

Influenza in Sri Lanka, 1918–1919: the impact of a new disease in a pre-modern Third World setting*



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Abstract

In 1918–1919 there was an unusually serious influenza pandemic. The main object in this paper is to establish the course and impact of this outbreak in Sri Lanka using census and registration data. Influenza probably entered the country through the port of Colombo and possibly also through the port of Talaimannar. As elsewhere there was a mild first wave followed by a virulent second wave characterized by fatal pneumonic complications. Women suffered heavier mortality than men and young adults more (relatively) than other age groups. Fertility fell. Probably about 1.1 per cent of the population died.

Introduction

There had almost certainly been many influenza pandemics before that of 1918–1919: Patterson (1986:83) lists nine between 1700 and 1900. Usually, though, these were fairly benign: a very large proportion of the population tended to catch the disease but very few to die from it. Moreover, where there were deaths these tended to be among the elderly or the very young. What marked the 1918–1919 pandemic from earlier (and later) pandemics was its terrible virulence: one authority (Burnet 1979) has even suggested that influenza was probably responsible for 50–100 million deaths worldwide at this time. The lower figure of this range is certainly not difficult to believe: Davis (1951:237), for example, has estimated that there were about 20 million deaths in India alone. Another remarkable feature of the 1918–1919 pandemic was its tendency to kill disproportionately those in the prime of life rather than the elderly or the very young: one of the contributors to the official British report on the outbreak noted that mortality seemed to be concentrated among those aged 20–40 and especially those aged 25–35 (French 1920:90). Thus the influenza pandemic of 1918–1919 tends to invite comparison with such other great historical pestilences as the Black Death in the fourteenth century and the Plague of Justinian in the sixth century, many accounts ranking it third in mortality terms after these two but some even putting it in second place. (See, for example, Ministry of Health 1920:182; Cliff, Haggatt and Ord 1986:1; Patterson 1986:1.)

Accounts of the 1918–1919 outbreak usually speak of two and often three distinct waves of influenza. The first wave was in spring-summer of 1918 and was apparently fairly mild; the second was in autumn-winter of 1918 and was very far from mild, showing a terrible propensity to lead on to pneumonic complications and death. According to French (1920:69) in his contribution to the official British report on the outbreak, and obviously talking in round numbers, 20 per cent of those contracting the disease developed pneumonic complications and eight out of these 20 per cent died. The third wave, where there was one, tended to come in the early part of 1919; it involved the same serious form of the disease as the second wave but its overall impact was much less.

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According to Crosby (1976) the first wave of the 1918–1919 pandemic began in the United States in March 1918 and then spread around the world over a four-month period. Most other accounts essentially agree, though some point out that the disease may have arisen elsewhere but not been especially noticed. Beveridge (1977) suggests that the first wave of the pandemic may have begun in the United States or it may have begun in China. It apparently struck Britain in June and July (Ministry of Health 1920) and reached Bombay in June 1918 (Mills 1989). The second wave has been seen by some observers as a puzzle, in that it apparently arose in more than one place at the same time. Crosby (1976) reports that the first outbreaks of this more serious form of influenza occurred in the last week of August 1918 in Brest in France, in Boston in the United States and in Freetown in Sierra Leone. This apparent observation thus presents the difficulty that either the more virulent form of the disease arose or developed from the mild form independently but at much the same time in a number of different places around the world, or it travelled at faster than human speed between them; neither of which seems very likely. Hoyle and Wickramasinghe (1977, 1978) have suggested, with reference to this and other outbreaks, that the scattering of infective debris from comets might be responsible, thus producing simultaneity. However, by no means everyone accepts that there were such simultaneous outbreaks. Beveridge (1977) suggests that the severe second wave may have evolved from the first or resulted from the invasion of a new virus from Russia or Africa. Stuart-Harris, Schild and Oxford (1985) simply mention West Africa as the starting point of the second wave of the disease. In any case mortality in this more virulent second wave of the pandemic reached a peak in October 1918 in the United States, in October or November 1918 in different parts of Europe, and in November 1918 in most of India, though the peak was in October in Bombay Presidency and in December in Bengal (see Ministry of Health 1920; Crosby 1976; Mills 1989).

The intention in this paper is to trace the course and assess the impact of the 1918–1919 influenza outbreak in Sri Lanka (then Ceylon). This effectively means the second wave of the disease since it is possible to examine data only on mortality and not on morbidity. There is certainly a need for such an account since although a number of assessments of the impact of influenza in 1918–1919 on various developed countries are available, almost no detailed studies of Third World countries have been carried out, virtually the only exception being Mills's (1989) account for India; of course in many cases there are few or no data which would permit this. The data used in this paper come from vital registration and the census and have been taken from the *Reports of the Registrar General of Ceylon on Vital Statistics*, from issues of the *Ceylon Government Gazette* and from census reports. There are no doubt errors in these data, both of coverage and of accuracy. However, if they are used with care, a great deal of information can be had from them.

In the next section of the paper a brief account is given of the geography of Sri Lanka as well as of certain features of the demographic and the economic situation in the country in the early part of the twentieth century, in order to provide some indication of the context in which the 1918–1919 influenza outbreak occurred. In subsequent sections of the paper the influenza outbreak itself is examined in some detail.

The geography, demography and economy of Sri Lanka in the early twentieth century

Sri Lanka is an island not far north of the equator (5°55'–9°50'N), just off the south-east tip of India. It is about 140 miles across at its widest point and 270 miles from north to south. The south-central part of the island is mountainous, ranging from about 1000 feet to more than 7000 feet above sea level: this is where most tea is grown. The south-western part of the country is well watered (the wet zone); the remainder, the dry zone, is not (see Figure 1 and Table 6). Historically, that is until the late 1940s,

malaria was especially important in morbidity and mortality in Sri Lanka: this was particularly true of the dry zone in most of which malaria was endemic. Most of the population, 63 per cent of the approximately 4.1 million people in 1911, lived in the wet zone. In the early part of the twentieth century, as indeed now, the Sri Lankan economy was heavily dependent on the output of the estate (plantation) sector, principally tea but also rubber and coconuts. Sri Lanka imported most of its food at this time.

Basic demographic measures for Sri Lanka in the early part of the twentieth century, and for some later years for comparison, are shown in Table 1. Birth and death rates were computed in every case for three-year periods centred on census years. The overall picture seems to be one of no secular trend at all in the crude birth rate over the entire period 1901–1953 and of a decline in the crude death rate only after 1921. The data are consistent with the idea, in other words, that in the first two decades of the twentieth century in Sri Lanka there was a ‘pre-demographic transition’ situation of more or less constant fertility and mortality. The small differences between the figures for 1911 (in fact 1910–1912) and the other years are probably genuine. There was a malaria epidemic in 1911–1912, so it is not at all surprising that both the crude death rate and the infant mortality rate were highest at this time. Nor is it surprising that the crude birth rate was lowest around 1911: an upsurge in mortality is commonly followed by a temporary downturn in fertility. In this case an examination of the yearly totals of registered live births for successive years clearly indicates a marked fall in 1912.

Table 1
Crude birth rates, crude death rates and infant mortality rates for Sri Lanka around census years, and census populations, 1901–1953

	1901	1911	1921	1931	1946	1953
Crude birth rates	38.5	36.7	39.1	37.9	38.4	38.6
Crude death rates	28.0	31.5	29.7	22.7	18.9	11.2
Infant mortality rates	173	202	188	165	126	74
Population	3,566	4,106	4,499	5,307	6,657	8,098

Note: crude birth and death rates were calculated by dividing one-third of the number of births or deaths in the three-year period centred on the census year by the census population and infant mortality rates by dividing infant deaths in the three-year period by live births in the same period; crude birth and death rates are shown per 1000 total population and infant mortality rates per 1000 live births; census populations are shown in thousands.

The appearance of influenza in Sri Lanka in 1918

In the 18 years between 1900 and 1917 the maximum number of deaths registered as due to influenza in any one year in Sri Lanka was 256 in 1909; the minimum number was 44 in 1903; the average number of deaths from influenza per year in this period was 115. In 1918, on the other hand, the number of deaths registered as due to influenza in Sri Lanka was 19,102 of which, moreover, 18,887 were recorded in the last quarter of 1918. Clearly, the 1918–1919 influenza pandemic had reached Sri Lanka.

According to the Principal Civil Medical Officer of Ceylon in his report for the year 1918 (Ceylon 1919:Part IV, B1-B14) the first cases of influenza appeared in June of 1918 in Colombo, the capital city and main port, among harbour workers, and the disease spread from there.

The spread of the disease was rapid, and the gravity of the symptoms increased as the disease increased. By September and October nearly every Province and district in the

Island was affected. Notable features of the disease were the rapid onset of pneumonia in a large percentage of cases, mostly of the broncho-pneumonia type (Ceylon 1919:Part IV, B2)

Despite the absence in this account of any clear reference to mild and virulent waves of influenza there may well have been such waves. According to the Medical Officer the initial epidemic in Colombo was in June and July; however the data indicate that mortality did not rise there appreciably until September. Moreover, the Government Agent for the Northern Province, in his report for the district of Jaffna for the year 1918, wrote:

There was a wide prevalence of influenza in the district in common with the rest of the Island, or rather with the whole world. It swept over the country in two waves: one mild, and the other a severe outbreak, attended with high mortality. The first occurred about the middle of August, and appeared to be dying out towards the end of September, when it re-appeared in greater virulence and spread everywhere (Ceylon 1919:Part I, D4).

The total numbers of deaths registered each year in Sri Lanka, from all causes, for years between 1900 and 1925 are shown in Table 2. It may be seen that 1918 was the second worst and 1919 the worst year in mortality terms during the whole of this period. The worst years previously had been 1906, 1911 and 1914, all years in which serious malaria outbreaks had occurred. A more detailed picture is provided by the data presented in Table 3 on the total deaths registered in each quarter of 1918 and 1919. It may be seen that the peak of mortality was in fact in the last quarter of 1918, though the first quarter of 1919 was not very far behind; 1919 as a whole was a worse year than 1918 because not only the first quarter in 1919 but also the second and third quarters had exceptionally high mortality. Just how serious was the mortality in the last quarter of 1918 and the first quarter of 1919 may be seen from the fact that these were, respectively, the worst and second worst quarters in mortality terms over the whole period 1900–1925; moreover the next worst quarter, the third quarter of 1911, had only two-thirds the number of deaths in the last quarter of 1918.

Table 2
Deaths registered each year 1900–1925 in Sri Lanka, and indices showing the relative mortality in different years

Year	Total deaths	Relative to 1919 = 100	Rank order of year ^a
1900	100,873	60	22
1901	98,813	59	24
1902	99,680	59	23
1903	96,084	57	25
1904	93,940	56	26
1905	108,160	64	21
1906	136,271	81	7
1907	119,377	71	15
1908	117,982	70	16
1909	122,969	73	11
1910	110,195	65	19
1911	143,380	85	3
1912	134,383	80	8
1913	119,956	71	14
1914	136,831	81	6
1915	109,818	65	20

1916	120,162	71	13
1917	113,389	67	18
1918	149,407	89	2
1919	168,323	100	1
1920	132,955	79	9
1921	140,749	84	5
1922	126,820	75	10
1923	141,891	84	4
1924	122,958	73	12
1925	117,543	70	17

^aYear with most deaths 1900–1925 = 1, year with fewest deaths = 26.

That the upsurge in mortality in Sri Lanka during 1918–1919 was largely due to the influenza outbreak is very clear from the data on causes of death shown in Table 3. Not only were there many deaths during this period from influenza and—almost a defining characteristic of the 1918–1919 outbreak—from pneumonia, but there were also more deaths than usual from respiratory diseases other than pneumonia and it seems quite likely that this rise may also have been influenza-related. It may be seen, moreover, that there was an increase in deaths from pyrexia, meaning pyrexia (fever) of unknown origin, during this time. Although in the Sri Lankan context such deaths are usually taken to indicate deaths from malaria and there was indeed a malaria outbreak in some areas of Sri Lanka during this period, it seems extremely likely nevertheless that many of the deaths ascribed to pyrexia during 1918–1919 were influenza deaths.

A more detailed picture of the timing of the 1918–1919 influenza epidemic in Sri Lanka is provided by the data shown in Table 4 on the number of deaths registered each month during this time. It may be seen that mortality first rose, albeit only slightly, in September 1918 and that this was then followed by a dramatic rise in October. Mortality reached a peak in November 1918, when the number of deaths registered was almost three times the average for November during 1915–1917, and then declined, remaining, however, at very high levels through the first three months of 1919 before dropping back to still-above-average levels at the end of the year.

Table 3

Total deaths and deaths from particular causes registered in each quarter of 1918 and 1919 in Sri Lanka, and indices showing the relative mortality in these quarters compared with all quarters 1900–1925 or 1900–1921

	Year and quarter							
	1918				1919			
	Jan– Mar.	Apr– June	July– Sept.	Oct– Dec.	Jan– Mar.	Apr– June	July– Sept.	Oct– Dec.
Total deaths	30,137	23,929	27,027	68,314	58,522	40,227	37,512	32,062
Relative to worst quarter 1900–1925 = 100	44	35	40	100	86	59	55	47
Quarter rank 1900–1925 ^a	43	94	71	1	2	9	12	30
Influenza deaths	32	20	163	18,887	12,324	5,498	3,897	1,095
Relative to worst quarter 1900–1921 = 100	0	0	1	100	65	29	21	6
Quarter rank 1900–1921 ^b	34	71	14	1	2	3	4	6
Pneumonia ^c deaths	1,239	1,089	1,886	12,556	2,834	2,702	3,419	1,797

Relative to worst quarter 1900–1921 = 100	10	9	15	100	23	22	27	14
Quarter rank 1900–1921 ^b	20	37	8	1	3	4	2	9
Malaria ^d and pyrexia deaths	4,074	3,457	3,951	8,011	8,917	6,340	5,136	4,034
Relative to worst quarter 1900–1921 = 100	32	27	31	63	70	50	40	32
Quarter rank 1900–1921 ^b	55	79	62	7	5	19	31	58
Deaths from:								
all respiratory diseases ^c (excluding pneumonia)	1,099	842	1,086	2,236	1,817	1,365	1,368	1,010
pyrexia	3,784	3,209	3,647	7,728	8,357	5,943	4,836	3,736
malaria ^d	290	248	304	283	560	397	300	298
unspecified causes (excluding pyrexia)	1,232	1,009	1,091	1,358	1,749	1,616	1,613	1,506

^aQuarter with most deaths = 1, quarter with fewest deaths = 104

^bQuarter with fewest deaths = 88

^cIncluding broncho-pneumonia

^dIncluding malarial cachexia

^eThe 'respiratory diseases' category does not include influenza

The suggestion that mortality rose in September 1918 as a result of the influenza outbreak is supported by the monthly figures on deaths by cause, available only for certain causes of death for Sri Lanka as a whole. In August 1918 in Sri Lanka only eight deaths were registered as due to influenza; in September this rose to 145. Moreover, the number of deaths recorded as due to pneumonia or broncho-pneumonia in September was 977, up from 500 in August and 409 in July, and an average of 388 per month in the first six months of the year. The suggestion that mortality reached a peak in November 1918 because of the influenza outbreak is also supported by the monthly figures on causes of death. There was a very marked peak in November 1918 in the number of deaths registered as due to influenza (8,253 deaths) and a very marked peak also in the number recorded as due to pneumonia or broncho-pneumonia (6,082 deaths).

Table 4
Deaths registered each month in 1918 and 1919 in Sri Lanka, and indices showing deaths each month in relation to the average number in the same month during 1915–1917

Month	1918		1919	
	Deaths	Relative to 1915–1917 = 100	Deaths	Relative to 1915–1917 = 100
January	11,243	99	21,124	187
February	9,987	100	20,097	201
March	8,907	92	17,301	179
April	7,870	90	12,423	142
May	8,166	84	13,325	137
June	7,893	85	14,479	155
July	8,674	90	13,968	145
August	9,000	94	12,103	126
September	9,353	109	11,441	133
October	23,453	258	10,724	118

November	26,231	286	10,223	111
December	18,630	195	11,115	116

The spread of the disease through the island

The numbers of deaths registered each month in the 21 administrative districts of Sri Lanka during 1918 and 1919, compared with the average number of deaths in the same month during 1915–1917, are shown in Table A1 in the appendix. Certain features of these data are also indicated on the maps presented as Figure 2 which are intended to show the progress of the disease through the island. Names of districts are indicated on the map presented as Figure 1.

In Colombo, Kalutara, Kandy, Kegalle, Mannar, Mullaittivu, Puttalam and Ratnapura mortality rose in September 1918 whereas in the other districts mortality did not increase until October. What this amounted to in geographical terms may be seen from Figure 2, part (A). The districts affected earliest by the epidemic were apparently in two clusters, one around Colombo in the south-west of the island and the other in the north, though not including the northernmost district of all, Jaffna.

The further progress of the disease through the island may be seen from Figure 2, part (B), which indicates for every district the worst month in mortality terms during 1918. Mullaittivu with joint peaks in October and November has been counted as October and Kurunegala with joint peaks in November and December has been counted as November. In twelve districts the peak month for mortality in 1918 was October and in eight districts it was November; in Batticaloa it was December. It may be seen that, with the exception only of Kandy, all of the districts affected earliest by the epidemic, that is, where mortality rose in September, also experienced an early mortality peak, in October. Moreover, other districts which experienced an October mortality peak were all districts adjoining these. The evidence suggests, in other words, that influenza spread out in Sri Lanka from Colombo and from some other point further north, possibly having arrived there from Colombo or possibly from elsewhere. Initially, coastal districts in the north, north-east and west and districts in the south-west near to Colombo were affected; subsequently the disease spread to the interior of the island and to districts in the south; finally it reached Batticaloa district on the east coast of the island.

Figure 1
The districts of Sri Lanka

Figure 2
The timing of the rises in mortality in the different districts of Sri Lanka during 1918–1919

Note: These maps are based upon the data presented in Table A1 which show the number of deaths each month relative to the average number in the same month during 1915–1917; names of districts are shown in Figure 1.

That Colombo and some other districts nearby should have been affected very early in the epidemic is hardly surprising and is consistent with the suggestion of the Principal Civil Medical Officer of Ceylon already cited that influenza entered the country through the port of Colombo. As for

the other cluster of districts, some doubt attaches to the observation since each of the districts in question had a rather small population: all three districts had populations below 40,000 and Mullaittivu had a population of only about 18,000. However, there are reasons for suspecting that the observation might be genuine. The port of Talaimannar in Mannar district was the Sri Lankan end of the sea crossing between Sri Lanka and India which linked the railway systems of the two countries. In 1918 in Sri Lanka, Talaimannar was second only to Colombo in terms both of the number of vessels using the port and the total size of their crews (Ceylon 1919:Part II, A42). Not far short of 200,000 people passed through Mandapam quarantine camp in south India during 1918 en route to or from Sri Lanka via Talaimannar (Ceylon 1919:Part I, N8). Trincomalee on the north-east coast was not at this time in use as a military or naval base (Ceylon 1920:Part I, E12).¹

The information presented in Figure 2, part (C), points to another feature of the situation. Although in most districts the worst month in mortality terms during the whole of 1918–1919 was in fact in 1918, in a few districts the peak month was in 1919. These were Anuradhapura (peak in February), Batticaloa (January–February), Chilaw (March), Kurunegala (February), Negombo (February, June) and Puttalam (February). In these districts the interval between the first appearance of influenza as indicated by rising mortality and the worst month for mortality during 1918–1919 was typically four or five months (disregarding for the moment the second 1919 peak in Negombo district which will be discussed subsequently) compared with, usually, one month or less in the other districts. Was it not, then, the case that influenza simply moved more slowly in some districts than others so that the height of its impact tended to come rather later, moreover in some cases after an earlier peak had apparently been reached? This may have been so; however the situation seems also to have been complicated by the fact that there was a serious outbreak of malaria in some districts at this time.

The report of the Principal Civil Medical Officer of Ceylon for 1918 refers to there having been only one 'extensive epidemic' of malaria in Sri Lanka during 1918, that is, in the North-Western Province comprising Kurunegala, Puttalam and Chilaw districts (Ceylon 1919:Part IV, B2). The seriousness of this outbreak is confirmed by the local official reports. The Government Agent for the North-Western Province in his report for 1918 wrote (with reference to Kurunegala district):

About the end of November the epidemic of influenza abated, but about the same time a severe outbreak of malarial fever occurred, attended again with unusual mortality. The explanation probably is that the victims were weakened by a previous attack of influenza.

The report for Puttalam and Chilaw districts for 1918 referred to malaria having 'set in in an epidemic form with unwonted severity' and went on 'Many cases of malaria were complicated by pneumonic sequelae, probably due to influenza. By the end of the year almost every part of the district had begun to suffer' (Ceylon 1919:Part I, F2, F12). It is perfectly clear, moreover, from the official reports that the malaria epidemic persisted in these districts through the early part of 1919 (Ceylon 1919:Part I, F2, F10; Ceylon 1920:Part I, F2).

There seems to be no mention in the official reports of a similar outbreak of malaria in either Batticaloa district or in Negombo district and in the case of Anuradhapura district there are only vague hints of this possibility in the form of references to 'influenza and fever' and 'fever and influenza'

¹ It might be feared that the apparent timing of the upsurge in mortality in Mannar district was due not to deaths in the local population but to deaths among those in transit. However, it is clear that this was not the case since the overwhelming majority of those passing through would have been Tamil estate labourers, yet the pattern of month-by-month changes in the numbers of registered deaths in Mannar district was much the same for Tamils and non-Tamils; moreover the upsurge in mortality was somewhat more marked for non-Tamils.

epidemics (Ceylon 1919:Part I, G1-G2). It seems quite likely, however, that Anuradhapura district was also affected: it adjoined districts of the North-Western Province; it had the same kind of climate (all these districts are in the so-called 'dry zone' of Sri Lanka); and the peak month for mortality was February 1919, just as in Kurunegala and Puttalam districts. Moreover, it will be seen that the overall rise in mortality in Anuradhapura district during 1918–1919 was second only to that in Kurunegala district.

Was the explanation, then, for monthly mortality reaching a peak in early 1919, at least for some districts, that as the influenza outbreak was beginning to subside it was succeeded by an outbreak of malaria, so that mortality rose still further? The material presented in Table A2 in the appendix suggests that it was not as simple as this. These data seem to show that just those districts (with the exception to some extent of Negombo) which reached a mortality peak in early 1919 also reached the high-point of influenza-related mortality in early 1919. In Anuradhapura, Batticaloa, Chilaw, Kurunegala and Puttalam districts the number of deaths registered as due either to influenza or pneumonia reached a peak in the first quarter of 1919 whereas in all other districts there was a peak in the last quarter of 1918. Moreover, in the case of Negombo district, though the high-point of mortality from influenza and pneumonia was in the last quarter of 1918 there were almost as many such deaths (93% of the number) in the first quarter of 1919.

It might be objected that at a time when influenza was prevalent there was a danger that malaria deaths would be misreported as influenza deaths. For this reason data on deaths from pneumonia and deaths from all respiratory diseases (which include pneumonia but do not include influenza) in these districts are presented in Table 5: these causes are likely to be influenza-related but are presumably not confusable with malaria. These data clearly indicate a 1919 peak in influenza-related mortality in Batticaloa district, where the high-point was apparently in the second quarter of the year, and in Chilaw district; and they suggest that there was probably a 1919 peak also in Anuradhapura district. In Kurunegala district and in Puttalam district the peak of influenza-related mortality was apparently in late 1918 though in neither case was the first quarter of 1919 far behind. The data for Negombo district are not very helpful.

In some of these districts, then, the high-point of influenza-related mortality was almost certainly in 1919 and it is possible, if the reporting of influenza deaths was valid, that there was a 1919 peak in virtually all of them, the possible exception being Negombo. Some of these districts were also badly affected by malaria during this time. It is possible that the high-point of influenza mortality was delayed until 1919 in some districts simply because the infection travelled more slowly in those districts, perhaps because the population was more scattered. Another possibility, however, which fits with the apparent observation that in some districts influenza seemed to be subsiding but then re-emerged, is that the mortality rate among those contracting influenza was actually worsened in some districts by the appearance of malaria. Observers at the time remarked that the malaria outbreak in the North-Western Province was particularly deadly because people were already weakened by influenza. It is perfectly possible that the reverse was also true: that those who contracted influenza who were already suffering from malaria, or had done so recently, were more likely than the average influenza sufferer to die from the disease.

Table 5
Deaths from pneumonia and from all respiratory diseases registered in the last quarter of 1918 and each quarter in 1919 in certain districts of Sri Lanka, and indices showing the relative mortality in these quarters compared with all quarters 1900–1921.

District

	Anura- dhapura		Batticaloa		Chilaw		Kurunegala		Negombo		Puttalam	
	N	(R)	N	(R)	N	(R)	N	(R)	N	(R)	N	(R)
Pneumonia												
4th quarter 1918	95	(1)	80	(21)	47	(2)	351	(1)	15	(50)	60	(3)
1st quarter 1919	59	(3)	98	(11)	77	(1)	242	(2)	29	(13)	59	(4)
2nd quarter 1919	38	(7)	201	(1)	34	(4)	148	(3)	18	(38)	63	(2)
3rd quarter 1919	14	(29)	119	(7)	18	(16)	95	(4)	17	(41)	24	(15)
4th quarter 1919	18	(16)	120	(6)	29	(7)	61	(10)	27	(18)	46	(6)
All respiratory diseases												
4th quarter 1918	211	(8)	289	(4)	102	(2)	551	(1)	38	(23)	140	(2)
1st quarter 1919	229	(3)	341	(2)	180	(1)	535	(2)	46	(15)	131	(3)
2nd quarter 1919	180	(13)	390	(1)	71	(13)	299	(9)	38	(23)	95	(4)
3rd quarter 1919	151	(26)	204	(8)	45	(57)	225	(27)	25	(52)	50	(25)
4th quarter 1919	111	(59)	165	(12)	61	(23)	146	(50)	41	(22)	64	(13)

Notes: N = number, R = quarter rank 1900–1921; quarter with most deaths = 1, quarter with fewest deaths = 88.

Pneumonia includes broncho-pneumonia.

Respiratory diseases include pneumonia (but do not include influenza).

The third wave of the epidemic

For some time after the 1918–1919 outbreak in Sri Lanka mortality from influenza and from pneumonia continued at much higher levels than had obtained before the epidemic. Even by 1925 the number of deaths registered as due to influenza (1,532) was still six times the number in the worst year before 1918 (since 1900). The number of deaths registered as due to pneumonia or broncho-pneumonia in 1925 (7,371) was 47 per cent higher than the number in the worst year before 1918; the excess varied between 33 per cent and 78 per cent over the period 1920–1925. In other words, there may well have been a number of further ‘waves’ of influenza following the first outbreak of the virulent form of the disease in 1918–1919. That being said, the monthly figures on deaths by cause for the whole island (these data are not available for districts) suggest that there was indeed a ‘third wave’ of the epidemic, in June and July 1919. The number of deaths registered as due to influenza each month increased to a maximum in November 1918 and declined thereafter. However, the number quite clearly rose again, though to nowhere near the original peak level, in June and July 1919. In the case of mortality from pneumonia and broncho-pneumonia there was a similar upsurge in June and July 1919 (beginning in May) though with another, even more marked, in September 1919.

The data on deaths from all causes each month by district shown in Table A1 in the appendix suggest that there may well have been a resurgence of influenza sometime in the period between May and August 1919 in the following districts: Badulla, Batticaloa, Colombo, Galle, Kalutara, Kandy, Kegalle, Matale, Matara, Negombo, Puttalam and Ratnapura. The same may have been true also of Chilaw, Hambantota, Mannar and Mullaittivu districts though the evidence is less clear in these cases. In Nuwara Eliya district there was a very sharp increase in mortality in September 1919. This was clearly associated with a resurgence of influenza since the third quarter of 1919 in this district was second only to the last quarter of 1918 (over the period 1900–1921) in both influenza and pneumonia plus broncho-pneumonia deaths. The upsurge in this district was undoubtedly largely responsible for the marked rise in pneumonia and broncho-pneumonia deaths in September in the island as a whole. Kandy district also showed a marked increase in mortality in September 1919, in addition to an earlier

peak in June. In the cases of Anuradhapura, Jaffna, Kurunegala and Trincomalee there seems to be no evidence of any ‘third wave’ of the epidemic, at least during 1919.

The impact of influenza on different subgroups in the population

Districts

Table 6 presents ratios (expressed as percentages) of observed deaths in 1918–1919 to average deaths in 1915–1917 in different districts: the impact of influenza varied substantially between districts. These variations seemed particularly large, judged on the basis of the mortality in the worst month during 1918–1919, which clearly may reflect not only seriousness of overall impact but also shortness-and-sharpness of attack. However, there were clear differences even when a longer time period is considered. The ratio of deaths observed during the worst month in 1918–1919 to average deaths in the same period during 1915–1917 varied from 190 per cent in Matara to 828 in Nuwara Eliya; the mean value was 387 per cent. For the whole six-month period comprising the last quarter of 1918 and the first quarter of 1919 these ratios ranged from 140 in Galle to 402 in Kurunegala with a mean of 231. For the period comprising the last quarter of 1918 and all of 1919 the ratios varied between 127 in Jaffna and 253 in Kurunegala with a mean of 173.

It is very difficult to say what may be the reasons for these differences between districts; however, a few points are probably worth noting. The first is that of course not all of these differences were due only to influenza. The districts showing the greatest excess mortality, on a six-month or a 15-month view of the data, were Kurunegala and Anuradhapura, in at least one of which and most probably both of which there was a serious outbreak of malaria during this period. Chilaw and Puttalam, which also suffered from malaria, were high up on the list, too, in terms of excess mortality. There is some suggestion in the data that in general (again over six or 15 months) districts in the dry zone may have tended to suffer more than those in the wet zone and districts where a substantial proportion of the population lived on estates (mainly tea estates) more than non-estate districts; the estates in Badulla and Matale would have been in non-dry parts of these districts. It is possible that the dry zone tended to suffer more because it was generally less healthy, less developed and less well provided with facilities than the wet zone and so may have experienced higher mortality from influenza. The dry zone was also much more prone to malaria than the wet zone and it is possible that this might have contributed to higher mortality. In the estate sector it is possible that congested living conditions led to higher mortality from influenza. The largely Indian Tamil labour force typically lived in close-packed ‘lines’ of small adjoining single-storey units. (On the other hand there is no real suggestion in the, admittedly rather simple, data of Table 6 that the ‘urbanness’ of districts was important.) It is also conceivable that cold might have been a factor on estates: tea is typically grown at high or relatively high altitudes, from about 1,000 feet to more than 6,000 feet above sea level. On the other hand it might simply be that the relatively poor state of general health of Indian Tamils (discussed below) predisposed them to higher mortality from influenza.

Table 6

The rises in mortality over different periods of time during 1918–1919 in Sri Lanka and districts, with some socioeconomic and climatic information about districts

District	Observed/expected ^a deaths (and rank ^b)			1921 %	Wet or dry zone d
	Worst month during 1918–1919	October 1918 – March 1919	October 1918 – December 1919		

							Urban ^c	Estates	
Colombo	262	(17)	153	(20)	138	(19)	31.9	1.5	wet
Negombo	196	(20)	167	(17)	150	(17)	7.5	11.4	wet
Kalutara	310	(15)	156	(19)	143	(18)			
Kandy	364	(12)	206	(14)	162	(13)	10.4	34.8	wet
Matale	427	(7)	283	(3)	188	(6)	6.7	29.9	dry
Nuwara Eliya	828	(1)	244	(10)	183	(7)	4.5	62.8	wet
Galle	213	(19)	140	(21)	132	(20)	13.5	3.6	wet
Matara	190	(21)	159	(18)	156	(14)	10.9	2.2	wet
Hambantota	370	(11)	236	(11)	175	(10)	6.5	0.2	dry
Jaffna	306	(16)	174	(16)	127	(21)	12.8	0.0	dry
Mannar	623	(2)	253	(7)	167	(12)	14.5	0.0	dry
Mullaittivu	389	(10)	276	(5)	202	(3)	13.4	0.4	dry
Batticaloa	256	(18)	213	(13)	176	(9)	8.3	0.5	dry
Trincomalee	391	(9)	248	(9)	153	(16)	27.6	0.4	dry
Kurunegala	574	(3)	402	(1)	253	(1)	2.9	4.5	dry
Puttalam	346	(13)	253	(8)	180	(8)	23.9	1.9	dry
Chilaw	444	(5)	281	(4)	201	(4)	6.5	3.2	dry
Anuradhapura	402	(8)	325	(2)	232	(2)	8.1	1.4	dry
Badulla	430	(6)	255	(6)	189	(5)	4.4	35.7	dry
Ratnapura	316	(14)	197	(15)	154	(15)	3.5	23.9	wet
Kegalle	498	(4)	229	(12)	169	(11)	1.3	21.0	wet
Sri Lanka	286		216		166		12.9	12.6	

^a'Expected' means average for same month or period during 1915–1917. Deaths in the period October 1918 to March 1919 are compared with one-third of the total deaths in first and fourth quarters during 1915–1917. Deaths in the period October 1918 to December 1919 are compared with one-third of the total deaths during 1915–1917 plus one-third of the total deaths in fourth quarters during 1915–1917.

^bRank indicated in brackets. District showing greatest rise = 1, district showing smallest rise = 21.

^c'Urban' includes the three municipalities of Colombo, Galle and Kandy, 21 local board areas and the towns proclaimed under the Births and Deaths Registration Ordinance.

^dThis matter is by no means completely straightforward and some classification schemes categorize some districts as 'intermediate' between wet and dry. This classification has been taken from United Nations (1976:35).

Ethnic groups

According to the 1911 census of Sri Lanka 66 per cent of the population were Sinhalese, 13 per cent were Ceylon Tamils, 13 per cent were Indian Tamils and six per cent were Ceylon Moors. The Sinhalese, Ceylon Tamils and Ceylon Moors were all long-established populations, whereas the Indian Tamils were immigrants from south India mainly working on tea estates. The Sinhalese are overwhelmingly Buddhist and the Tamils Hindu, though there are Christian minorities in both cases; Moors are Muslims.

On a 'worst month' view of the data there seemed to be very substantial differences between ethnic groups so far as the impact of influenza was concerned (see Table A1 in the appendix). In the worst month for Indian Tamils there were more than six times (611%) the average number of deaths in the same month for this group during 1915–1917; the corresponding ratio for the Sinhalese in the worst month was less than two-and-a-half (238%). The figures for Moors and Ceylon Tamils were 336 per cent and 281 per cent, respectively. However, viewed over a longer period of time the differences between ethnic groups were very much less and the positions of groups relative to each other changed somewhat. For the period comprising the last quarter of 1918 and the first quarter of 1919 the ratios of observed to average 1915–1917 deaths (percentages) were: for the Sinhalese 213; for Ceylon Tamils

188; for Indian Tamils 261; and for Moors 212. For the period comprising the last quarter of 1918 and all of 1919 the figures were: Sinhalese 170; Ceylon Tamils 143; Indian Tamils 184; and Moors 155.

It seems, then, that ethnic groups differed very considerably in terms of whether they suffered extremely heavy mortality from influenza in a relatively short period of time or somewhat lower mortality over a longer period, but that the longer-run differences between them, that is over six or 15 months, were very much smaller. Indian Tamils apparently suffered particularly badly in a relatively short period of time. This may well have been due to the fact that they were heavily concentrated in a residential sense in that they lived in small areas on estates and also fairly concentrated in a geographical sense in that estates were themselves concentrated in a certain part of the country (see Table 6 and Figure 1). The Sinhalese, by contrast, experienced much lower peak mortality but many more months not far off that peak, so that on balance over 15 months they were not much better off than the Indian Tamils. This may well have reflected the fact that the Sinhalese were much more scattered both in being more likely to live in small rural communities, through which influenza may have moved more slowly, and in being distributed across many more districts in the island, where influenza arrived at different times. In the case of the Sinhalese, though, malaria would have been a factor as well as influenza; the overwhelming majority of the population in the North-Western Province, and in Anuradhapura district, were Sinhalese. It should not be overlooked, however, that even on a 15-month view of the data Indian Tamils apparently suffered more than other groups in the population.

Why should Indian Tamils have experienced higher mortality from influenza than other sections of the population? Congested living conditions and low temperatures due to altitude may have played a part. However, the most important factor may well have been simply the poor state of health of Indian Tamils even in ordinary times. Indian Tamils were drawn from the lowest echelons of south Indian society; and their conditions of life and work in Sri Lanka were arduous. Their mortality tended to be considerably higher than that of other groups in the Sri Lankan population. The mean expectation of life at birth for Indian Tamils computed for the combined period made up by 1900–1902, 1910–1912 and 1920–1922 was 24.0 years; the corresponding figure for the Sinhalese was 33.6 years; the figures for Moors and Ceylon Tamils were 30.3 and 31.5 years respectively. (The figures cited are averages of the life expectancies of males and females; figures for Ceylon and Indian Tamils were derived as in Table A1 in the appendix.) Thus it may be that Indian Tamils suffered more than others in 1918–1919 mainly because they were already more debilitated and so at greater risk of death from influenza in the epidemic. However, it is also conceivable that the impact of influenza on this group may then have been further exacerbated by the serious food shortage that affected Sri Lanka in late 1918 and during 1919 (discussed below) since this may well have had more effect on those, like estate workers, who depended on wages and were remote from subsistence agriculture, than on others in the population.

Age groups

Table 7 shows the impact of influenza during 1918–1919 on different age groups in the Sri Lankan population. It may be seen that, as has been noted for other countries, young adults suffered more, in one sense at least, than any other age group. The greatest proportional increases in mortality rates occurred among men aged between 20 and 35 and among women aged between 15 and 35. By contrast, infant mortality and mortality among those aged 45 and over were apparently not very much affected by the epidemic. But a somewhat different picture emerges when absolute rather than relative changes in mortality rates are considered. For both males and females it was those in the first year of life who suffered the greatest absolute increase in the mortality rate with the 1–4 age group experiencing the second greatest rise. The adult age groups which suffered the greatest proportional increases in mortality rates experienced lower absolute increases than these two groups. Thus, despite the fact that the infant mortality rate apparently only rose nine per cent during 1918–1919 the implied number of

additional deaths in infancy was still more than 25 per cent of the implied additional number in the entire 15–34 age group. Moreover, the implied number of additional deaths in the 1–4 age group was more than half the implied additional number in the 15–34 age group.²

² In general the estimated age-specific death rates for Sri Lanka in 1918–1919 shown in Table 7 may be biased upwards slightly because of the way the denominators were estimated. This was done by interpolating 75 per cent of the way between the 1911 and 1921 censuses. No account was taken of the fact that the 1921 population was itself somewhat diminished precisely because of the influenza epidemic; moreover arguably a figure of a little higher than 75 per cent might have been used. However, in the case of the 1–4 age group the upward bias may well be greater than in other age groups because the population aged 1–4 in 1921 would have been affected also by the fall in the number of births in the aftermath of the epidemic. On the basis of the figures presented in Table 7 the implied number of additional deaths in the 1–4 age group because of the epidemic was almost two-thirds the implied additional number in the entire 15–34 age group. The extremely cautious expression ‘more than half’ used in the text easily allows for the maximum conceivable upward bias in the 1–4 rate.

Table 7
Estimated age-specific mortality rates by sex for Sri Lanka in 1918–1919, ratios (%) of estimated to ‘normal’ rates and differences between estimated and ‘normal’ rates

Age group	Males			Females		
	Estimated rate ^a (per 1000)	Estimated/ normal rate ^b (%)	Estimated - normal rate ^c (per 1000)	Estimated rate ^a (per 1000)	Estimated/ normal rate ^b (%)	Estimated - normal rate ^c (per 1000)
0	211	109	17	198	108	16
1–4	53	131	12	62	127	13
5–9	15	113	2	18	114	2
10–14	9	102	1	11	116	1
15–19	13	122	3	16	166	6
20–24	17	146	6	23	153	8
25–34	20	143	6	30	150	10
35–44	26	126	5	29	131	7
45–54	33	107	2	29	111	3
55+	77	103	2	91	99	-1

^aNumbers by age group were estimated by linear interpolation (75% of the way) between the censuses of 1911 (taken on March 10) and 1921 (taken on March 18). Age-specific death rates were computed by dividing half the registered deaths in the age group in question during 1918 and 1919 by the estimated number in the age group. For the first year of life an infant mortality rate rather than an age-specific death rate was used. This was calculated by dividing the infant deaths in 1918 and 1919 by the live births in this period.

^bThe rates taken as ‘normal’ were for the combined period made up by 1900–1902, 1910–1912 and 1920–1922. Age-specific death rates were computed by dividing one-third of the total number of deaths in the age group in question during these nine years by the sum of the 1901, 1911 and 1921 census counts of the age group. Infant mortality rates were calculated by dividing the infant deaths during these nine years by the live births in the same period.

^cThese figures may contain rounding errors since they were obtained by subtracting rates expressed to the nearest whole number per 1000.

Women

It is clear from the data presented in Table 8 that women suffered heavier mortality than men during the 1918–1919 influenza outbreak in Sri Lanka. The ratio of male to female deaths fell markedly in the last quarter of 1918 (to 0.93) and the first quarter of 1919 (0.95). Only in five previous quarters (since 1900) had the ratio of male to female deaths dropped below one and only in two quarters had this ratio dropped below 0.99 (in one instance to 0.93 and in the other to 0.96), in both cases when there was a serious outbreak of malaria. It may be seen from Table 7 that female mortality apparently rose rather more than male mortality in all age groups between 15 and 45, and possibly between ten and 55.

One possible factor in this heavier mortality among females is the risk associated with pregnancy and childbirth. According to Beveridge (1977:15),

In most pandemics up to and including that of 1918–19, there were reports of abortions and stillbirths due to influenza. In 1918–19, one series of 1350 pregnant women who had influenza were observed: abortion, stillbirth or premature labour occurred in 26% of those without pneumonia and 52% of those with pneumonia. The prognosis was said to be serious for the women who aborted or went into labour.

Table 8
Live births, maternal deaths, ratios of male to female deaths, stillbirths^a and stillbirth^a rates, by quarter, for Sri Lanka during 1918, 1919 and 1920

Year and quarter	Live births	(Relative to average number 1915–17 = 100)	Maternal deaths	Ratio male/female deaths	Stillbirths ^a	Stillbirths ^a per 1000 live births	
1918	1st	52,623	(114)	988	1.01	266	56
	2nd	42,731	(103)	706	1.03	254	63
	3rd	42,869	(109)	775	1.03	263	64
	4th	45,164	(97)	1,541	0.93	303	71
1919	1st	50,448	(110)	1,332	0.95	296	61
	2nd	41,077	(99)	988	1.00	186	45
	3rd	31,165	(79)	649	1.02	210	65
	4th	38,716	(83)	695	1.07	264	62
1920	1st	45,465	(99)	810	1.05	258	57
	2nd	38,494	(93)	714	1.05	265	59
	3rd	38,054	(97)	638	1.05	285	62
	4th	41,707	(89)	731	1.07	376	73

^aStillbirths and ratios of stillbirths to live births are for the 33 towns in which stillbirths were registered at this time.

It may be seen from Table 8 that there was a marked upsurge in maternal mortality (mortality associated with pregnancy or childbirth) in the last quarter of 1918 and the first quarter of 1919 in Sri Lanka, indicating that influenza did indeed lead to complications in pregnancy as Beveridge (1977) suggested. However, far from there being an increase in the stillbirth rate at this time, there seems to have been a slight drop in the rate, at least during 1919. In the years 1912–1921, the first ten years stillbirths were registered in Sri Lanka, in certain urban areas, the ratio of stillbirths to live births in these areas varied between 58 per 1,000 in 1919 (and in 1915) and 71 per 1,000 in 1917, with no particular trend over time. It may be seen from Table 8 that this ratio was particularly low—at 45 per 1000—in the second quarter of 1919; this was noticeably lower than for any other quarter during the period 1912–1921, the next lowest figure being 53 per 1,000. It is possible that the stillbirth rate fell at this time because influenza, in tending to cause miscarriage, and even the death of the mother, had the effect of bringing forward potential difficulty in some cases to an earlier stage of pregnancy.

However, the heavier mortality experienced by females during the 1918–1919 epidemic could not have been entirely explained by pregnancy-related deaths. What other reasons might there have been for the higher mortality among females? The explanation may be that in general at that time in Sri Lanka mortality tended to be higher for females than males. The mean expectation of life at birth early in the twentieth century, based on the 'normal' rates referred to in Table 7, was 32.7 years for males and 30.2 years for females: mortality rates were higher for females than males at all ages except during infancy and in the 45–54 age group; and early in the twentieth century also apparently in the 15–19 age group, though there are reasons for believing this may not have been genuine. It may have been then, much as has been suggested in relation to Indian Tamils, that women tended to suffer heavier mortality than men in the 1918–1919 epidemic partly because they were already in somewhat worse health than men.

This of course begs the question of why this should have been so in the first place. It has been suggested that the phenomenon of excess female mortality in the Indian sub-continent (for it is by no means confined to Sri Lanka) essentially reflects discrimination against women in such areas as nutrition, medical attention and general care. Whether this was so in Sri Lanka or whether other factors such as differences between the sexes in environment or lifestyle, or differences in their susceptibility to particular diseases, were responsible, is an interesting and debatable matter, but one which is unfortunately beyond the scope of this paper.

It may be seen from Table 8 that fertility clearly fell in response to the influenza outbreak: there was a marked drop in the second half of 1919 and it looks as though fertility was somewhat depressed throughout 1920 (though it recovered in 1921). This probably occurred for a number of reasons including the death of prospective mothers or their partners, an increase in foetal loss, a reduction in coital frequency because of illness or social disruption and the postponement of marriages because of death in the family.

The effect of the epidemic on agricultural production, and the possible significance of food availability for mortality in the epidemic

There is little doubt that the influenza epidemic disrupted agricultural production in Sri Lanka. According to the Director of Agriculture in his report for the year 1918 (Ceylon 1919:Part IV, C1) influenza 'seriously handicapped agricultural operations.' Tea exports were 12.5 million pounds, in weight, lower in 1918 than in 1917, down from 193 million pounds.

This ... was brought about to some extent by unfavourable weather conditions ... but was mainly the result of the influenza epidemic, which made it impossible to gather the whole of the north-east monsoon crop (Ceylon 1919:Part IV, C1).

'Paddy crops during the year were, on the whole, satisfactory' (p. C4) However,

In the North-Central Province and in parts of the Central Province sowing of the maha [major harvest] crop could not be carried out owing to the severe influenza epidemic, and shortage of paddy crops is to be expected in these parts. In some areas of the Southern Province cultivation was also prevented by the influenza epidemic (Ceylon 1919:Part IV, C4).

Local official reports from various parts of the island also mention difficulties of this kind towards the end of 1918 and early in 1919. The Assistant Government Agent for the Northern Province in his report for the district of Mannar in 1918 (written in March 1919) reported that 'The prevalence of influenza during the latter part of the year has very seriously interfered with the sowing of the paddy fields for the 1918–19 crop' and that the area cultivated 'is, it is estimated, probably not much more than half that cultivated for 1917-18' (Ceylon 1919:Part I, D14). The Government Agent for the Province of Uva, reporting in April 1919, wrote of Badulla district:

The evil effects of the epidemic have, I fear, by no means passed. The health of many villagers has been impaired, and their ability to work decreased. Cultivation of chenas [shifting plots of temporarily-cleared jungle] was in many cases interfered with, and in one case, where a whole village was struck down at once, the village chena was not watched, and has been totally destroyed by elephants, and the village has been left entirely destitute of food (Ceylon 1919:Part I, H1-H2).

It seems extremely likely, then, that there would have been some shortfall in the availability of locally-grown food in Sri Lanka during 1919 as a result of the influenza outbreak. However, the food shortage that developed in Sri Lanka during 1919, and indeed during the last few months of 1918, had relatively little to do with the situation in Sri Lanka and a great deal to do with the situation in India at the time. According to the Principal Collector of Customs of Ceylon in his report for the year 1919:

During the first four years of the war this Island, which imports over three-quarters of the foodstuffs required for its population, had been in the happy position of ability to obtain practically all its requirements. In 1918, however, the failure of the monsoon and the depletion of the normal reserves in India, coupled with the difficulty in obtaining freight, led to considerable anxiety. By the end of that year the export of all rice from South India had been prohibited, and Ceylon was thrown entirely on Rangoon and Calcutta for its supplies. At the beginning of 1919 the position was therefore serious, and the crisis rapidly came to a head in April, when the Indian Government informed Ceylon that the exports from India would be curtailed to 140,000 tons for the first nine months of the year, as against 30,000 tons a month, the normal requirements of this Island. On urgent representations a further supply of 50,000 tons was allowed to be ear-marked for the use of estate labourers and other Indians resident in Ceylon. As the stock of rice at any one time in the Island never exceeds two months' supply, a system of food control and rationing of supplies had to be inaugurated at once (Ceylon 1920:Part II, A3).

It is clear that the shortage of imported food was already serious during the last few months of 1918. The Assistant Government Agent for the Western Province in his report for the district of Kalutara for 1918 referred to a 'rice crisis' in the district from September onwards (Ceylon 1919:Part I, A16-A17). In some villages in Puttalam district there were food riots (Ceylon 1919:Part I, F10). There were many references to food shortages and rising food prices in local official reports.

At the time of the 1918–1919 influenza outbreak in Sri Lanka, then, there was quite a serious food shortage in the country. This may have been exacerbated, at least during 1919³, by the epidemic itself through its debilitating effects on the labour force, but in the main it was the result of the situation in India. Did this food shortage itself contribute to the mortality in the influenza epidemic? Certainly some observers at the time believed it had made things worse, particularly when coupled with the poor state of the economy at the time. According to the Assistant Government Agent for the Western Province in his report on Kalutara district for the year 1918,

The year under review ... has been a period of continued decline, staple products being low in price or almost unsaleable, while the cost of the necessaries of life steadily rose. This produced a considerable amount of unemployment and hardship for the poorer classes, especially in the towns. To crown these misfortunes came the influenza epidemic, producing in places positive distress. ... Between September and the end of the year matters were made worse by a serious shortage of imported rice. Prices rose to about double the normal rates, making rice almost prohibitive in cost for the poorer classes. Steps were taken to guard against looting or any disturbances ... Coming on the top of this

³ The influenza epidemic may well have caused some drop in food production in Sri Lanka in the early part of 1919. It is rather unlikely, however, that output over the whole year was adversely affected. There was a great deal of scope in Sri Lanka for late planting and planting of alternative crops. Moreover, the high prices which obtained during 1919 because of the shortage of imported food would have provided an incentive for increased output; and there are some indications that this was indeed what happened.

condition of high prices and scarcity of employment, the influenza epidemic hit the poorer people hard and caused temporary acute distress in some places. The universality of the catastrophe appeared at first to paralyze effort. Whole families and hamlets were struck down together, and there was often none to procure food or attend on the sufferers (Ceylon 1919:Part I, A16-A17).

It is obviously possible that in Sri Lanka in 1918–1919 the population was indeed somewhat weakened because of the food shortage and the poor state of the economy and that this led to a higher death toll in the influenza epidemic than otherwise would have been the case. It might even be thought rather unlikely that there would have been no effect at all of this kind; though it should perhaps be emphasized that the measures taken for the procurement and distribution of food worked quite well and that by no stretch of the imagination was there famine in Sri Lanka at this time. Those dependent on wages from their labour and remote from subsistence agriculture might well have been particularly vulnerable; this would include labourers in urban areas and on tea estates. It must be emphasized, though, that it is simply not possible to gauge the likely scale of any effect that shortage of food may have had on influenza mortality at this time.

Conclusion

The outbreak of influenza in Sri Lanka in 1918–1919 had all of the features for which the 1918–1919 influenza pandemic is famous. It took a terrible toll in mortality, at least as bad as the worst malaria epidemic in Sri Lanka up to that time (since 1900), an important reason being that sufferers tended to develop fatal pneumonic complications. It progressed through a number of waves, the first innocuous, the second extremely severe and the third a damped version of the second. It showed a preference, in a certain sense, for victims who were in the prime of life rather than very young or old.

Influenza was first reported in Sri Lanka, in its mild form, in June 1918. The severe second wave began in September and reached a peak in November 1918. The evidence is consistent with the disease having entered the country through Colombo, the capital city and main port, and possibly also through Talaimannar, the railway terminus and port on the rail-sea route to India, and having spread out from there. Although the disease was sometimes referred to in Sri Lanka at the time as ‘the Bombay fever’ or ‘Bombay influenza’ there is no particular reason to think that influenza did indeed arrive from there. In fact, so far as one can tell, the timing of the epidemics in Bombay and Colombo was the same, with influenza first appearing in June and the severe outbreak beginning in September and reaching a peak in October; for details of the epidemic in India see Mills (1989).

In most parts of the island the peak of the epidemic, so far as mortality was concerned, came towards the end of 1918. However, in a few districts the peak was in early 1919. It is possible that influenza simply moved more slowly through some districts than others. However, it is also possible that in some districts influenza mortality was exacerbated and prolonged by an outbreak of malaria at the same time.

The impact of influenza in Sri Lanka, so far as mortality was concerned, varied between areas and between ethnic groups. At the time it was widely remarked that the Indian Tamil labour force on estates suffered particularly heavy mortality in the epidemic. This was probably true, possibly reflecting particular circumstances on estates, possibly the generally poor health of Indian Tamils, and possibly in some degree the food shortage of 1918–1919. Yet people’s perception was almost certainly entirely fashioned by the especially short-and-sharp nature of the outbreak in this group, which was in some degree misleading and might have been entirely so. Clearly, it is necessary to be cautious about accepting too readily at face value the perception of people at the time of such matters.

A similar point might be made in relation to the impact of influenza on different age groups in the population. A few observers reported at the time in Sri Lanka that the epidemic seemed to strike those in the prime of life especially hard. They might have been led to this conclusion by experiencing the fact that mortality rates rose proportionally more among young adults than for any other age group. However they were probably also influenced by a sense that young adults were the group who were normally least affected in epidemics, that for their mortality to rise was unusual. In any case, as has been noted, their perception of the matter was in danger of overlooking the fact that the greatest absolute rises in mortality rates occurred among those under age five so that there was a very substantial number of deaths among children during the influenza epidemic. It might be interesting to re-examine the data for developed societies from this point of view.

Women suffered heavier mortality than men during the influenza outbreak in Sri Lanka and maternal mortality rose and fertility fell. Contrary to expectation, however, the stillbirth rate did not rise but fell slightly at this time; though it is perfectly possible that the miscarriage rate may have increased during the epidemic. The heavier mortality among females was no doubt due in part to the particularly damaging impact influenza had on pregnant women; in addition the fact that female mortality was usually higher than male mortality in Sri Lanka at that time, and female health therefore presumably less good, may also have played a part.

The influenza outbreak undoubtedly caused a great deal of disruption in Sri Lanka. Morbidity and mortality were substantial; both plantation agriculture and subsistence agriculture were adversely affected. There were many local reports of difficulty or distress because of the temporary breakdown of family and village support systems. But many communities seem to have responded to the situation fairly quickly and there was a proliferation of 'relief committees' organizing support for victims of the outbreak. Such activity may have been quite important in ameliorating the impact of the epidemic.

During the last few months of 1918 and during 1919 there was quite a serious food shortage in Sri Lanka. This arose because India restricted rice exports, on which Sri Lanka was heavily dependent, and had little or nothing to do with any drop in agricultural production there might have been in Sri Lanka itself as a result of the influenza epidemic. It is possible that this food shortage worsened the mortality from influenza during the 1918–1919 outbreak. However, it is not possible to gauge the likely scale of any effect of this kind.

How many deaths were there in Sri Lanka during 1918–1919 as a result of the influenza outbreak? The number of additional deaths during these two years implied by the differences between the estimated age-specific death rates for 1918–1919 and the 'normal' rates shown in Table 7 is about 51,000.

This is probably a reasonable estimate, though taking account of the fact that the age-specific rates for 1918–1919 may be slightly too high (see footnote 2) might reduce this figure by two or three thousand. However, it does depend on the arbitrary assumption that the excess mortality during 1918–1919 which was due to malaria rather than influenza is exactly offset by the excess mortality due to malaria included in the so-called 'normal' rates as a result of the fact that two of the nine years on which they are based, 1911 and 1912, were bad years for malaria.

In round numbers, then, some 50,000 people probably died in Sri Lanka during 1918–1919 as a result of the influenza outbreak, about 1.1 per cent of the population. Expectation of life at birth fell from the usual level of 31.5 years to 26.7 years: these values are based upon the 'normal' and the estimated 1918–1919 mortality rates of Table 7. This was heavier mortality than was experienced in

England and Wales, where possibly one in 200 (0.5%) of the population died in the epidemic.⁴ However, it was very much lighter than the mortality in India where according to Mills (1989:256) almost 5.5 per cent of the population died.

⁴ The figure of 0.5 per cent in fact relates to the female population of England and Wales. There are horrendous problems in attempting to produce such an estimate for the male population, not least the difficulty of estimating the population exposed to risk during a period including the closing months of the First World War and the first few months of peace. According to the Registrar-General for England and Wales there were 100,000 female deaths during 1918-1919 in England and Wales which were attributable to the influenza epidemic (this included deaths from more causes than just influenza); the estimated mid-1918 population of females was 19,697,600. See *The Eighty-First Annual Report of the Registrar-General of Births, Deaths, and Marriages in England and Wales*, HMSO, London, 1920; and the supplement to that report entitled *Report on the Mortality from Influenza in England and Wales during the Epidemic of 1918-19*, HMSO, London, 1920.

Appendix

Table A1

Ratio of deaths each month during 1918 and 1919 to the average number of deaths during the same month 1915–1917, for the whole of Sri Lanka, for the different ethnic groups, and for administrative districts

1918	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
All Sri Lanka	99	100	92	90	84	85	90	94	109	258	286	195
Sinhalese	104	108	97	95	83	82	94	96	112	224	220	180
Ceylon Tamils	82	77	80	73	78	88	85	97	92	281	253	184
Indian Tamils	95	93	91	94	92	93	84	98	98	322	611	301
Moors	97	96	81	80	77	86	89	76	120	336	238	172
Colombo	108	107	96	91	85	84	96	89	132	262	158	117
Negombo	131	121	99	123	88	74	102	92	98	178	143	127
Kalutara	101	99	95	96	104	100	111	108	120	310	211	126
Kandy	99	109	88	92	86	87	87	93	119	248	364	248
Matale	102	104	89	91	82	71	87	86	100	324	427	378
Nuwara Eliya	87	103	76	100	82	101	86	111	68	138	828	139
Galle	116	111	95	105	90	84	91	96	105	213	171	122
Matara	120	113	99	115	94	84	92	100	98	180	190	140
Hambantota	93	107	110	107	87	73	80	107	110	196	370	249
Jaffna	76	70	77	74	83	97	89	94	90	306	243	168
Mannar	85	94	82	92	82	82	86	89	137	623	397	172
Mullaittivu	94	91	99	47	58	127	76	95	127	388	389	296
Batticaloa	100	92	84	67	67	72	71	91	82	115	205	226
Trincomalee	88	99	99	69	81	68	119	94	87	391	264	232
Kurunegala	98	100	96	83	68	71	78	80	99	198	291	288
Puttalam	92	97	67	69	78	66	120	104	149	243	187	199
Chilaw	113	104	88	82	66	76	75	89	106	222	169	153
Anuradhapura	70	71	64	63	79	87	89	110	102	244	319	267
Badulla	77	86	105	98	96	89	99	87	94	269	430	303
Ratnapura	96	93	78	76	78	84	95	97	141	316	261	158
Kegalle	129	131	127	94	81	94	82	93	135	498	293	203
1919												
All Sri Lanka	187	201	179	142	137	155	145	126	133	118	111	116
Sinhalese	203	238	216	160	149	166	153	142	124	117	115	120
Ceylon Tamils	163	138	137	122	128	148	130	100	86	81	82	103
Indian Tamils	139	137	88	99	109	140	125	101	216	165	122	113
Moors	191	186	173	125	115	121	158	106	98	98	102	110
Colombo	131	136	127	117	145	163	127	114	116	105	129	129
Negombo	179	194	186	156	156	196	172	133	114	110	103	107
Kalutara	107	96	102	128	169	174	155	142	109	118	107	104
Kandy	125	161	100	97	126	158	120	109	177	149	146	107
Matale	218	211	133	107	121	142	147	174	105	99	99	97
Nuwara Eliya	103	136	114	112	99	106	93	122	371	157	93	141
Galle	111	124	102	110	126	157	148	133	120	128	108	115
Matara	164	149	134	124	142	169	188	180	147	142	126	154
Hambantota	233	214	169	159	151	135	163	142	100	118	114	110

Continued over

Continued

Jaffna	142	114	119	110	94	94	85	83	79	80	78	103
Mannar	162	196	159	119	106	98	133	75	81	80	79	90
Mullaittivu	239	171	241	163	180	198	128	123	145	112	112	134
Batticaloa	256	256	225	163	182	241	237	135	93	95	100	108
Trincomalee	237	219	163	116	109	56	86	72	74	85	62	104
Kurunegala	472	574	518	315	160	171	161	117	100	97	95	102
Puttalam	243	346	260	175	139	102	153	77	93	89	113	117
Chilaw	251	403	444	239	148	170	130	98	120	99	131	140
Anuradhapura	308	402	364	243	226	147	154	131	123	106	94	107
Badulla	182	207	161	140	128	133	184	151	130	144	117	154
Ratnapura	204	133	118	109	117	167	130	136	132	115	128	90
Kegalle	133	120	137	93	103	167	165	138	134	139	92	119

Notes: The figures shown for Ceylon Tamils are in fact for all Tamils in Ceylon Tamil districts, that is, Batticaloa, Jaffna, Mannar, Mullaittivu and Trincomalee; the figures for Indian Tamils are for all Tamils in Indian Tamil districts, that is, Badulla, Kalutara, Kandy, Kegalle, Matale, Nuwara Eliya and Ratnapura. It was necessary to proceed in this fashion because no distinction was made between Ceylon and Indian Tamils in the published statistics from death registration. The distribution of Tamils by district in Sri Lanka was such, however, that this approach must give reasonable results.

The overwhelming majority of Moors (88% in 1911) were Ceylon Moors.

The district referred to as Mullaittivu district at this time later became Vavuniya district and has now been split into Mullaittivu and Vavuniya districts.

Table A2

Deaths from influenza or pneumonia in the last two quarters of 1918 and all quarters of 1919 for the whole of Sri Lanka and for the different administrative districts, together with indices showing the mortality of each quarter from these relative to the worst quarter 1900–1921

	1918		1919			
	3 ^a	4	1	2	3	4
Deaths from influenza or pneumonia						
Sri Lanka	2,049	31,443	15,158	8,200	7,316	2,892
Colombo	509	2,810	1,124	1,426	654	553
Negombo	30	353	328	193	117	95
Kalutara	88	1,637	111	592	271	63
Kandy	404	4,228	897	730	916	461
Matale	60	2,080	216	131	276	74
Nuwara Eliya	131	2,678	436	362	1,246	196
Galle	45	1,448	159	455	428	128
Matara	7	734	166	138	247	42
Hambantota	12	1,103	444	153	83	33
Jaffna	218	2,558	653	289	265	246
Mannar	30	468	69	28	21	22
Mullaittivu	22	342	101	60	50	36
Batticaloa	38	338	1,306	1,115	787	178
Trincomalee	23	323	165	27	36	45
Kurunegala	70	2,178	4,874	934	181	95
Puttalam	34	92	311	162	24	46
Chilaw	12	95	291	124	24	30
Anuradhapura	15	934	1,478	369	65	30
Badulla	124	3,762	1,465	490	1,171	358

Continued over**Continued**

Ratnapura	138	1,338	382	320	257	56
Kegalle	59	1,944	182	102	197	105

Relative to worst quarter 1900–1921 = 100

Sri Lanka	7	100	48	26	23	9
Colombo	18	100	40	51	23	20
Negombo	8	100	93	55	33	27
Kalutara	5	100	7	36	17	4
Kandy	10	100	21	17	22	11
Matale	3	100	10	6	13	4
Nuwara Eliya	5	100	16	14	47	7
Galle	3	100	11	31	30	9
Matara	1	100	23	19	34	6
Hambantota	1	100	40	14	8	3
Jaffna	9	100	26	11	10	10
Mannar	6	100	15	6	4	5
Mullaittivu	6	100	30	18	15	11
Batticaloa	3	26	100	85	60	14
Trincomalee	7	100	51	8	11	14
Kurunegala	1	45	100	19	4	2
Puttalam	11	30	100	52	8	15
Chilaw	4	33	100	43	8	10
Anuradhapura	1	63	100	25	4	2
Badulla	3	100	39	13	31	10
Ratnapura	10	100	29	24	19	4
Kegalle	3	100	9	5	10	5

^aThe district figures shown for this quarter in fact include the 20 influenza deaths which occurred in the previous quarter (with the effect that the district totals sum to 20 more than the Sri Lanka total).

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