Mother's milk and infant death in Britain, circa 1900-1940

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Milk as nutrition, as the essence of motherhood, as white symbol of purity and as icon of commercial advertising: all are familiar. But what about milk as harbinger of death? My contribution to this journal issue is to reconstruct the darker side of the most popular of infant foods.

Introduction

Tracing one's family tree over the internet has become a growth industry in recent years and an fascinating exercise in virtual history. The Mormon website in particular (www.familysearch.org) is an extraordinary mine of information, based upon carefully collected parish register and other data stretching back in some locations for over three hundred years. It is possible to confirm existing knowledge of pre-1900 relations and to start new avenues of enquiry. I have found that my ancestors of the paternal side have been in Liverpool for at least the last 170 years, starting in Upper Beau Street in Everton, then moving to Bootle, and then to Great Crosby, a familiar status migration of working class people moving up the social gradient to a middle class suburb. One of the surprising discoveries was how often certain names cropped up, such as Charles Atkins or Alfred Atkins, sometimes twice or three times in just a few years. I wondered at first whether different branches of the Atkins clan were christening their children at the same church but it seems more likely that high rates of mortality in the nineteenth century led disappointed parents to recycle the names of dead infants. Burying babies and starting again is something that we associate today with poor countries in the developing world, but the experience was also common in Britain before the First World War.

The real origin of my interest in infant death actually has nothing to do with genealogy, however, nor even with population history. I am a specialist in the history of food systems, particularly perishable foodstuffs such as dairy foods, and in recent years I have been researching the health consequences of food consumption. Since milk is a good medium for the transmission of a wide variety of diseases, I have looked at the resulting morbidity and mortality.

The present paper will give a brief overview of contamination and disease in Britain's milk supply between 1880 and 1940, with particular reference to the impact upon infants. Not surprisingly, young children consumed a substantial proportion of market milk and, as a result, they seem to have suffered heavily from diseases such as bovine tuberculosis and summer diarrhoea. I will ask why these children were not wholly breast-fed and why relying upon artificial foods was such a risk. Finally, I want to give a preliminary report on my findings from data I have collected on the feeding of over three million infants, as recorded in the Medical Officer of Health Reports of 130 Local Authorities, mainly from England and Wales.

Disease and contamination

Because of poorly regulated conditions of production, much milk was heavily contaminated in the late nineteenth and early twentieth centuries. The new science of bacteriology demonstrated this. In about 1900, up to one third of samples of London milk contained pus from the diseased udders of country cows and in Manchester only 4.2 per cent of samples were found to be 'clean'. Particles of manure, dust from the cowshed, dirt from the railway wagon: all of these made milk a dangerous cocktail for those who drank it raw. Its nutrient mix also made it the ideal breeding ground for a wide variety of diseases.

Atkins (1992, 216) discusses the main diseases that can be transmitted through milk. They are viral, ricksettial, bacterial and protozoal, with helminths and toxicoses also possible. The deadly list includes well-known afflictions such as anthrax, botulism, brucellosis, cholera, diphtheria, dysentery, enteritis, E. coli, gastroenteritis, giardiasis, hepatitis, listeria, paratyphoid, salmonella, scarlet fever, tuberculosis, typhoid, and many others less prominent. In the period under review there were hundreds of recorded milk-borne epidemics. They tended to be localized and could often be traced to the milk round of one dairyman. The middle class suffered disproportionately because of their higher milk consumption and because their babies were most likely to be artificially fed.

The two foremost causes of milk-related deaths amongst infants were tuberculosis and diarrhoea. Bovine tuberculosis has been underemphasized in the literature of medical history, for the understandable reason that its close relative, pulmonary tuberculosis, was such a major killer at all ages and a social problem that exercised the Victorians and Edwardians. But, in addition to being an airborne disease that thrives in overcrowded housing, tuberculosis is also potentially a trans-species infection. Milk was the medium of transmission from diseased cattle to unwitting consumers that led to approximately 500,000 deaths amongst infants in the period 1850-1950, and up to 30 per cent of all deaths from tuberculosis before 1930 (Atkins 2000a). The hazard was only brought under control gradually as milk was increasingly pasteurized in the 1930s and 1940s (Atkins 2000b).

'Summer diarrhoea' was also a cause of infantile mortality on a large scale. As the name indicates, the peak of deaths came in the warmer weather, usually in the late summer and early autumn, and some late nineteenth century commentators assumed a connexion with a warming of the soil and an increase of unspecified gaseous effusions. Others pointed out that milk transported over long distances from milk-producing country areas to the milk-consuming urban middle classes was unlikely to arrive in prime condition. Souring was an issue for the milk trade, to which the answers were the use of the rather crude Lawrence refrigerator or chemical preservatives that increased the shelf-life of milk (Atkins 1991). Domestic contamination is also likely to have been a factor (Newsholme 1906). Only a small minority of houses had satisfactory food storage areas before the First World War and it seems likely that the poor quality milk delivered to the doorstep deteriorated further before it was fed to babies.

At one point in the 1890s diarrhoea accounted for as much as 20 per cent of infantile mortality. We have no estimate of the proportion of this caused by milk but the contemporary discourse certainly assumed that it was substantial. Woods, Watterson and Woodward (1989) disagree with such a conclusion and emphasise instead overcrowded and insanitary housing, and poor street cleaning. But in the view of the present author, and others such as Paul Huck (1994, 1997), milk *is* likely to have been very important mediating factor in the deaths of those infants not breast-fed. It was this group that had the highest mortality from diarrhoea.

Trends in breast-feeding and bottle-feeding

It seems that breast-feeding rates in Britain were higher than in many continental countries throughout the period 1880-1940. There were regional variations and social class differences,

however, and a steady decline has been hypothesised. Ann Roberts (1973, 2) in her PhD thesis suggested for the period 1850-1900 that 'commercial activity and contemporary comment indicate a steady trend away from breast-feeding ... in favour of the feeding bottle and artificial foods'. In this assertion she is supported by evidence from America (Apple 1987). The rise of large capitalist dairy companies, such as Express Dairies and United Dairies in London, brought affordable milk to most urban areas, and increasingly sophisticated advertising encouraged its adoption. The decline in wet-nursing at this time may be an indicator that even wealthy women were convinced that cow's milk was both convenient and safe (Fildes 1988).

From about 1900 there was a reaction to this trend. A number of progressive Medical Officers of Health sought to encourage mothers to breast-feed for extended periods. They leafleted houses and propaganized whenever they or their officials paid visits, but there was a problem of knowing where new babies lived. The Notification of Births Acts (1907, 1915) provided the necessary lists of addresses and many Councils at the same time were employing Health Visitors, part of whose duties it was to encourage mothers to breast-feed. As a result, the period 1900-1925 saw the spread of a new creed of healthy infant-feeding and the decline in breast-feeding seems to have been halted or even reversed in some areas. Data collected by Medical Officers of Health in the period 1907-1930 suggest that an average of about 85 per cent of babies were breast-feed in their first two months of life.

The percentage of babies who were not breast-fed in those first two months grew quickly as many were either weaned or bottle-fed and it seems that the technology available for feeding them artificially was only slowly improving. According to Valerie Fildes (1998), 'it seems likely that the eradication of the long-tube feeding bottle was a major factor in the ... fall in infant mortality'. Before 1900 a glass bottle with a long rubber tube attached was popular. The convenience of the tube was that the child could be left to suck unsupervised. The problem was that these tubes, and also the bottles, were difficult to clean. Accumulations of dirt and congealed residues were inevitable and it is no surprise that infections and deaths were much higher for babies fed with this method than with the newer, boat-shaped bottle, which had a rubber teat and was much easier to keep clean. Medical Officer of Health data indicate that tube bottles were used in about 78 per cent of cases of artificial feeding in 1904, where a child had died, falling to nil by 1925.

Medical Officer of Health data

In the early twentieth century local authorities started collecting data about infant mortality and infant feeding. The Home Office survey of 1908 was an exemplar (Anon. 1910; Anon. 1913) and the larger, city authorities took it upon themselves to continue with surveys through to the 1920s, when child death rates were seen at last to have been brought under control and the enthusiasm for further data collection therefore waned. The nature and quality of the data varied from one authority to another, but it is possible to build an overall picture. The annual reports of most Medical Officers of Health were printed and many have survived in archives such as the Wellcome Library for the History and Understanding of Medicine, London.

Dr Valerie Fildes (1990, 1992, 1998) did the pioneering work in this area. She garnered, from the MOH reports of 22 Local Authorities, observations on the feeding of 425,113 provincial infants in their first month, from 1900 to 1919; and 222,989 London infants, from 1905 to 1919, in 23 London Boroughs. In my own project I have 2,389,530 provincial observations for 1902 to 1938, from 95 Local Authorities, and 596,717 for 28 London Boroughs and the

City of London. This makes a total of 3,028,530 observations. The database is vast and complex and, as yet, I have not completed its analysis.

A reading of feeding data in the first half of the twentieth century should bear in mind a number of points that confound any notion that the dataset is scientifically balanced and statistically representative. First, the larger, mainly city, authorities had an advantage because of the resources at the disposal of the MOH. Small, rural authorities are under-represented in my dataset, as are authorities in Northern Ireland, Scotland and Wales. Second, there is probably some bias towards poorer families because health visitors concentrated their efforts on poor households and those with a history of infant death. It was not uncommon to consider middle class babies as being 'too good to visit'. Third, data recorded on home visits was rather different from baby clinics, where the raison d'etre was educating mothers for breast-feeding.

In an ideal world we would have the individual feeding record of each infant, along with the sex, parity, and the mother's social class, occupation and level of education. Unfortunately, full sets of such records are rare, but Alice Reid (1999) has made the most of one such, in Derbyshire, for the period from the Great War to the mid-1920s. Her in-depth statistical analysis is highly significant in the literature of infant and child mortality, but it cannot be repeated for the altogether less trustworthy MOH data series.

Like Dr Reid, Professor David Barker (1998) and his team of environmental epidemiologists at Southampton have collected information from health visitors' registers. Their focus is not so much upon infant morbidity and mortality as upon the correlation of certain characteristics of individual infants, including their feeding, with disease in later life.

Feeding patterns

For the United Kingdom as a whole, breast-feeding was overwhelmingly dominant in the first month or two. The mean of over 80 per cent is not especially helpful as a guide, however, because many mothers quickly weaned their babies on to solid foods. The protection afforded by the Immunoglobulin A in mother's milk was therefore short and the risk of ill-health heightened. Table 1 shows, by way of example, that in Blackburn the majority of the babies of housewives were still breast-fed in the fifth month but weaning among women employed in the cotton industry came earlier because breast-feeding was incompatible with mill life. Apart from employment, many other factors bore upon the weaning process. The most important was that many women were said to be physically unable to feed their babies because their milk dried up, perhaps due to malnutrition or illness.

Table 1. Weaning curves for Blackburn, 1915: percentage of infants breast-fed at each month

	1	2	3	4	5	6	7	8	9	10	11	12
Working mothers	73.5	50.5	36	28.5	24.4	22.5	17.9	16.5	14.4	8.7	4.9	3.0
Not working	75.7	69.3	61	55.2	51.9	48.8	44.9	41.2	35.4	28.2	17.1	13.8

Source: Blackburn MOH Report.

Poor mothers usually wanted to breastfeed because it was the cheapest option and, incidentally, it also reduced their chance of conceiving another child. If they had no milk or were working, the cheapest alternatives were either home-made artificial foods, such as bread sops, or pobs as they were widely known, or condensed milk. The latter was cheaper than

cow's milk and more convenient because it lasted longer before becoming undrinkable. Condensed milk was often made from skimmed milk and it was therefore nutritionally of dubious benefit for the youngest infants. For the better off, cow's milk, dried milk and a variety of patent foods were available. In Table 2 we can get an idea of the relative proportions of these for the city of Coventry.

Table 2. Infant feeding in Coventry, 1907-28

Breast-fed	83.9
Cow's milk and water	7.5
Cow's milk and barley or oatmeal water	1.9
Cow's milk and patent food	1.9
Dried milk	3.3
Condensed milk	1.2
Biscuits, bread sop, etc.	0.4

Source: Coventry MOH reports.

The patent and other processed foods fell into three categories. First, there were desiccated milks with some addition containing no unaltered starch, such as Allenbury's. Second, there were farinaceous predigested foods, such as Melin's, Benger's and malted foods. Finally, the shops had a wide range of non-predigested farinaceous foods such as Robinson's, Ridge's, Neaves', Frame Foods, Force, and Quaker Oats. It was not until the vitamin age, after the First World War, that a full appreciation developed of how potentially dangerous a diet exclusively based on cereals was for babies (Fildes 1986).

Infant mortality

Many of the MOH reports record feeding practices for babies that had died, as well as the living. Intuitively one would expect the mortality rate to be higher amongst artificially fed children, not only because they were missing the protective qualities of breast milk but also because the challenge from dirty or infected cow's milk was so great. Recent evidence of this is available with respect to the so-called 'baby milk scandal', where certain manufacturers of formulated milks have been accused of encouraging the termination of breast-feeding in favour of the commercial product, with disastrous results where illiterate mothers have been unable follow printed instructions about sterilising feeding bottles to (www.babymilkaction.org).

Table 3.	Willesden,1906-7:	comparative death rates for feeding type	5
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	breast	mixed	artificial
Diarrhoea and enteritis	3.7	37.8	347.8
Tuberculosis	5.2	20.3	51.6
Marasmus	6.3	23.3	127.7
Pneumonia	17.8	40.7	127.7
Measles & whooping cough	11.5	49.4	46.2
Bronchitis	16.8	20.3	40.8

Source: Willesden MOH report.

The death rates per thousand live births shown for Willesden in Table 3 can be calculated similarly for a number of towns and cities. In the early century in particular, the significance of feeding type is obvious, especially for diarrhoea. Another way of expressing the relationship between feeding and health status is shown in Table 4. Here both dead and surviving children are tabulated, giving a more balanced and accessible notion of the fate of babies born in Croydon between 1900 and 1925. Diarrhoea was again a major cause of death but non-breastfed mortality from diseases with diarrhoea-like symptoms affected only 1.7 per cent of all of the infants in the Borough under six months. The total deaths amongst children fed on cow's milk or condensed milk amount to 3.1 per cent of the total births. The equivalent figures for other local authorities are higher, suggesting that Croydon had a safer milk supply than many. By 1927 about 85 per cent of the London supply was pasteurized and this undoubtedly had a positive impact upon infant life. In many provincial towns and villages similar penetration of heat treatment was not seen until the 1950s.

Table 4. Croydon, 1900-20: feeding patterns in relation to the death or survival of infants,0-6 months

	diarrhoea deaths	died of other causes	survivors	total
Breast only				10.0
	0.5	3.5	64.1	68.0
Breast and subsequently cow's milk	0.1	0.4	9.4	9.9
Breast and subsequently condensed milk	0.1	0.2	3.6	3.9
Breast and subsequently other foods	0.1	0.4	4.7	5.2
Breast and simultaneously cow's milk, condensed milk or other foods	0.2	0.2	2.6	3.1
Entirely cow's milk	0.6	0.5	2.4	3.4
Entirely condensed milk	0.4	0.4	2.4	3.2
Entirely other food	0.3	0.4	2.5	3.2
Total	2.2	6.1	91.7	100.0
	<i></i>	0.1	21.1	100.0

Source: Croydon MOH reports.

Conclusion

In the briefest of papers it is not possible to do justice to the extraordinary complexity of infant mortality in early twentieth century Britain and its relationship to milk. I have stressed the faecal contamination and generally poor sanitary state of the milk supply, which scarcely improved before the 1920s in London, and probably later in the provinces. I have also commented on the loss of life from two major killers: bovine tuberculosis and summer diarrhoea. Here I agree with Paul Huck (1997, 384) that 'safe milk supplies for the minority of infants who were not breast-fed could have had a big effect on overall infant mortality, because it is precisely these infants who contributed a disproportionate amount of the mortality'.

The next step is a further analysis of my dataset gathered from MOH reports. This will help us to understand regional variations in patterns of infant feeding and their relationship to mortality. I expect the equation to be far from straightforward, for instance because of the paradox noted by Valerie Fildes (1992, 68) that areas associated with the highest percentage of breast-feeding also sometimes had the highest infant mortality rates. She explained this as the result of the poorest districts having widespread breast-feeding but malnourished women there produced milk of a poor quality with less protective effect, which quickly dried up, forcing early weaning. In addition, I will in future research the role of the local and the central states in attempts to modify infant feeding practices. Some work on this already exists (Dwork 1987) but the resource of MOH reports has not yet been fully exploited to understand the variety of local policies and implementation.

Although the milk of healthy and well-nourished mothers was safe and life-giving, I have tried to show that other babies were at risk, especially those who were artificially fed during at least part of their first year. Cow's milk and other artificial foods were responsible for much disease morbidity and mortality, especially in the period before about 1925, and the transition to improved infant feeding is a significant one in the medical history of Britain.

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