problem: Notting Dale Special Area in George Newman's London, in Garrett et al *op. cit.* (note 17), 188-189.

on low incomes, breast-feeding was the most obvious choice and that much of the criticism directed at them was misguided.⁶⁷ However, caution must be used when considering the figures as they only refer to a small proportion of women.

Studies, both contemporary and recent, point to the fact that breast-feeding was adopted by most women, whenever possible, but for varying duration.⁶⁸ William Howarth, Medical Officer for Health for Derby in 1905 made enquiries into the extent of breast feeding in Derby between 1900 and 1903, (see **Table 5**) concluding that "...the only children exposed to exceptional risk are those reared by hand and born in the second and third quarters of the year." when climatic conditions came into play. Breast fed babies who died from diarrhoea and epidemic enteritis numbered 8.6 for the same diseases hand fed babies dying numbered 51.7.⁶⁹ In her study of Derby, Nolan, has noted that at least half of the infants visited by the health visitor during the period 1900-1907 were breast fed.⁷⁰ The 1895 Leicester Health Report suggested that most of the deaths from infantile diarrhea were those that were bottle fed and that efforts were being made to encourage more breast feeding.⁷¹ The difficulty with the reports carried out by the individual towns as to how many women breast-fed is that they only refer to a small percentage of women seen and therefore we can only speculate. Two years later in 1897 a survey showed that breast fed infants constituted only 6.9% of diarrhea deaths whereas babies fed on cows and condensed milk constituted 26.6% and 15.7% respectively.⁷² This was followed the next year by similar findings, where again, cow and condensed milk fed by the bottle to infants accounted for 191 deaths whereas breast fed infants accounted for 36 fatalities.⁷³

For many mothers, breast-feeding was not always possible because of their own inability to produce milk, the time constraints involved in breast-feeding or just simply that the infant would not breast feed. Given the premium attached to breast-feeding, any interference with it was singled out for particular attention and censure

⁶⁷ *ARMOH, Nottingham*, 1908. The Notification of Births Act had been adopted in 1908 and had been invaluable to the MOH who had arranged a home visit by a member of staff. The *Nottingham Guardian* 1 August 1908, p.9, col.1, reported The Medical Congress considered the Notification of Births was instrumental in reducing infant mortality.

⁶⁸ Woods, *op. cit.* (note 8), 117.

⁶⁹ Howarth, *op. cit.* (note 20), 210-13.

⁷⁰ Nolan, *op. cit.* (note 16), 158.

⁷¹ *ARMOH, Leicester*, 1895.

⁷² *ARMOH, Leicester*, 1897.

⁷³ *ARMOH, Leicester*, 1898.

by many medical men of that period, the failure to breast-feed was seen as the mother's failing and the cause of much of the high infant death rate. Unfortunately the views of the midwives, employed after the 1902 Midwives Act are not known and unavailable, but as they were employed by the Local Authorities it is possible that they conformed to what the medical men dictated.

Table 5. Number of children breast fed and hand fed in Derby and their related deaths under 12 months

Year	Total no. of births	Breast fed children	Deaths under 12 months	Hand fed children	Deaths under 12 months
1900	2334	1389	94	406	72
1901	2411	1366	96	442	101
1902	2347	1353	89	411	82
1903	2097	1170	89	367	66

Source: William J Howarth, "The influence of feeding on the mortality of infants", *The Lancet*, July 22, 1905

Table 6. Numbers and percentage of women breast-feeding in Nottingham, 1908-15

Method					
Year	No. of mothers visited	Breast-feeding	Hand-feeding	Combination: breast and hand	Percentage breast-feeding
1908	1192	1007	92	67	90%
1909	2005	1641	204	157	80%
1910	2523	1911	246	174	75.7%
1911	2443	2001	220	150	82%
1912	2371				82%
1914	2243	1573	311	255	70%
1915			13%	8%	75%

Source: *Annual Health Reports Nottingham, 1908-1915*

Ignorance of the mother on the correct way of feeding was tackled in Derby by introducing female sanitary inspectors to instruct mothers in their homes on the proper methods of feeding and rearing their babies.⁷⁴ In 1901 a record was begun of the relationship between deaths and methods of feeding. Two important points emerged; first, the proportion of infants who were breast fed was quite low and second, the death rate amongst breast fed babies was lower than amongst the other two groups.⁷⁵ Once again there is conflict between what the Medical Officers were saying about breast-feeding and what the women were actually doing or wanted to do. For many women breast feeding would have been the preferred method because it

⁷⁴ Nolan, *op. cit.* (note 16), 184.

⁷⁵ Howarth, *op. cit.* (note 20) and Nolan, *op. cit.* (note 16), 185.

was cheap, it was available at any time and there was no interference from outside factors. To lay the blame at the mothers was easy for the MOH and diverted the emphasis away from the Local Authority's lack of progress in other areas challenging their ability to control the public health environment,⁷⁶ for example improvements in excrement removal, Nottingham being the prime example.

The alternative to the breast was to hand-feed, which had a detrimental effect on infant mortality because there was so much ignorance associated with hand-feeding.⁷⁷ Hand-feeding for the poor in the nineteenth century seldom involved the substitution of cow's milk for the mother's milk. In 1856, it was suggested that children should be fed on 'good cow's milk' as a substitute for breast-milk if there was need to hand-feed a child, but that many hand-fed children 'pine away' as a consequence of being fed on biscuit, gruel and other articles.⁷⁸ Cow's milk was one of the most adulterated foods in Victorian and Edwardian Britain so it was perhaps fortunate that it was not generally consumed by the lower income groups because it was such a poisonous liquid to give an infant and may have caused even more deaths. Unbeknown to the women there were three major factors against using milk for infant feeding. Firstly, the poor quality of the milk supply; secondly, the inadequate and unhygienic conditions for cleansing utensils; and thirdly, the relationship between contaminated milk and the spread of communicable diseases, particularly diarrhoea and tuberculosis.⁷⁹

There had been attempts to devise breast milk substitutes. These attempts to

⁷⁶ Williams and Mooney, *op. cit.* (note 8), 196.

⁷⁷ McCleary, *Infant welfare movement*, p. 29. See also Mooney and Tanner, *op. cit.* (note 67), 179-183; and Alice Reid, *op. cit.* (note 17), 205-210, both giving detailed problems of artificial feeding.

⁷⁸ F J Brown, 'The first food of infancy', *Journal of Public Health and Sanitary Review* (1856), 59-60.

⁷⁹ Dwork, *op. cit.* (note 8), 59, and P J Atkins, 'White Poison? The social consequences of milk consumption, 1850-1930', in *Social History of Medicine*, 5, 2 (1992), 218. Extra-pulmonary tuberculosis, *Mycobacterium tuberculosis*, manifested itself in other parts of the body and was usually regarded as a separate but related condition. Of these diseases scrofula (infection of the lymph nodes), tabes mesenterica and tubercular meningitis were listed separately until the early part of the twentieth century, when they were classed as general tuberculosis, abdominal tuberculosis and tuberculosis of the brain, respectively. This type of extra-pulmonary tuberculosis, tended to affect children, and as the consumption of milk increased around the turn of the century, so this became more pronounced. The link between cows and tabes mesenterica and other tuberculous infections had been known but its transmission was illusive, although a large proportion of cattle were infected. Richard Perren, *The meat trade in Britain 1840-1914*, (London:Routledge and Kegan Paul, 1978) 63. See also rural opposition found in *Nottingham Evening Post*, 9 April, 1908 p.4, col.5 and *Daily Guardian*, 24 July 1908, p.3, col.3

‘humanise ‘ milk had entailed modifying animal milks in such a way that they corresponded as closely as possible to human milk. This depended on knowledge of the qualitative differences such as the distinctions between protein in bovine and human milk. Many babies reacted adversely to modified cow’s milk because it was much less digestible than human milk. It would seem that the answer was to boil the milk despite objections that there was some loss of its nutritive value. Boiling milk had a dual purpose, not only did it make it more digestible, but it protected against infection.⁸⁰ This essentially simple task could well have been an onerous task for many working-class mothers who had only an open fire on which to cook and were probably ignorant of the fact that boiled milk was less harmful than ‘fresh’ milk.

The usual alternatives to breast-milk were a combination of various liquid pulps made out of the parent’s food or condensed milk. The most popular weaning foods were a mixture of arrowroot, oatmeal and sago, and a mixture known as ‘pap’ made from bread and water and sweetened with syrup or treacle, but quite often the child would be fed on whatever was available; or as quoted in the Report on Physical Deterioration, “a bit of everything we take ourselves.”⁸¹ A two month old infant in Derby was fed on bread, chips, bloaters (a type of fish) and condensed milk!⁸² However, it was in this weaning period that ‘weanling diarrhoea’ became a hazard and the Local Government Board enquiry of 1880s concluded that it was among the most fatal of infant ailments.⁸³ After the age of six months the passive immunity derived from the mother began to decline and new and unaccustomed foods irritated the gut, as well as the change from light to semi-solid foods and of course the ingestion of contaminants and pathogens.⁸⁴ For the contemporary medical men feeding was the most important task for the mother but it was also the source of the problem of infantile diarrhoea. They blamed the mother for failing to carry out her basic motherly tasks. It would have been incongruous for them to admit any liability highlighting their own failures regarding environmental improvements. Once again this fits in with the contemporary view of the woman’s role in the domestic sphere.; looking after the home and family.

⁸⁰ Mephram, *op. cit.* (note 12), 227-236.

⁸¹ *ARMOHPC*, PP.1861, 179 (XXII), p. 192 *Physical Deterioration*, PP.1904, Cd2210 (XXXII), examination of Dr Alfred Eicholz, His Majesty’s Inspector of Schools, 25

⁸² Nolan, *op. cit.* (note 16), 187.

⁸³ *ARMOHLGB*, Supplement to seventeenth report, PP.1889, C5638 (XXXV), Wohl, *op. cit.* (note 57), 22-3.

⁸⁴ Ebrahim, *op. cit.* (note 58), 58.

The most widely used substitute for fresh milk was condensed milk, usually sweetened and skimmed, which was cheap and palatable to the poor. It was dangerous for infants depriving them of essential nutrients, fat and Vitamins A and D which would lead to malnutrition (emaciation or atrophy), rickets and scurvy.⁸⁵ Despite the legislation of 1899 insisting that the tins should be clearly labelled, this would have proved futile because of illiteracy.⁸⁶ This type of milk was harmful to infants, firstly because it had little nutritional value and infants fed on it were likely to slowly starve to death;⁸⁷ and secondly because it usually came packaged in tins and contained sugar in excessive proportions. This problem was compounded by the fact that since tin openers were not universally owned, mothers would request the shopkeeper to open the tin and it would remain open thereafter,⁸⁸ open to the elements where all types of bacteria could attack it. Health authorities may have advised mothers not to use opened tins of condensed milk but budgetary constraints dictated otherwise. The problem was exacerbated by inadequate storage facilities in many of the houses rented by the poor⁸⁹ combined with the inadequate waste facilities⁹⁰ Miss McCleverty, Derby's sanitary inspector, believed that condensed milk was totally unsuitable for infants as a result.⁹¹

It is against this background that the first milk depots were set up. They were based on the *Goutte de Laits*, which had proved so successful in France. The first to be set up in Britain was in St Helens, Lancashire in 1899. In general they provided clean milk and a certain amount of help in the care of the infants, but this varied within the localities. Breast-feeding was strongly promoted, but to demonstrate good bottle-feeding techniques was also considered a priority.⁹² Beaver has suggested that the availability of cheaper cow's milk and improvements in the production of milk by the late nineteenth century may have had some bearing on infant mortality rates. Whilst acknowledging that milk supplied to households must have been contaminated

⁸⁵ The importance and knowledge of Vitamins did not become known until 1912

⁸⁶ Dr F J H Coutts, 'Condensed milk with special reference to the use as infant food', *Public Health and Medical Subjects - Local Government Board, New Series*, 56, (1911).

⁸⁷ Howarth, *op. cit.* (note 20), 213.

⁸⁸ Ian Buchanan, "Infant feeding, sanitation and diarrhoea in colliery communities, 1880-1911", in D J Oddy and D S Miller (eds.) *Diet and Health in Modern Britain*, (London:Croom Helm ,1985) 158.

⁸⁹ Atkins, *op. cit.* (note 79), 214 fn. 34.

⁹⁰ Howarth, *op. cit.* (note 20), 213.

⁹¹ *Ibid.* and Nolan, *op. cit.* (note 16), 188.

⁹² McCleary, *op. cit.* (note 77), 82.

with pathogens, he suggests that ‘if the milk killed many infants, it probably saved far more.’⁹³ This argument has been dismissed by Atkins whose view is that the ‘milk quality was so abysmal that the damage caused by diseases may have outweighed the nutritional benefits.’ He further comments that the poor state of milk was probably responsible for the stubborn persistence of infant mortality rates.⁹⁴ Before the general use of railways to carry milk from rural areas to towns, much of the milk consumed in towns came from the cows kept in town stalls.⁹⁵ The condition of these cowsheds was dire, with the cows, the milkers and the utensils often filthy and unhygienic. Seldom would the milk be sold fresh and was referred to as ‘old’ milk. As well as being old, it had been kept in conditions detrimental to its freshness, and when purchased would be unfit for adults let alone for infants. In Derby milk was kept under conditions where it was virtually impossible to prevent it from becoming contaminated.⁹⁶ At the beginning of the twentieth century although the number of artificially fed infants in Derby was still quite high, only a proportion were fed on cow’s milk.⁹⁷

Leicester’s MoH, C. Killick Millard believed the poorer areas of Leicester were “diarrhea areas” and went on to expand that the method of feeding was the key factor in this high rate of diarrhoea. He was uncertain as to how many infants were hand fed but the reasons why was quite clear; many mothers tried to breast feed their children but after a short time the milk had failed.. Squalor, dirt and neglect were not a universal feature but contaminated and improperly prepared milk was. This prompted the employment of a female sanitary inspector in 1897 who visited the homes of the poor on a regular basis, sometimes making as many as 20 visits to a household. She helped and advised the new mothers on how to feed and bring up their babies as well as checking on the babies themselves as to their weight, size and general appearance. Her work was seen as crucial in improving the standards of health and hygiene within the home. In 1899 she made a great contribution to the welfare of infants when there was a particularly serious outbreak of summer diarrhea;

⁹³ M W Beaver, ‘Population, infant mortality and milk’, *Population Studies*, XXVII, (1973), 246

⁹⁴ Atkins, *op. cit.* (note 79), 226-7

⁹⁵ D M Amos, ‘Food and health in nineteenth century Nottingham’, (Unpublished MA dissertation, University of Nottingham), and Atkins, *op. cit.* (note 80), 218

⁹⁶ Nolan, *op. cit.* (note 16), 155

⁹⁷ Nolan, *op. cit.* (note 16), 162

mothers were taught the correct way of hand feeding their children.⁹⁸ In 1900 to try and combat the problems of using cow's milk, a milk sterilizing depot was opened for infants whose mothers were unable to suckle.⁹⁹ In 1904, 61% of all infant deaths that occurred were under the age of six months and of these 14% were entirely breast fed, 12% partly breast and hand fed but by the far the greatest number 73% was hand fed.¹⁰⁰ Thus showing how dangerous it was to hand feed infants incorrectly.

Similarly Derby, under the guidance of the MoH embarked on policies of welfare aimed at protecting infant life.¹⁰¹ Dr Iliffe seemed a lone figure in the struggle and appeared powerless to cope with the problem and even when his successor Dr Howarth took over there did not appear to be a turning point until 1900 when he recommended the appointment of two female sanitary inspectors. Their success can be measured by the fact that the number of breast fed children rose from 54% in 1902 to 83% in 1913. But more importantly there was a noticeable reduction in infant mortality, once again suggesting that breast feeding improved the lives of infants.¹⁰² Between 1910 and 1914 the infant mortality rate fell indicating that the adoption of breast feeding by an increasing number of Derby's mothers was probably the major factor accounting for this improvement.¹⁰³ Following on the success of the health visiting in 1910 the town's first Mothers' and Babies' Welcome was opened in the town.¹⁰⁴ According to Nolan this close physical contact between health visitor and new mothers was the key element to reducing infant mortality in Derby.¹⁰⁵ In her research on health visiting in Derbyshire, Alice Reid has found that visiting together with other measures such as the registration of births, encouragement to breast feed and dissemination of knowledge on safe artificial feeding and the control of the milk supply all helped in reducing infant mortality.¹⁰⁶

Nottingham did not establish such a milk depot, but in 1908, volunteers under the guidance of Boobyer, set up the 'Mothers and Babies' Welcomes' which essentially carried out the same sort of programme. Unfortunately evidence as to how

⁹⁸ *ARMOH, Leicester*, 1887 and 1899.

⁹⁹ *ARMOH, Leicester*, 1897, 1900, 1905 and 1906.

¹⁰⁰ *ARMOH, Leicester*, 1904.

¹⁰¹ Nolan, *op. cit.* (note 16), 177.

¹⁰² Nolan, *op. cit.* (note 16), 197-8 and 202.

¹⁰³ Nolan, *op. cit.* (note 16), 203

¹⁰⁴ Nolan, *op. cit.* (note 16), 203.

¹⁰⁵ Nolan, *op. cit.* (note 16), 341.

¹⁰⁶ Reid *op. cit.* (note 17), 191-210.

well these Welcomes assisted is not available and there is no clear evidence as to what effect they had on the reduction of infant deaths. As the Mother and Baby Welcome in Nottingham, the Leicester milk depot was situated right in the centre of the town in the midst of where infant mortality was at its highest.¹⁰⁷ This proved to be quite successful as 1906 had an exceptionally hot and dry summer and autumn. This meteorological phenomena was when diarrhea and especially infantile diarrhoea was at its highest. Parents would bring their children to the depot, sometimes too late, but it showed that they were beginning to take notice of efforts to help them.

The alternatives to condensed milk were proprietary (patent) infant foods, made by Leibig, Allenbury, Nestlé and Berger. The first of these, Leibig's, came onto the market in 1867. It was claimed that these feeds were 'A substitute for breastmilk which entirely fulfils the conditions which are necessary in a perfect food adaptable for the use of infants from birth.'¹⁰⁸ The medical profession had severe reservations about the value of these feeds and nearly fifty years later, Dr Ralph Vincent, a witness to the enquiry, told the Physical Deterioration Committee that, "... the use of artificial food was absolutely fraudulent and deleterious - many do not provide a food at all in the proper sense of the word."¹⁰⁹

The contents of these foods were not the only problem since the use of them, in conjunction with bottles and teats, created a lethal combination of dirt and infection for the infant. Because of the economics involved, ginger-beer bottles and other containers were used in conjunction with the newer rubber-teats and the old leather teats, or even bits of old cloth or rag, to allow the infant to suckle. It was noted in a report that habitually improperly fed infants contribute to the deaths from diarrhoea.¹¹⁰ Influential medical journals had highlighted the damage caused by the way food was given to a child which was often too thick for the child to digest properly and resulted in purges having to be administered.¹¹¹ The baby food companies of today have been criticised for selling powdered milks to Third World countries because the lack of sanitation, clean-water and illiteracy leads to over-dilution and contamination

¹⁰⁷ *ARMOH, Leicester*, 1906.

¹⁰⁸ Mephram, *op. cit.* (note 12), 242.

¹⁰⁹ *Physical Deterioration*, PP.1904, Cd2210 (XXXII), Q. 12053, examination of Dr Ralph Vincent, Doctor to Infants School at Hampstead, 442.

¹¹⁰ *ARMOHPC*, PP.1860, 2736 (XXIX), Second Report.

¹¹¹ Isaac Pidduck, 'The causes and prevention of infant mortality', *The Lancet*, 31 December, 1864, 744.

of the feed.¹¹² A consultant paediatrician at Edinburgh Royal Infirmary summed up the problem experienced today:

‘It is clear to all but those who will not see that informed, adequate and relatively safe bottle feeding must follow, or at least accompany, but never precede literacy, education, infection-free water supplies, sanitation and a standard of living which permits the purchase of enough baby foods, equipment and sterilisation.’¹¹³

Poor water supplies, lack of equipment and insufficient knowledge on baby feeding preparation were all present in Victorian and Edwardian England and the problem of efficient cleansing of the equipment, led to many children suffering from diarrhoea as a result.¹¹⁴ Even in more rural areas these problems still existed as pointed out by Sneddon in his examination of the Lincolnshire Fens.¹¹⁵

The evidence so far tends to refute any suggestion the idea that mothers were uncaring when it came to looking after their babies. Many tried or intended to breast-feed but it was not always possible; hand feeding was always difficult given the basic facilities available, such as poor access to clean water, washing arrangements, the nature of the alternative food available and the problem of sterilizing equipment. It was only when an integrated approach was taken to implement measures relating to the mother, child and the environment that improvements were able to be seen. Until that time the condemnation of mothers by the authorities fitted in with the presiding belief that a woman’s place was in the home and caring for the family and any deviation was at the crux of the problem.

Illegitimacy

Historical evidence from Germany in the late nineteenth century indicated that a key factor in the higher mortality of illegitimate children was that unwed mothers were less likely to breast-feed their children and to wean the child at an earlier age. A similar result has been found in England at the turn of the century.¹¹⁶ A combination of illegitimate births and the mother having to work appeared to be influential in infant mortality. Women who had illegitimate babies and we can only speculate that they were not married, were under great pressure, trying to keep themselves and their

¹¹² Open University, *Third World Studies*, U204, Block 4, (1989), 43.

¹¹³ Dr James Farquhar, as quoted in Andrew Chetley, *The politics of baby foods. Successful challenges to an international marketing strategy*, (London:Pinter, 1986) p.29

¹¹⁴ Wohl, *op. cit.* (note 57), 22.

¹¹⁵ Sneddon, *op. cit.* (note 17), 96.

¹¹⁶ Knodel and Kinter, *op. cit.* (note 13), 399- 405.

baby with limited options for work and housing available and according to the Medical Officers were guilty of neglecting their children. However, given the proportion of illegitimate births to legitimate they accounted for only a small proportion of infant deaths.

One factor of motherhood which was pertinent to both Nottingham and Leicester was illegitimacy. Women or girls, who had illegitimate children, were always going to have to work to keep themselves and their offspring, even more than legitimate babies, and this compounded their problems. In Nottingham twice as many illegitimate babies died from diseases attributed to their poor feeding, through diseases such as diarrhoea, atrophy, debility, and wasting diseases than from any other causes.¹¹⁷ It must be assumed that this was associated with a lack of finances., if they had to return to work shortly after the baby was born in order to earn money the baby would be weaned early on the suspect and dangerous mixtures already discussed. Boobbyer commented that, “The lack of a husband in the case of such mothers’ almost necessarily entails their industrial employment.”¹¹⁸ Illegitimate children in urban areas faced accumulated hazards compared to legitimate rural births and were always considered more at risk from early deaths because of the ‘common lack of solicitude on the part of the mother for their welfare’. In 1909 it was claimed that the average death-rate among illegitimate children was twice that of children born in wedlock.¹¹⁹ Once again the role of the mother was paramount and Newman’s view of motherhood was overriding.¹²⁰ A home for unmarried mothers was eventually established in Nottingham in 1920.¹²¹

We are fortunate that the MoHs for Leicester systematically recorded the deaths for both legitimate births and illegitimate births (**Table 7**). MOH Killick Millard commented that, “ The contrast (with legitimate children) was so terribly great that one is driven to the conclusion that only deliberate neglect in many cases can account for it.... It is evident that whilst mortality amongst legitimate infants is decreasing, the mortality among illegitimate infants has in the past four years shown a

¹¹⁷ *ARMOH, Nottingham* 1907, 1914 and 1915.

¹¹⁸ *ARMOH, Nottingham* 1909, 141.

¹¹⁹ *ARMOHLGB*, Thirty-ninth Report, PP.1909, Cd5263 (XXXIX), supplementary report on infant and child mortality.

¹²⁰ Newman, *op. cit.* (note 5), 257.

¹²¹ *ARMOH Nottingham* 1916-1928.

decided increase.¹²² It can be seen from Table 6 that mortality among illegitimate infants was much higher than those of the legitimate, often accounting for more than one third increase.¹²³

Table 7. Deaths of infants both legitimate and illegitimate per 1000 births in Leicester

Year	Legitimate births	Illegitimate births
1895	200.6	330.6
1896	179	335.8
1897	206	360.8
1898	191	375.4
1899	182	401
1901	178	347
1902	150	273
1903	159	213
1904	155	318
1905	139	295
1906	154	486
1907	122	377
1908	123	291

Source: ARMOHs, Leicester, 1895-1903 and 1908

Enquiries, both before and after our period (1890-1910) concluded that the precise measure of the influence of neglect, illegitimacy, working mothers etc. could not be determined. The part played by illegitimacy was a difficult one - although its effect is probable on individual health, its effect on the gross mortality in an entire district could be small.¹²⁴

Research in Derby has shown that only a small proportion of deaths of infants could be attributed to illegitimacy, between 2% and 4%. The death rate amongst illegitimate babies was not a significant factor in the overall infant mortality rate because of the relatively low proportion of illegitimate births to total number of births. Nevertheless, action was taken to look after the unmarried mother and her child at the end of hostilities in 1918.¹²⁵

Domestic and municipal sanitation and living conditions

Of the other factors which may have influenced infant mortality rates, domestic and municipal sanitation and living conditions were considered of equal

¹²² ARMOH, Leicester, 1908.

¹²³ ARMOH Leicester, 1895-1903.

¹²⁴ ARMOHPC, Fourth Report, PP.1861, 179 (XXII), Appendix V, enquiry into excessive mortality of young children, 653, Seaton, *op. cit.* (note 3), 41. ARMOHLGB, Forty-seventh Report, PP.1918, Cd9169 (XI), p. xxix.

¹²⁵ Nolan, *op. cit.* (note 16), 229-230.

importance. Several studies made since the decline of infant mortality have examined the individual causes to try and resolve the matter. In the 1930s Titmuss found that the environment in its widest sense of the term was the main determinant in deaths of infants between the ages of 1 and 12 months.¹²⁶ More recent work has shown that although the environment played its role in keeping the death rate of infants high in all three towns, the sanitary conditions were extremely bad but the timing of improvements in these conditions does not sit with the improvements in infant survival.¹²⁷

C H Lee has shown in his study of regional inequalities that infant mortality *was directly* linked to high-density living, especially housing density (the number of people per room) and urbanisation.¹²⁸ Williams has shown that whilst the environment played a part in the variations in infant mortality, other factors such as geography, socio-economic and the season also played a contributory part.¹²⁹

From the earliest health reports for Nottingham there had been a link between poor housing, which usually encompassed overcrowding, cramped living conditions and poor sanitation, with infant mortality. The main areas of high infantile deaths were in the districts of north-west Nottingham, north-east Nottingham and south-east Nottingham, all three districts having an excess of population over acreage. The north and south-east districts were the poorest areas and low lying with damp and porous sub-soil. The south-east district encompassed the Red Lion Street area which was recorded as having a population of 510 persons per acre compared to the overall Nottingham record of 24. Again the highest numbers of diarrhea cases were also reflected in these same districts.

Table 8. Number of deaths from diarrhea in Nottingham and number and percentage of those infants under one

Year	Number of all deaths from diarrhoea	Number of deaths infants under one and percentage to All
1890	185	122
1897	530	426 (80.4%)
1904	346	291 (84%)
1906	375	309 (82%)

¹²⁶ Titmuss, *op. cit.* (note 2), 60.

¹²⁷ E Hall and M Drake, 'Diarrhoea: The Central Issue?', in Garrett et al, *op. cit.* (note 17), 168, Amos, *op. cit.* (note 12), Chapter 6 and Nolan, *op. cit.* (note 16).

¹²⁸ Lee, *op. cit.* (note 14), 63.

¹²⁹ Williams, *op. cit.* (note 8), 89.

1908	171	142
1909	163	130

Source: ARMOH, Nottingham 1890-1909

This is comparable to areas of Leicester where the MoH in 1902 suggested that the question of infant mortality was bound up with town and country life and although poverty and ignorance existed in the country infant mortality was usually lower than in urban areas; it was not just a case of housing and sanitation it was a question of density of population in a given area. Deaths were particularly rife in old and poor class properties and in thickly populated areas.¹³⁰ Over the period 1890-1910 the districts of Newton, St Margaret's, Wyggeston and Latimer had the highest deaths recorded for under one year old, with Wyggeston having the highest recorded number of deaths. These four districts also recorded the highest number of cases of diarrhea for all ages. All four districts were in the older parts of Leicester and were low-lying with soil contaminated by filth and many of the houses had soil floors.¹³¹

Similarly in Derby overcrowding was regarded as a factor in determining rates of infant mortality.¹³² The most overcrowded wards were Kings Mead, Bridge and Castle and their respective infant mortality rates were 211, 165 and 152, the highest amongst all the wards in 1902. As Nolan states, overcrowding tends to facilitate the spread of infectious disease especially diarrhea which was high in the three wards. However, Nolan was unable to ascertain whether the declining infant deaths after 1900 were influenced by a reduction in overcrowding due to decentralization of the population but may have been counter-balanced by the demolition of slums and the crowding together in other areas.¹³³

Overcrowding had been shown to be a significant problem in housing by contemporary commentators. However, Newsome's investigations in 1910 were unable to prove the connection between overcrowding and infant mortality.¹³⁴ Watterson concluded that urban development, provided that it took place in a controlled way, may have had a more dramatic effect on the decline of infant mortality than other factors.¹³⁵ Stocks has shown that density per room is more problematic than density per acre and its effects were far and away more serious at

¹³⁰ ARMOH Leicester, 1901.

¹³¹ ARMOH, Leicester, 1904.

¹³² Nolan, *op. cit.* (note 16), 140.

¹³³ Nolan, *op. cit.* (note 16), 140-42 and also see Amos, *op. cit.* (note 18), 67-72.

¹³⁴ ARMOHLGB, Thirty-ninth Report, PP.1910, Cd5263 (XXXIX), 61-2.

¹³⁵ Watterson, *op. cit.* (note 8), 468.

pre-school age.¹³⁶ This is because the more people who are living in only a couple of rooms the more likely diseases are spread between the occupants and infants would have been likely to have caught infections from older siblings who were either at school or played outside with other children.

The study of the three towns thus far suggest that it is not conclusive that overcrowding or poor housing was the over-riding factor for high infant mortality and the evidence so far seems to pose more questions than it answers. Although it is well accepted that urban areas suffered more infant mortality than rural areas, there were variations within those urban areas and other factors such as geography, socio-economic and the seasons played their part.¹³⁷ Woods *et al* warned , ‘One should not be tempted to believe that the relationship between infant mortality and urbanisation was always straightforward.’¹³⁸ Williams has shown in her investigation of Sheffield that housing and sanitary conditions are likely to be different at the micro-level, from one street to the next and from one court to another, as it is at the macro-level.¹³⁹ Similarly Mooney and Tanner have also suggested this after examining Kensington.¹⁴⁰ This suggests that there was a local factor which affected different towns and even parts of the same town.

In Nottingham, the one local factor which had a dramatic affect on the mortality figures was the inefficient excrement removal system within the borough.¹⁴¹ Since the mid-nineteenth century various commentaries had noted that there was a link between excrement removal, privies, cesspools and their location in relation to dwelling houses and the increased rates of both adult and infantile diarrhoea (**Table 8**).¹⁴²

The problem of the pail-system for removing excrement was to be highlighted as being a serious problem for the health of the town by Philip Boobbyer., again and again. He was only too aware that the use of pail-closets was related to the number of cases and deaths from typhoid (enteric) fever and diarrhoea, especially infantile

¹³⁶ P. Stocks, ‘ The association between mortality and density of housing’ , *Proceedings of the Royal Society of Medicine (Epidemiology Section)*, 27 (1934), 1144 and 1146.

¹³⁷ Watterson, *op. cit.* (note 8),, and Lee, *op. cit.* (note 14),

¹³⁸ Woods *et al*, *op. cit.* (note 8), 354.

¹³⁹ Williams, *op. cit.* (note 8), 92.

¹⁴⁰ Mooney and Tanner, *op. cit.* (note 17).

¹⁴¹ See also Wohl, *op. cit.* (note 57), Chapter 4

¹⁴² ARMOHPC, Second Report, PP. 1860, 2736 (XXIX), Report by Dr Greenhow into diarrhoeal of England, 126.

diarrhoea, every year.¹⁴³ He demonstrated this by showing that typhoid had rapidly diminished in other large towns where practical sanitation had developed. The most convincing evidence was the Local Government Report, which showed that Leicester, a town with a similar population and characteristics, including the manufacture of textiles, in contrast to Nottingham, had begun to phase out the pail closet and replace them with water closets in the 1890s and by the end of our period, 1910 diarrhoea had been reduced by 25%.¹⁴⁴ Leicester's early form of excrement removal had been ashpits and midden privies. In an effort to lessen the effects of "miasma", the council purchase 7,000 pails. However, it soon became obvious that much of the sickness in the town was due to this system and in 1896 it was decided to rid them of the pails and change over to the use of water carriage. An examination of other districts within the Nottingham reveals that they, too suffered from infantile diarrhoea but not to the same extent as the north-east and south-east. The south-west district had, by the beginning of the twentieth century, developed into the area now commonly known as the Meadows and although much of this housing was relatively new, and supposedly constructed of better quality materials, not all the properties were built to high standards and its cheaper rents attracted the lower paid workers. The area also contained many of the common lodging houses, already associated with poverty. The north-west district contained some of the new suburbs, such as Hyson Green, Carrington and Sherwood where the housing was of a better quality and occupied by better-off artisans and there was a significantly lower death rate.

By 1908, it was noticeable to the health authority in Nottingham that there was a connection between defective scavenging, the use of dry closets and the unacceptable rates of infant mortality. This was reinforced by diarrhoeal mortality being reduced in other large towns such as Leicester, Manchester, Salford and Birmingham, by radical reform of their excremental removal system.¹⁴⁵ This was borne out in the following year when Newsholme made the link between the two and stated that the Board had written to various sanitary authorities urging them to convert from pail closets to the modern water closet. Nottingham and Leicester were

¹⁴³, Philip Boobbyer, 'Typhoid fever in midden towns', *Public Health 1896-7*; C. Creighton, *A History of Epidemics in Britain*, Volume 2, 2nd edition, (Cambridge: Cambridge University Press, 1891-94), 222, has also written that the medium of milk was a possibility but that it could not be responsible for the bulk of the disease.

¹⁴⁴ *ARMOHLG*, Thirty-eighth, Report, PP.1909, 4935 (XXIX) xxvi.

¹⁴⁵ *ARMOH, Nottingham*, 1908.

singled out as contrasting experiences. Nottingham had excessive incidence of diarrhoea and enteric fever where over half the city was served by pail closets. Leicester, on the other hand, had begun to adopt the water closet far more rapidly and the results were quite apparent with an initial reduction in typhoid fever to be followed then by a reduction in diarrhoeal deaths. Comparing the first with the last quinquennial period, (see **Table 9**) the diarrhoeal death-rate had fallen by 30 per cent in Leicester, and had increased by 17 per cent in Nottingham; while the death-rate from typhoid fever had fallen by 78 per cent in Leicester, compared to 43 per cent in Nottingham. Comparing the quinquennial periods 1889-93 and 1899-1903, in Leicester the typhoid mortality declined by 49 per cent but rose 15 per cent in Nottingham and this was despite the number of alleged new water-closets fitted in new houses. The two towns had similar populations, Leicester 240,000 and Nottingham 260,000. The experiment was considered trustworthy and Newsholme concluded that, if Nottingham was to adopt a similar system to Leicester, then the death rates from the two diseases would be reduced.¹⁴⁶ Newsholme stressed this point in his investigation into Infant and Child Mortality comparing Nottingham with Leicester, and pointed out that the average death-rate in 1889-93 in Nottingham was 37.9, whilst in Leicester it was 52.3. By 1909 the roles had reversed, in Nottingham it was 36.2 and Leicester 24.9, a fall of 4 per cent and 52 per cent respectively.¹⁴⁷ Following a very detailed investigation, several recommendations were made but the one which was relevant to Nottingham was that all other measures would fail to achieve their aim, while the authorities continued to condone an inefficient scavenging system and use the dry-closet method rather than water-carriage in compactly populated districts. It was suggested that financial cost should not be a consideration when the lives of people were at stake.¹⁴⁸ The Health Report for 1910, although showing a lower than normal rate of deaths from diarrhoea, caused Boobyer to ponder its epidemiology. The weather conditions had been unfavourable due to cold, wet conditions during the summer period, yet there was still a concentration of fatalities in Narrow Marsh, Barker Gate, Meadow Platts and Old

¹⁴⁶ *ARMOHLGB*, Thirty-eighth report, PP.1909, Cd4935 (XXIX), Medical Officer's Report, xxv-xxvii.

¹⁴⁷ *ARMOHLGB*, Thirty-ninth report, PP.1910, Cd5263 (XXIX), 66. A recent publication on health in Leicester, Clive Harrison, *In sickness and in health*, (Leicester:Leicester City Council, 1999), suggests that Leicester had one of the highest and most persistent infant mortality rates

¹⁴⁸ *ARMOHLGB*, Thirty-ninth report, PP.1910, Cd5263 (XXIX), 77

Sneinton and between St Ann's Well Road and Carlton Road - areas within the south-east and north-east districts. Over three-quarters of the deaths occurred in the age group 0-1 year old and it was concluded that the deaths were indicative of the poor sanitary conditions.¹⁴⁹

Table 9. Comparing death rates in Nottingham and Leicester, 1889-1908

Period	Leicester				Nottingham			
	Mean death rates		Proportional figures		Mean death rates		Proportional figures	
	Diarrhoea per 1000 births	Enteric Fever per 1000 births	Diarrhoea	Enteric Fever	Diarrhoea per 1000 births	Enteric Fever per 1000 births	Diarrhoea	Enteric Fever
1889-93	48	0.19	100	100	31	0.26	100	100
1894-98	49	0.18	103	94	40	0.26	127	99
1889-1903	36	0.1	76	51	40	0.3	128	115
1904-08	33	0.04	70	22	37	0.15	117	57

In this table mean-death rates for quinquennial periods are given.

Source: *ARMOLGB, 1909*

The state of sewage disposal in Derby was of a similar nature. There were over 400 courts in the town and few of these had water closets; but the poor sanitary arrangements were not just confined to poor areas as a census in 1893 revealed that out of the 19,969 houses only 7,520 had water closets. Derby, too suffered from a lack of management of sewage removal with some privies not being emptied for months.¹⁵⁰

Furthermore, these factors were influenced by the seasonal effect of diarrhoea and suggest that the seasonal effect operated in two ways. Firstly, it identified particular areas within the urban environment, usually areas lacking in sanitary facilities resulting in a high number of infant deaths regardless of the socio-economic status. Secondly, infants from particular socio-economic groups, usually the very poor and regardless of where they lived were most vulnerable to the disease. Thus each component had an independent yet additive contribution.¹⁵¹ Williams has suggested that mortality rates varied not only geographically within a borough and within streets, but also according to the socio-economic status of the inhabitants of a micro-area.¹⁵² Climatic conditions had a great effect on the prevalence of diarrhoea and were more noticeable during the summer months and early autumn, especially when it was hot and dry. The piles of rotting waste, animal manure, particularly that of the horse, the loose, moist sub-soil containing organic rotting matter, were all

¹⁴⁹ *ARMOH, Nottingham* 1910.

¹⁵⁰ Nolan, *op. cit.* (note 16), 113

¹⁵¹ *ibid.* p 89

¹⁵² Williams, *op. cit.* (note 8), 73

breeding grounds for flies.¹⁵³ In recent research Wilson has shown that there is a clear positive correlation between the number of warm/hot days with maximum temperatures of 21 degree celcius or more and the number of infant deaths from diarrhoea for the period 1905-1916 when most houses still had pail closets but when the conversion to water closets had been completed by 1926 there is no correlation.¹⁵⁴ The hot dry summers of 1893, 1895, 1897, 1901 and 1908 produced high death rates in Nottingham. Conversely the reduced figures for 1902 reflected a cooler, wetter summer. Woods *et al* have examined the Registrar General's Report for 1911, an exceptionally hot summer, and summarised that the hot, dry summers during the 1890s, together with the urban environment, increased the rate of infant mortality from diarrhoea.¹⁵⁵ Summer infant diarrhoea clearly was of considerable importance in influencing the annual rate of infant mortality.¹⁵⁶ In Leicester the infant death rate for 1902 reflected not only a cooler, wetter climate but also the relaying of faulty and old sewers, with 139.5 deaths per 1000 births.¹⁵⁷ In her study of Derby, Nolan has also shown that the years 1893, 1895, 1897 and 1901 were also responsible for a greater number of deaths, particularly during the third quarter, July, August and September.

Williams found in her survey of Sheffield¹⁵⁸ that the accumulations of domestic refuse, found near to houses, were transported into the houses on the soles of the feet and in clothes where more putrefaction continued, adding to the already dirty state of the dwellings. The transference of filth from outside of the house to the interior made the latter a potentially dangerous place for babies and toddlers who would be crawling around the floor, transferring dirt and bacteria from the floors into their mouths and thus causing diarrhoea to reach epidemic proportions in many poor neighborhoods. One way of reducing the problem suggested by HGH Monk, MoH for

¹⁵³ ARMOH, *Nottingham* 1889 and W M Frazer, *The history of English public health, 1834-1939*, (London:Balliere, Tindall and Cox,1950), p. 333. Naomi Rogers, "Germs with legs. Flies, disease and the new public health", *Bulletin of the History of Medicine*, 63, (1989), 600-1. Until the late nineteenth century the common house fly had been an accepted part of the domestic environment; considered a pest but not dangerous. But by the first decade of the twentieth century the fly had been transformed into an enemy. Insects in the home were beginning to be seen as a sign of insanitary living conditions.

¹⁵⁴ John Wilson, *Studies on Weather and public health in Nottingham 1905-1926*, paper for publication in *Royal Meteorological Journal* "Weather".

¹⁵⁵ Woods *et al*, *op. cit.* (note 8), 362

¹⁵⁶ R Woods and N Shelton, *Atlas of Victorian mortality*, (Liverpool:Liverpool University Press, 1997), 57.

¹⁵⁷ ARMOH, *Leicester*, 1903.

¹⁵⁸ Williams, *op. cit.* (note 8), 71-94.

Leicester was to remove the old soil floors and replace it with concrete floors.¹⁵⁹ However, this does not appear to have been seriously considered.

However, in their work on the causes of the decline in infant mortality, Woods *et al.* whilst conceding that ‘the health of towns movement did make significant advances possible’, evidence from 1911 shows that epidemic diarrhoea could still prove a potent short term influence on infant mortality rates.¹⁶⁰ Nevertheless, the evils of the environment failed completely to explain the excess of infant mortality. Recent examinations have been carried out on this subject by Watterson; Woods *et al.*; Watterson; Lee and Williams,¹⁶¹ all of whom see the causes of infant mortality as being multifarious.

Conclusion

By the beginning of the twentieth century the health authorities for England were proud of their achievements in reducing the general death rate through a variety of environmental factors such as improvements in housing and sanitation. Unfortunately these improvements had had little effect on the infant mortality rates. At the end of the nineteenth century and beginning of the twentieth century these rates were a sobering reminder of the fact that whatever strides had been made in relation to adults there was still a long way to go with respect to infants.¹⁶²

Of the three towns under discussion it was expected that Nottingham and Leicester would have had the higher infant mortality rates as these were quintessential industrial towns employing a large number of women. The fact that Derby, too, had a high rate, was perhaps not so expected, in that it was less industrial in terms of employing women and served an agricultural hinterland. However, the three towns experienced comparable conditions with respect to the environment and with infant mortality rates. In all three towns there was heavy criticism from the authorities, of the mother for going out to work, but the evidence presented suggests that the numbers who fell into this category was not as high as expected, compared the numbers of women in northern textile towns. Methods of feeding infants were also similar with most women in each town indicating they wanted to breast feed their infants. The alternative was to hand feed which held considerable drawbacks. Of the

¹⁵⁹ ARMOH, *Leicester* 1896 and 1900.

¹⁶⁰ Woods *et al.*, *op. cit.* (note 8), 130.

¹⁶¹ Watterson, *op. cit.* (note 8), Woods *et al.*, *op. cit.* (note 8), Watterson, *op. cit.* (note 8), Lee, *op. cit.* (note 14), Williams, *op. cit.* (note 8).

¹⁶² Wohl, *op. cit.* (note 57), 39.

three towns Derby seems to have made the earliest efforts to reduce infant mortality by its introduction of health visitors and changes in milk supply and happily this had had the effect of reducing the numbers of infants dying. Nevertheless Nolan argues that the distinction between factors relating to the physical environment and those involving the mother are somewhat arbitrary.¹⁶³ Leicester had also by 1901 introduced health visitors, but there had already been a reduction in infant mortality before this date and this may be accounted for by the removal of pail closets and the introduction of water closets. Evidence for Nottingham shows that it was slow to get to grips with the problem of infant mortality and although it had applied for two lady health visitors the introduction of the Baby clinics did not begin until 1908.

The problem of accounting for illegitimacy as a cause of infant mortality cannot be conclusively determined. There is insufficient evidence available but it is possible to suggest from the death figures that legitimate children stood a far better chance of surviving than those born illegitimately on the grounds that they were most vulnerable to outside influences from their mother to the environment.

Improvements in environmental conditions were a major consideration in reducing the general death rate. Unfortunately they do not appear to have had a similar effect on infant deaths. Contemporary and present day studies have looked at housing, overcrowding and excrement removal without a conclusive answer, only suggesting that all three had a role in the deaths and when compounded by unfavorable climatic conditions and the spectre of poverty they significantly increased the risk of fatalities. Both Leicester and Derby had begun to improve their excrement removal around the time that there was a noticeable fall in infant deaths which suggests this had some influence. However, Nottingham's inability to improve its excrement removal system until 1920 certainly cannot have helped conditions but infant deaths had begun decline by 1910 posing the question why should one town which had failed to make improvements see a decline in deaths as the other two where improvements had been made? In each of the boroughs measures were taken which had the effect of reducing infant deaths. For Derby it was principally the introduction of the health visitor. For Leicester it was the introduction of the water closet. We can only speculate that in Nottingham it was a combination of improved infant and maternal welfare and improved diet which helped reduce the deaths of

¹⁶³ Nolan, *op. cit.* (note 16), 28.

infants.

By the end of the nineteenth century contemporaries began to recognize the problem of infant mortality but their understanding of this anomaly was focused principally on the role of the mother and how she raised her infant. This thinking fitted into the period, where many problems were assumed to lay with the individual rather than the physical environment. However, this distinction could be regarded as somewhat arbitrary as both sets of influences would have had some bearing and it would be difficult to separate them. Nevertheless the growth of social intervention in terms of better sanitary conditions, improved milk supply, legislation such as the Notification of Births Act 1906 and Midwives Act 1902 and the growing health department all assisted the MOH to better understand the causes and solutions for improving the lives of infants. Individually these factors taken to improve conditions and reduce the number of deaths had little effect but when brought together progress was made into reducing this sad loss of young life.