

‘Summer is here, fraught with death to hapless babes’: the seasonality of infant mortality in late nineteenth-century Tasmania

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Abstract

This study investigates the seasonality of infant mortality in nineteenth-century Tasmania using a unique computerised database containing all civil birth and death registration records for Tasmania from 1838 to 1899. The individual-level records allow the computation of cause-specific infant mortality rates, as well as rates by age at death (in days) and month of death. Infant mortality averaged around 90–110 deaths per 1,000 births from 1860 to the end of the century, while mortality at other ages steadily declined. Persistently high infant mortality was probably caused by infantile diarrhoea. This argument is borne out by the seasonal pattern of infant mortality, which remained stable over this period, and which consisted of a strong peak in January, February and March, and lower levels of mortality in the colder months. The seasonal patterns of other commonly registered causes of infant death—such as ‘Convulsions’, ‘Debility and marasmus’ and ‘Teething’—suggests that they subsumed many cases of infantile diarrhoea. Infant mortality under the age of ten days exhibited very little seasonality, and what there was followed birth seasonality very closely, indicating that the incidence of death soon after birth was not influenced by the month of birth. Infant mortality became more seasonal as age at death increased, also suggesting diarrhoeal disease as a cause of death, since older weaned infants were more susceptible to diarrhoeal disease.

‘once more summer is here, fraught with death to hundreds of hapless babes’

Richard Arthur. ‘The massacre of the innocents’, *Sydney Morning Herald*, 1 December 1894.

Introduction

Over the decade 1850–59, Tasmania experienced a substantial drop in infant mortality. In the early 1850s, more than 15 per cent of newborns did not survive to their first birthday. By the early 1860s, this had fallen by more than one-third to around ten per cent. However, the dramatic declines of the 1850s did not continue. The ten-per-cent statistic remained stubbornly constant until the end of the nineteenth century, despite large annual fluctuations in the number of infant deaths and substantial falls in mortality at nearly every other age. This paper investigates why infant mortality was relatively stable for the last four decades of the nineteenth century.

This paper begins by describing the data employed, and the most commonly registered causes of infant death in Tasmania. It then outlines nineteenth-century Tasmanian infant mortality trends. The remainder of the paper discusses the relationship between the seasonality of infant mortality, diarrhoeal disease, and infant feeding, and the reasons for persistently high infant mortality, 1860–99.

Data

Tasmania is an island of 67,000 km² that lies off the southeast coast of mainland Australia. In 1803 the British established a penal colony on the island. Over the next 50 years, the European population grew to around 70,000, while numbers of the Aboriginal population fell precipitously. The convict system was dismantled in the mid-1850s. By the end of the nineteenth century, Tasmania's population had increased to 140,000. In 1901, Tasmania became one of the six states of federated Australia.

Civil registration of births, deaths and marriages began in Tasmania in 1838. The original registers to 1899 are held by the Archives Office of Tasmania. These have been fully transcribed, and an electronic database of the transcriptions is available from the Australian Social Science Data Archive (Gunn and Kippen 2008). The database contains information on 195,000 births, 93,000 deaths—of which 21,000 were infant deaths—and 51,000 marriages registered in Tasmania over the period 1838–99.

Information in the birth registers includes name, sex, birth date, birth place, parents' names, father's occupation, and name and residence of informant. The death registers contain name, sex, age (in months, weeks or days for infants), date of death, place of death, occupation (infant deaths generally list father's occupation), cause of death, and name and residence of informant.

Causes of death were transcribed verbatim, giving 22,000 distinct wordings. These were classified using a nomenclature based on a combination of William Farr's nineteenth-century nosology and the modern *International Classification of Diseases* (Kippen 2009a).

Causes of infant death were classified as set out in Tables 1 and 2 and described below.

Registered causes of infant death

Infant death was a familiar and frequent occurrence in the nineteenth century. Despite this, the causes of many infant deaths remained a mystery. Often deaths were ascribed to prominent symptoms such as convulsions or debility, or to coincident conditions such as teething, rather than to actual causes of death. This section outlines the major registered causes of death in Tasmania, 1838–99.

Convulsions

The Australian writer, Henry Lawson (1902: 39–40), describes an episode of infant convulsions in his short story *Brighten's Sister-in-law*:

Did you ever see a child in convulsions? You wouldn't want to see it again: it plays the devil with a man's nerves...Jim was bent back like a bow, stiff as a bullock-yoke, in his mother's arms, and his eyeballs were turned and fixed...It must be only a matter of seconds, but it seems long minutes; and half an hour afterwards the child might be laughing and playing with you, or stretched out dead.

Convulsions were, and are, symptomatic of many infant conditions, some serious and some not so serious. Parents in the nineteenth century learned to dread the characteristic involuntary stiffening and rolling eyes that might accompany some minor illness or foreshadow their child lying 'stretched out dead'.

Because convulsions were often the final, and most manifest, symptom of an infant's fatal illness, the term 'Convulsions' in the nineteenth century was used as a convenient cause-of-death descriptor for many infant ailments. In Tasmania, 'Convulsions' was the most commonly registered cause of infant death (see Table 1). The Tasmanian doctor and sanitarian, E.S. Hall (1858: 102), complained:

The vulgar almost universally attribute the "cause of death" to the most prominent or latest symptom. It is certain that many other diseases terminated by convulsive struggles are erroneously recorded under this head, and, therefore, on this account, the mortality under this nosological term, is greater than it should be.

Table 1. Percentage distribution of infant deaths by cause by decade, Tasmania, 1838–99

Cause of death	1838–49	1850–59	1860–69	1870–79	1880–89	1890–99	Total
	Percentage						
Convulsions	24.6	26.1	22.8	20.8	20.1	13.8	20.6
Debility and marasmus	8.7	11.0	12.1	14.4	21.2	18.4	15.4
Diarrhoea and dysentery	12.0	15.0	17.8	15.4	16.4	11.8	14.8
Diseases of the respiratory system	9.0	12.0	13.3	14.0	12.9	13.0	12.7
Infectious diseases	12.3	9.4	10.7	8.7	6.5	10.5	9.3
Certain conditions originating in the perinatal period	2.7	3.6	5.2	7.6	7.0	12.5	7.1
Diseases of the digestive system	7.8	5.2	4.2	5.2	5.1	10.3	6.4
Diseases of the nervous system	3.9	3.6	3.9	4.6	3.3	3.1	3.6
Teething	3.4	3.4	1.8	2.5	2.3	0.4	2.1
Other natural causes	1.1	1.8	1.7	3.1	2.3	2.9	2.3
Unspecified natural causes	6.6	4.7	2.8	0.7	1.3	1.2	2.4
Murder and accidents	1.7	1.9	1.5	1.3	1.0	1.5	1.5
Unknown, not given	6.1	2.3	2.2	1.8	0.6	0.5	1.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of cases	1,745	3,828	3,082	3,279	4,725	4,792	21,451

Table 2. Percentage distribution of infant deaths by cause by age (days), Tasmania, 1838–99

Cause of death	0–9	10–49	50–99	100–199	200–364	Total
	Percentage					
Convulsions	31.9	28.1	17.9	14.4	10.6	20.6
Debility and marasmus	21.2	20.3	15.7	11.8	8.2	15.4
Diarrhoea and dysentery	0.7	8.9	18.1	22.2	24.4	14.8
Diseases of the respiratory system	2.6	10.9	15.7	16.3	17.9	12.7
Infectious diseases	1.2	8.7	12.7	11.9	12.3	9.3
Certain conditions originating in the perinatal period	27.5	5.6	1.2	0.6	0.4	7.1
Diseases of the digestive system	3.0	7.5	7.8	8.1	5.7	6.4
Diseases of the nervous system	0.5	1.1	3.1	5.3	7.9	3.6
Teething	0.0	0.0	0.3	2.7	7.1	2.1
Other natural causes	1.8	3.1	2.4	2.5	1.7	2.3
Unspecified natural causes	4.6	2.7	2.1	1.5	1.3	2.4
Murder and accidents	1.8	1.2	1.5	1.4	1.5	1.5
Unknown, not given	3.2	1.8	1.4	1.5	0.9	1.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of cases	4,266	4,556	3,890	4,130	4,609	21,451

According to registers, 'Convulsions' were responsible for 21 per cent of infant deaths over the period 1838–99, from 26 per cent in 1850–59, dropping to 14 per cent in 1890–99 (Table 1). The proportion of infant deaths registered as being from 'Convulsions' also fell substantially over time for each sex and age group (Figures 1 and 2). This shift appears to be due to changes in diagnostic fashion rather than real change in the causes of infant mortality. Overall, 32 per cent of infant deaths occurring at age 0–9 days were attributed to 'Convulsions', falling to 11 per cent of deaths at ages 200 days and above (Table 2).

Despite awareness that convulsions were usually symptomatic of some other condition, rather than being a disease in their own right, the category 'Convulsions' remained in the official cause-of-death classification systems used in Tasmania, the other Australian colonies, and England and Wales, until well into the twentieth century, appearing under 'Diseases of the Nervous System'. This categorisation probably resulted because convulsions were seen to be 'a common expression of the perturbation of the nervous system' (Quain 1882: 695). However, many recognised that 'Convulsions' was an imprecise cause at best. In the colony of Victoria, it was the Statistician's custom 'never to assign "convulsions" as the cause of death, if any other cause more exact can be got' which was 'in accordance with the teaching of the best authorities' (Jamieson 1882: 165).

Debility and marasmus

The causes 'Debility' and 'Marasmus' make up 65 per cent of deaths in this category. The remaining 35 per cent includes causes such as 'Weakness' (15%), 'Atrophy' (6%) and 'Inanition' (4%).

As with convulsions, debility (weakness) and marasmus (progressive wasting) are symptomatic of many infant conditions. In the nineteenth century, debility and marasmus were seen to be caused by, among other things, unsuitable food, chronic vomiting, chronic diarrhoea, congenital syphilis and acute disease (Quain 1882: 95, 329).

The proportion of infant deaths registered as being from 'Debility and marasmus' doubled from nine per cent in 1838–49 to 18 per cent in 1890–99 (Table 1) and increased over time for each age group and sex (Figures 1 and 2). This increase was probably due to a transferral of deaths from other categories, such as 'Convulsions', rather than to an actual shift in causes of infant death.

Considering infant deaths by age over the period 1838–99, 21 per cent of deaths occurring in the first nine days of life were attributed to ‘Debility and marasmus’. This fell to eight per cent for those who died at ages 200 days and over (Table 2).

Diarrhoea and dysentery

Sydney’s Dr W.F. Litchfield (1905: 421) believed that diarrhoeal disease, particularly in infants, was ‘by far the most deadly of Australian diseases. It causes many more deaths each year than does consumption, which has always been supposed to hold the pride of place as a death-dealer’. In nineteenth-century Australia, most cases of diarrhoea (a frequent and profuse evacuation of watery faeces) and dysentery (intestinal inflammation accompanied by tenesmus and bloody diarrhoea) in infants probably resulted from intestinal infections spread by food and water contaminated with infected faeces (Smith 1997: 40). Diarrhoea was largely a disease of the summer, as bacteria and viruses flourished in the warmer weather.

However, in the nineteenth century, the causes of infantile diarrhoea were the subject of much debate. Diarrhoeal disease was seen to be associated with dirty conditions and ‘miasmas’ (noxious atmospheres). This belief led to the registration of causes of deaths such as ‘1. Bad drains and stinks. 2. Diarrhoea’ (Gunn and Kippen 2008).

Between 12 and 18 per cent of infant deaths in each decade over the period 1838–99 were attributed to ‘Diarrhoea and dysentery’ (Table 1). The proportion of infant deaths in this category increased with age, from one per cent for those dying under the age of ten days to 24 per cent for those dying at age 200–364 days (Table 2).

Diseases of the respiratory system

The causes ‘Bronchitis’, ‘Pneumonia’, ‘Congestion of the lungs’ and ‘Croup’ account for more than 90 per cent of deaths classified as ‘Diseases of the respiratory system’. The proportion of infant deaths attributed to respiratory diseases remained fairly constant at around 13 per cent over the period 1850–99 (Table 1); however, such deaths increased with age, from three per cent for 0–9 day-olds to 18 per cent for those aged 200 days and above (Table 2). As today, most acute infantile respiratory diseases in the nineteenth century probably resulted from measles, whooping cough, influenza, and other viral and bacterial infections.

Infectious diseases

This category subsumes deaths classified as ‘Tuberculosis’, ‘Typhoid’, ‘Diphtheria’, ‘Whooping cough’, ‘Scarlet fever’, ‘Measles’, ‘Influenza’, ‘Parasitic disease’ and ‘Other infectious diseases’.

Between six and 12 per cent of infant deaths in each decade are classified as ‘Infectious diseases’ (Table 1). Around 12 per cent of infant deaths occurring at ages 50 days and above were attributed to causes found in this category, as opposed to one per cent for deaths occurring under the age of ten days (Table 2).

Certain conditions of the perinatal period

Eighty-one per cent of deaths in this category were caused by ‘Premature birth’. A further 13 per cent resulted from congenital defects such as ‘Spina bifida’ and ‘Malformation of the heart’. As might be expected, most deaths in this category occurred soon after birth; 94 per cent within the first 50 days of life.

The proportion of infant deaths attributed to ‘Premature birth’ and other causes within this category increased markedly over time, from three per cent in 1838–49 to more than 12 per cent in 1890–99 (Table 1). For deaths at ages under ten days, the proportion rose from seven per cent in the late 1840s to 55 per cent by the end of the century (Figures 1 and 2). The increase in deaths from ‘Premature birth’ was noted by Tasmania’s Statistician, E.C. Nowell (1882: xxxvii), who observed that only ‘medical men’ would be able to trace the cause of the ‘very serious increase’, ‘whether that be found in dress, morals, or social habits’. He did not consider the possibility that a change over time in cause-of-death diagnoses, independent of changes in actual causes of infant death, might have been responsible.

Diseases of the digestive system

The causes ‘Enteritis’ and ‘Gastritis’ make up 70 per cent of this category. ‘Thrush’ makes up a further 20 per cent and the remaining ten per cent consist of liver conditions. Between four and ten per cent of infant deaths in each decade were attributed to ‘Diseases of the digestive system’. Between 1880–89 and 1890–99, the proportion of infant deaths in this category doubled, from five to ten per cent. This increase probably resulted from a transferral of deaths from the category ‘Diarrhoea and Dysentery’, which fell from 16 to 12 per cent over the same period (Table 1).

Figure 1. Percentage distribution of infant deaths by age by 5-year period by cause, males, 1840–99

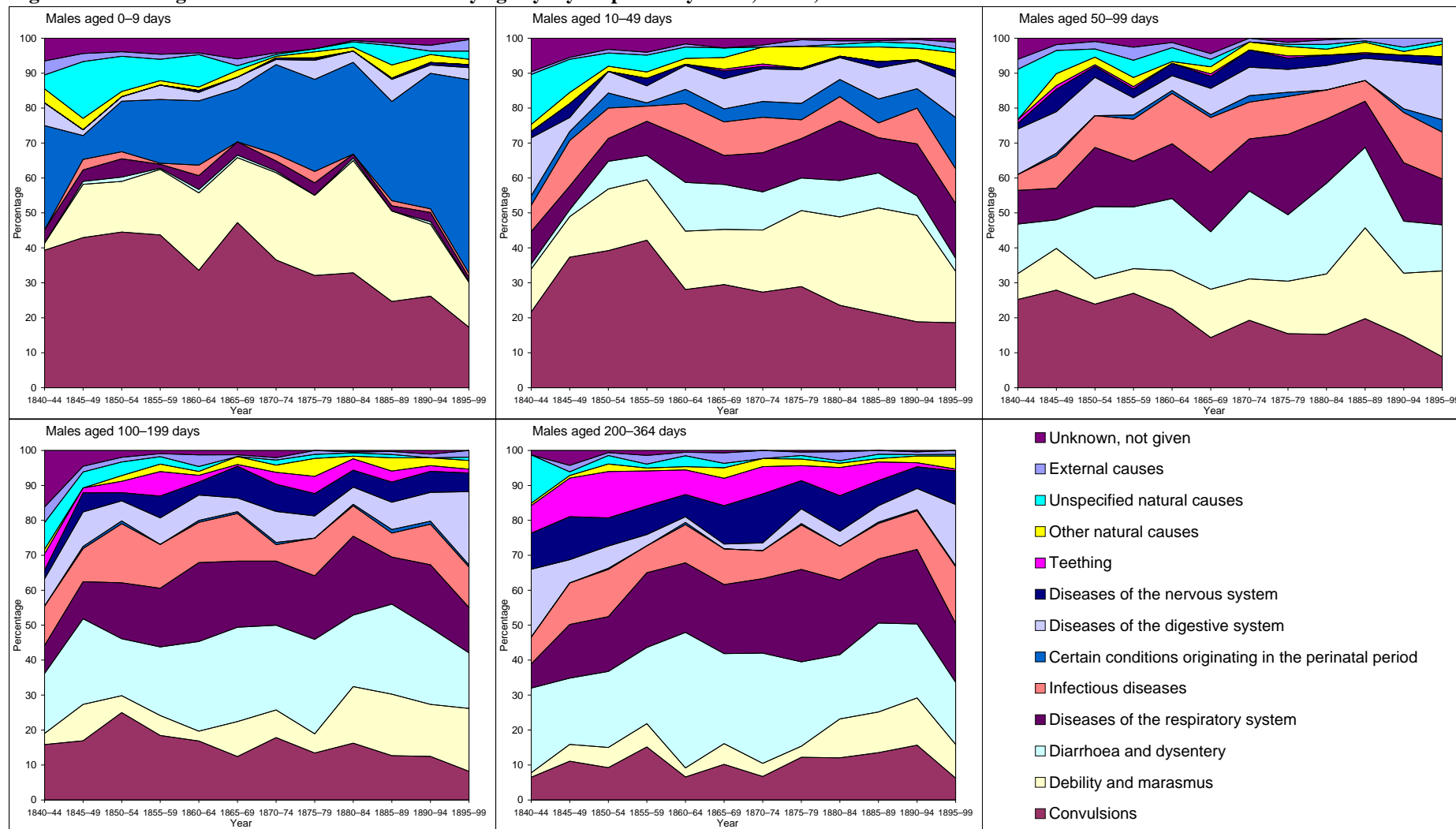
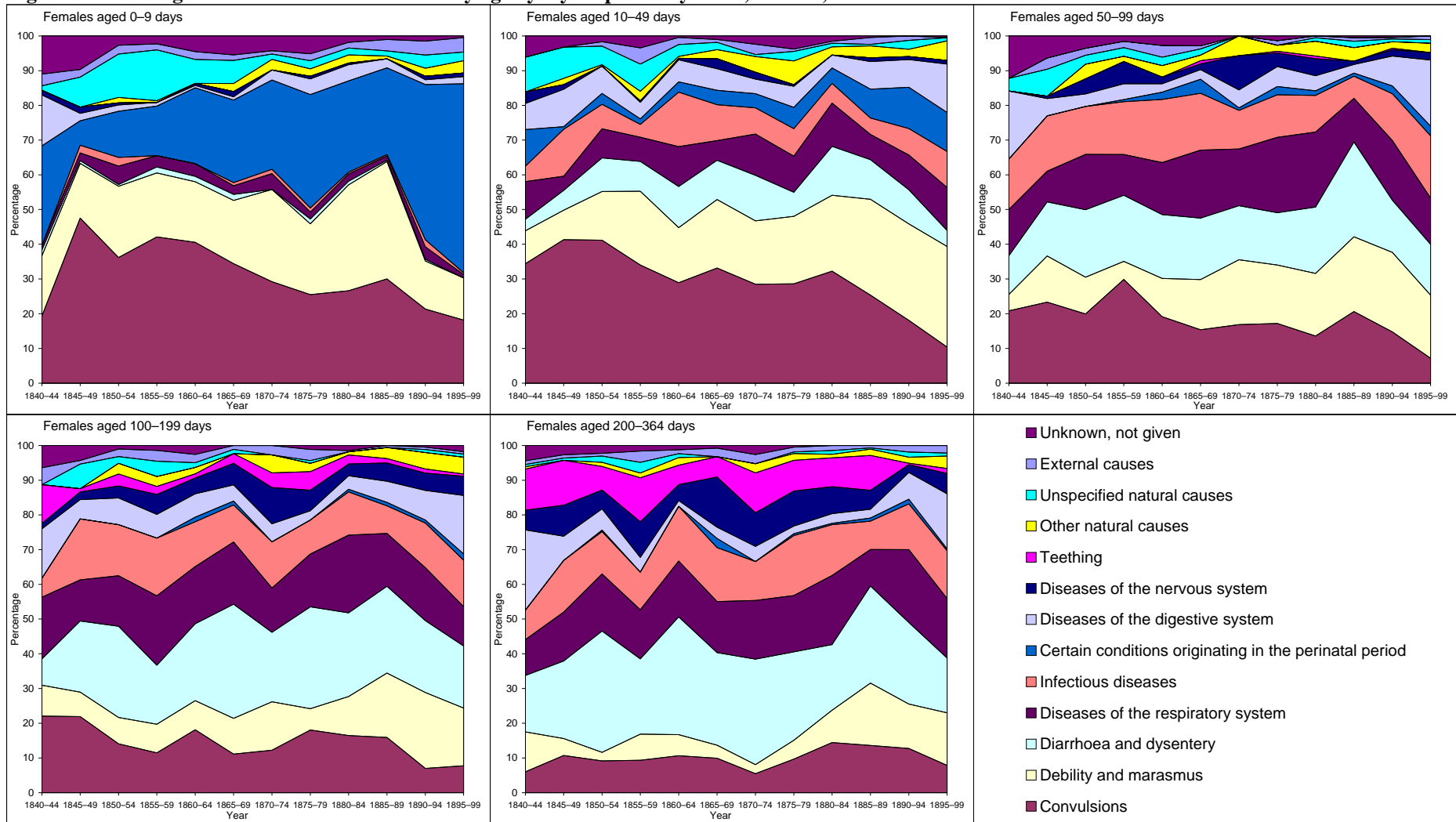


Figure 2. Percentage distribution of infant deaths by age by 5-year period by cause, females, 1840–99



Diseases of the nervous system

Forty per cent of deaths in this category resulted from ‘Hydrocephalus’ (water on the brain), 30 per cent resulted from ‘Meningitis’ and ‘Encephalitis’ and 13 per cent from ‘Cerebral congestion’. The proportion of infant deaths falling within this category remained fairly constant over time, at between three and five per cent (Table 1). Over the period 1838–99, less than one per cent of deaths occurring under ten days of age were attributed to ‘Diseases of the nervous system’, increasing to eight per cent of deaths at ages 200–364 days (Table 2).

Teething (Dentition)

In the early to mid nineteenth century, the ‘physiological process of dentition [was] regarded as a veritable cause of severe and fatal intestinal disorders of infants’ (*IMJA* 1898: 108). As it was believed that teething caused intestinal disorders, deaths that should properly have been registered as from diarrhoeal disease were often attributed to ‘Teething’.

‘Teething’ appeared in Tasmania’s cause-of-death classification system until well into the twentieth century. Despite this, the registration of ‘Teething’ as a cause of death was, by the 1890s, viewed as ‘a survival from the dark ages of medicine’ (Jamieson 1882: 165). Over the period 1890–99, only 21 infant deaths in Tasmania were ascribed to ‘Teething’, as opposed to 108 deaths in the decade before.

At ages 200–364 days (when cutting teeth is most common) the proportion of infant deaths attributed to ‘Teething’ fell from 13 per cent in mid-nineteenth century Tasmania to one per cent by the end of the century (Figures 1 and 2).

Other natural causes

This category consists of deaths classified under ‘Neoplasms’ (1%), ‘Diseases of the blood and blood-forming organs’ (5%), ‘Endocrine, nutritional and metabolic disorders’ (33%), ‘Diseases of the eye and ear’ (1%), ‘Diseases of the circulatory system’ (35%), ‘Diseases of the skin and subcutaneous tissue’ (17%), ‘Diseases of the musculoskeletal system’ (3%), ‘Diseases of the genitourinary system’ (4%) and ‘Paralysis’ (0.2%).

Over the period 1838–99, deaths in this category accounted for between one and three per cent of all infant deaths (Tables 1 and 2).

Unspecified natural causes

Sixty-three per cent of deaths in this category were attributed to ‘Natural causes’, ten per cent were caused by a ‘Visitation of God’ and nine per cent resulted from ‘Exhaustion’. The

proportion of infant deaths attributed to ‘Unspecified natural causes’ fell from seven per cent in 1838–49 to one per cent by 1870–79 (Table 1), as cause-of-death reporting, particularly by coroner’s juries, improved. ‘Unspecified natural causes’ as a cause of death declined steadily with age, accounting for five per cent of deaths occurring within the first nine days of life, and just one per cent of those occurring at 200–364 days (Table 2).

External causes

Deaths in this category constitute less than two per cent of total infant deaths in each decade and age group (Tables 1 and 2).

Unknown, not given

The proportion of infant deaths registered without a cause of death fell from six per cent in 1838–49, to less than one per cent by 1880–89 (Table 1), as cause-of-death reporting improved. Over the period 1838–99, infants dying at ages under ten days were more than three times as likely to have no cause of death registered as infants dying between 200 days and their first birthday (Table 2).

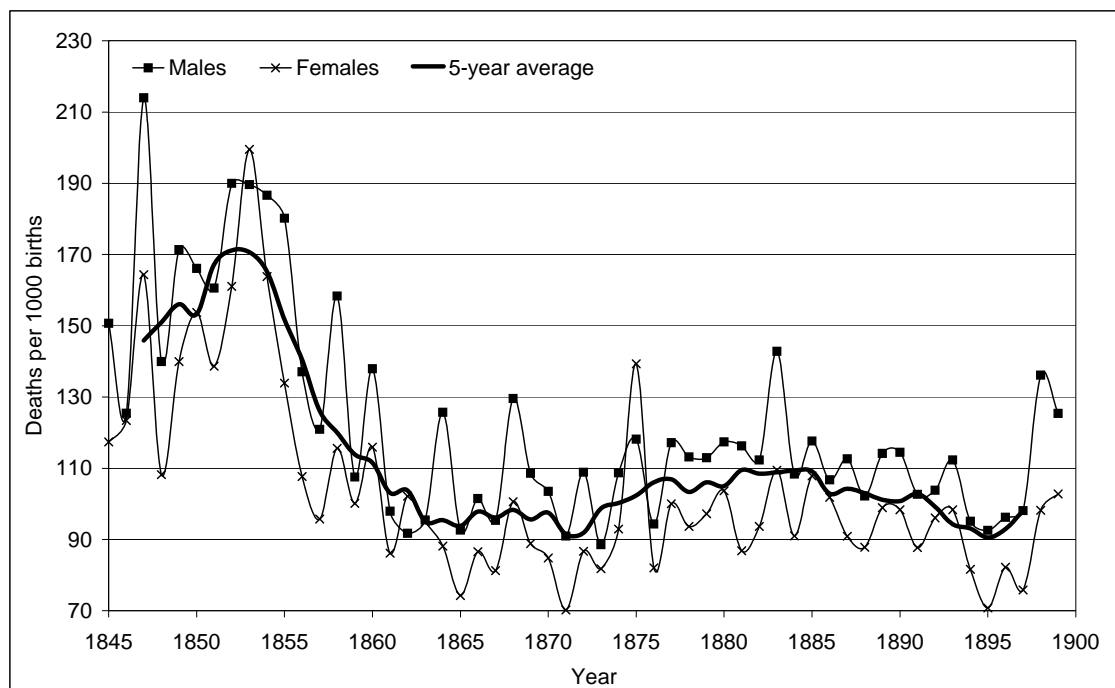
Tasmania’s infant mortality rate

Male and female infant mortality rates for Tasmania, 1845–99, are shown in Figure 3. Annual rates were relatively high over the first 15 years from 1845, with five-year-average infant mortality rates for both sexes combined ranging between 110 and 170. Infant mortality fell precipitously through the mid-to-late 1850s. Thereafter, it remained fairly stable until the end of the century at around 90–110 deaths per 1,000 births.

There are two reasons for the relatively high mortality of the 1840s and early 1850s, and the dramatic decline through the mid-to-late 1850s: cyclical epidemics (Kippen 2009b) and deaths of infants in the convict nurseries (Kippen 2009c).

Once the spate of epidemics of the late 1840s and early 1850s was past, and babies were no longer dying in large numbers in the female factories, infant mortality in Tasmania stabilised until the end of the century at around 90–110 deaths per 1,000 births (Figure 3).

Figure 3. Infant mortality rate (deaths per 1,000 births), males and females, Tasmania, 1845–99



Given that infant mortality in Australia at the end of the twentieth century was around five deaths per thousand births (ABS 2000: 93–94), a rate of 90–110, while certainly better than the rates seen in earlier decades in Tasmania, seems appalling to us today. However, in the late nineteenth and early twentieth century, a rate of 100 was considered to be ‘a normal standard for infant mortality’ (Litchfield 1905: 421). Table 3 shows that, in the late nineteenth century, Tasmania’s infant mortality rate was low in comparison to those of many European countries, and, of the Australasian colonies (in bold), was bettered only by New Zealand. This table also shows that relatively flat infant mortality was a feature of many countries over this time. Twenty-three of the 25 countries and colonies listed had an infant mortality rate in 1896–1900 within 20 per cent of their 1881–85 rate.

As indicated earlier, although the Tasmanian infant mortality rate changed very little from 1860 to the end of the century, the causes of death registered for infants changed markedly. From 1860–69 to 1890–99, the proportion of deaths attributed to ‘Convulsions’ fell from 23 to 14 per cent, ‘Debility and marasmus’ increased from 12 to 18 per cent, and ‘Diarrhoea and dysentery’ decreased from 18 to 12 per cent (Table 1). Since it is unlikely that the composition of actual causes of infant death changed so dramatically while the infant mortality rate remained stable, these changes must have resulted from changes in nosological fashion. That is, whatever was

killing Tasmanian babies in 1860 was still killing them 40 years later, but the terms used to describe the causes of these deaths changed.

Infant mortality and diarrhoeal disease

Why did infant mortality remain relatively stable while mortality at other ages was declining? Szreter (1988: 31) suggests, for England and Wales, that persistently high

Table 3. Infant mortality rates (deaths per 1,000 births) for selected countries and Australasian colonies, 1881–1900

Country	Year				Average
	1881–85	1886–90	1891–95	1896–1900	
New Zealand	90	84	87	80	85
Norway	99	96	98	96	97
Ireland	94	95	102	106	99
Tasmania	109	103	94	98	101
South Australia	101	^a 105	99	112	104
Sweden	116	105	103	101	106
Bulgaria	81	95	140	143	115
Queensland	136	119	103	104	116
New South Wales	124	115	111	113	116
Victoria	122	131	111	111	119
Scotland	117	121	126	129	123
Denmark	134	137	139	132	136
Western Australia	135	^a 123	130	160	137
Finland	162	144	145	139	148
England and Wales	139	145	151	156	148
Switzerland	171	159	155	143	157
Belgium	156	163	164	158	160
Serbia	157	158	172	159	162
France	167	166	171	159	166
The Netherlands	181	175	165	151	168
Italy	175	^a 175	^a 185	168	176
Spain	193	186	185	^a 185	^a 187
Romania	182	195	220	216	203
Prussia	207	208	205	201	205
European Russia	271	264	276	261	268

a. Estimated from the average of actual returns for the balance of the period 1881–1905.
Source: Phelps 1908: 246.

infant mortality was caused by unhygienic conditions and food preparation, which resulted in fatal attacks of infant diarrhoea. The bacterial organisms involved, which proved so deadly to infants, did not seriously affect older children and adults. Unfortunately, parents often assumed that what was safe for adults to eat was also safe for babies.

If a substantial proportion of infant deaths in Tasmania was caused by diarrhoeal disease, then the argument put forward by Szreter to explain stable infant mortality in England and Wales could equally apply to infant mortality in Tasmania. In Tasmania over the period 1860–99, between 12 and 18 per cent of infant deaths each decade were attributed to ‘Diarrhoea and dysentery’ (Table 1). These do not seem to be sufficiently large proportions for the argument to hold. However, there is evidence that other commonly registered causes of infant death, such as ‘Convulsions’, ‘Debility and marasmus’ and ‘Teething’ subsumed many cases of infantile diarrhoea and that therefore the proportion of infant deaths in Tasmania attributable to diarrhoeal disease is much greater than the death registers would suggest.

The term ‘Convulsions’ was often used a proxy for diarrhoeal disease (Glass 1973: 187). Convulsions commonly signalled the onset of an acute bout of diarrhoea in infants and ‘frequently bring it to an abrupt close’ (McKay 1898: 255). Hardy (1988: 390) notes that the summer peak of convulsions in nineteenth-century London ‘may disguise no more than a variety of non-specific bowel and heat-induced disorders in young infants’.

In Sydney, Dr W.F. Litchfield (1905: 421) grouped deaths from ‘Dentition’ and ‘Atrophy’ with those from ‘Diarrhoea’, because of the similar pathologies and seasonal incidence of deaths from these three causes. Litchfield concluded ‘that acute diarrhoea directly or indirectly played by far the most important part in infantile mortality’, with half of Sydney’s infant deaths attributable to diarrhoeal disease.

Another Sydney doctor, W.G. Armstrong, argued that the terms ‘Atrophy’, ‘Debility’, and ‘Inanition’ were

synonymous for the same pathological condition—or rather, for the same clinical group of symptoms...In so far as they convey any information, it is that of inability to assimilate food, a pathological condition which frequently—probably in the majority of cases—is sequel to an attack of acute diarrhoea (Armstrong 1905: 386).

He also found a substantive seasonal correlation between deaths from diarrhoea and dysentery, enteritis, atrophy, convulsions, and dentition, and concluded:

the close general similarity of the curves thus demonstrated is strong presumption in favor of identity of etiology of the diseases classed under these several heads, and clinical observation

further supports this presumption, so that I think I am justified...in treating all these assigned causes of infantile deaths as essentially one (Armstrong 1905: 387).

Diarrhoeal disease and the seasonality of infant mortality

In the nineteenth century, infant mortality from diarrhoeal disease exhibited a marked seasonality in many countries (Cheney 1984: 563), with large numbers of deaths in the summer months and very few deaths in winter. In the warm summer temperatures, disease-causing organisms flourished and infants were more at risk of fatal dehydration.

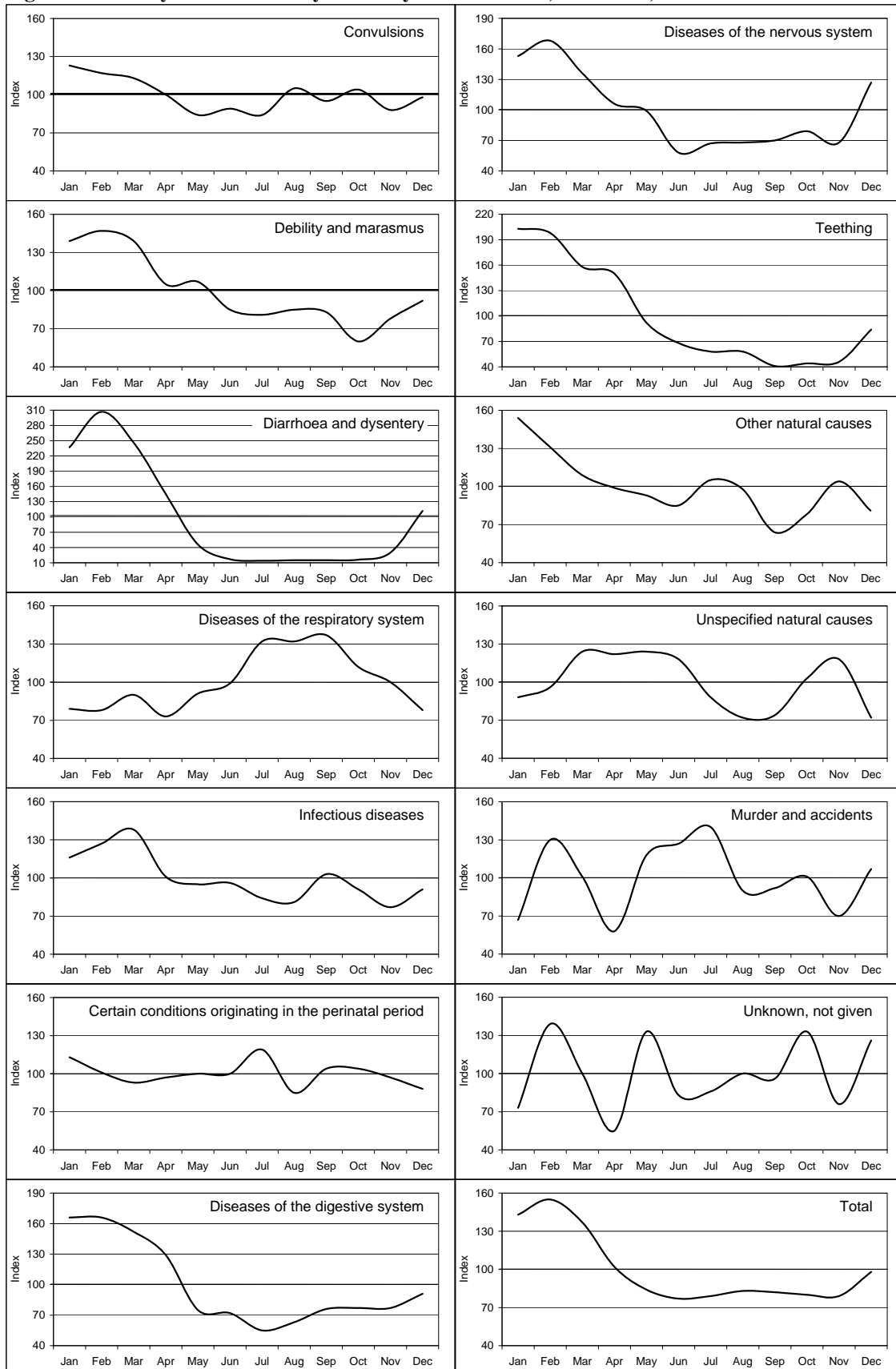
Armstrong (1905), Litchfield (1905), Lewis (1979; 1982), Cheney (1984) and Hardy (1988) have pointed to summer patterns of particular causes of infant death as evidence that these causes subsumed many cases of infantile diarrhoea. If the causes listed by these authors exhibited a summer seasonality in nineteenth-century Tasmania, then this would support the argument that infantile mortality from diarrhoeal disease in Tasmania was greater than indicated by the death registers, and help explain the continuing high incidence of infant mortality in late nineteenth-century Tasmania.

Figure 4 shows, for the period 1860–99, monthly infant-mortality indices for each cause of death. An index of 100 indicates that the number of deaths in that month (adjusted for the number of days) is equal to the monthly average. An index of 110 indicates that the number of deaths in that month is ten per cent above the monthly average, and so on.

Eight of the 13 causes show significant seasonality. These are ‘Convulsions’, ‘Debility and marasmus’, ‘Diarrhoea and dysentery’, ‘Diseases of the respiratory system’, ‘Infectious diseases’, ‘Diseases of the digestive system’, ‘Diseases of the nervous system’, and ‘Teething’. All of these, except for ‘Diseases of the respiratory system’, exhibit a summer peak and a winter trough.

As might be expected, the cause ‘Diarrhoea and dysentery’ is the most markedly seasonal, with deaths in the warmer months of January, February and March exceeding the monthly average by more than 130 per cent, and deaths in the colder months, May through November, at 14–46 per cent of the monthly average.

Figure 4. Monthly infant-mortality index^a by cause of death, Tasmania, 1860–99

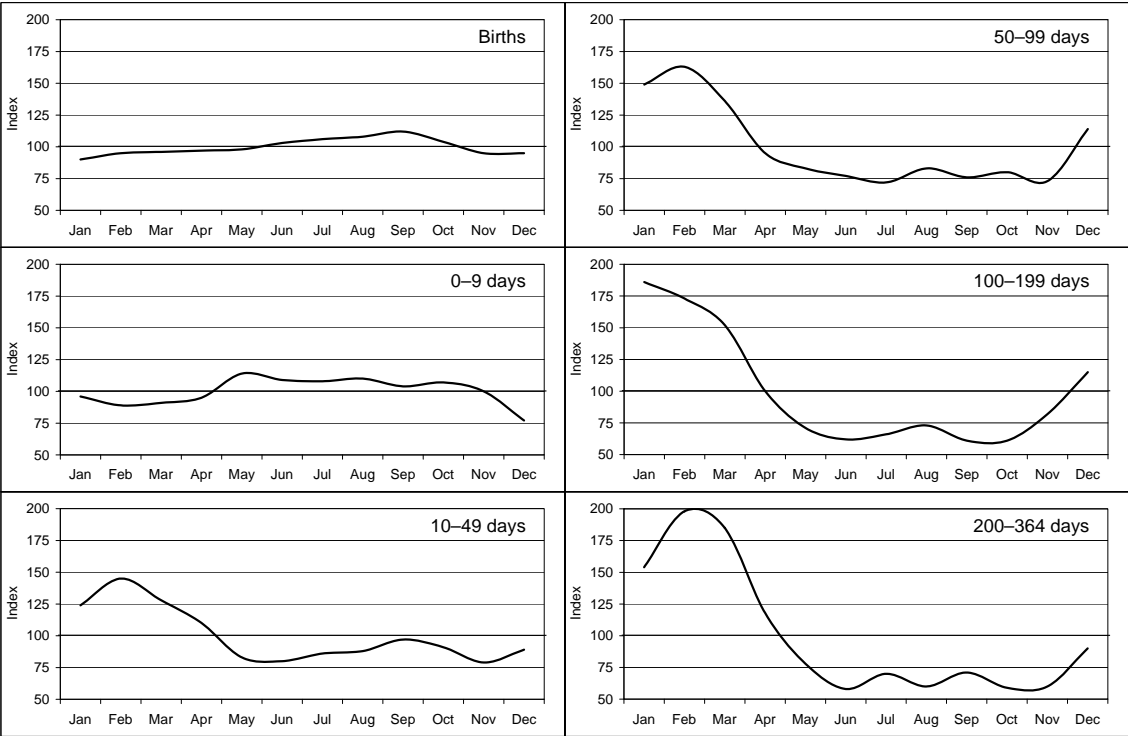


a. Adjusted for the number of days in each month.

The seasonal patterns of ‘Convulsions’, ‘Debility and marasmus’, ‘Infectious diseases’, ‘Diseases of the digestive system’, ‘Diseases of the nervous system’, and ‘Teething’ suggest that these six causes may have included substantial numbers of deaths from diarrhoeal disease.

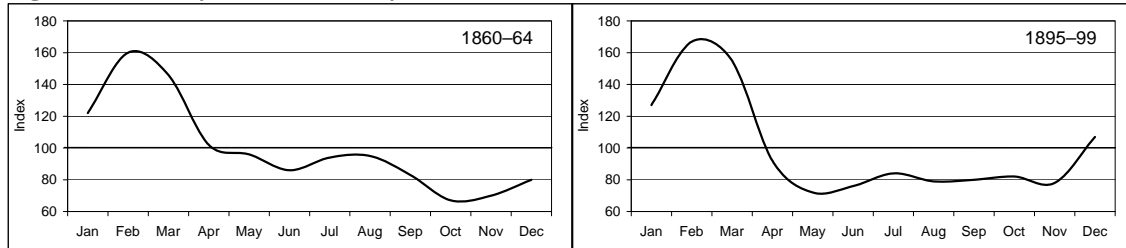
An examination of the seasonality of infant death by age at death also supports the argument that many infant deaths from diarrhoeal disease were registered as being from other causes. Figure 5 shows, for 1860–99, the monthly birth index, and monthly infant-mortality indices by age at death. Infant mortality under the age of ten days exhibited very little seasonality, and what there was followed birth seasonality very closely, indicating that the incidence of death soon after birth was not influenced by the month of birth. Infant mortality became more seasonal as age at death increased, so that at age 200–364 days, 45 per cent of deaths were occurring in January, February or March. This increased seasonality by age indicates that a substantial proportion of infant deaths were caused by diarrhoeal mortality.

Figure 5. Monthly births index^a, Tasmania, 1860–89; and monthly infant-mortality index^a by age at death, Tasmania, 1860–99



a. Adjusted for the number of days in each month.

Figure 6. Monthly infant-mortality index^a, Tasmania, 1860–64 and 1895–99



a. Adjusted for the number of days in each month.

Figure 6 shows the monthly infant-mortality index for the periods 1860–64 and 1895–99. The patterns for both are almost identical, supporting the argument that the causes of infant mortality changed very little over the 40-year period 1860–99.

Diarrhoeal disease and infant feeding

Medical practitioners and others in the nineteenth century looked for causes that might explain the high summer incidence of infant diarrhoea and the consequent mortality. The *Intercolonial Medical Journal of Australasia* (1898: 108) noted:

It is certain that hot weather alone, even if very excessive, has practically no direct influence in causing death or illness among young children, for among breast-fed infants there is no increase in illness during the summer although an enormous increase is noticed to occur among artificially-fed infants.

Many others had recognised this link between infantile diarrhoea, high summer mortality and modes of infant feeding. Breastfed infants were ‘largely immune to diarrhoea’ (Litchfield 1905: 423) while infants fed with artificial foods were open to severe attacks of the disease, from which they often died (McKay 1898: 257). Mothers were warned of the dangers of not nursing their babies, and were held morally culpable if they failed to breastfeed and the child died. In 1882, for example, a Melbourne doctor, James Jamieson warned:

If a woman who might nurse her child...brings it up on a bottle... and the child gets diarrhoea and wastes away, or is suddenly carried off by convulsions, she does not clear herself of responsibility by saying it was God’s will (Lewis 1980: 176).

Twelve years earlier, The *Australasian* had advised that ‘an infant’s properest food is its own mother’s milk, and...she who can suckle her own child and does not, is guilty of a serious offence against God’s law’ (Russell 1994: 107). Sometimes, however, mixed messages were sent. One Tasmanian publication noted the following, opposite advertisements for Nestle’s Milk Food (‘especially suitable for Babies with Diarrhoea and Weak digestion’) and Neave’s Farinaceous Food (‘the standard food for Babies and Invalids’):

In these Colonies breast milk is absolutely essential to nearly all who are born...nine out of ten die who do not get it, and most of the women who order feeding bottles to save them the bother of nursing might as well, at the same time, save trouble by ordering a death certificate (Homoeopathic Pharmacy 1883: 31).

By the end of the nineteenth century, the causes of summer diarrhoea in infants were well recognised: ‘contamination by bacteria and their growth in fluid food, and especially in milk’ (IMJA 1898: 106). Doctors and others stressed the importance of keeping milk and feeding utensils clean and protected from flies and filth (Nickson 1893: 330; Armstrong 1905: 393; Petrow 1995: 145).

There is little evidence about the extent of breastfeeding in Tasmania, and what infants were fed on who were not breastfed. The discussion in the medical journals and the widespread concern among doctors suggests that not breastfeeding was common. Cumpston notes that in Australia between 1890 and 1904, ‘the manufacture of “infants foods” had become active, and the maternal feeding of infants had been, to an appreciable extent, discontinued’ (Cumpston 1989: 110). Concern predates this and baby formula brands were being sold in Tasmania at least from the early 1880s.

Conclusion

High infant mortality in Tasmania over the late 1840s and early 1850s resulted from a series of severe epidemics and the extremely high fatality rate of babies in the convict nurseries. Infant mortality fell precipitously through the 1850s and, from 1860 to the end of the century, averaged around 90–110 deaths per 1,000 births. Even though the composition of registered causes of infant death changed markedly over this time, evidence suggests that this resulted more from shifts in nosological fashion than changes in the actual causes of infant death; the trend in infant mortality was flat over this period, and the seasonal pattern of infant mortality was the same in 1895–99 as it had been in 1860–64.

As Szreter has argued for England, it seems that high levels of mortality from diarrhoeal disease explain why infant mortality remained high in late nineteenth-century Tasmania while mortality was falling at most other ages. Examination of deaths by month of death indicate that many infant deaths registered from causes such as ‘Convulsions’, ‘Debility and marasmus’ and ‘Teething’ were probably due to diarrhoeal disease.

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