Towards a new demographic equilibrium: The inception of demographic transition in south India

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Studies on Indian demography have now shifted their emphasis away from a general discussion concerning the whole subcontinent towards a more comprehensive approach centred on regional contexts. It is becoming obvious that in spite of its political unity, India presents a far too complex situation to be subjected to global analyses that tends to project a unified picture of highly diverse demographic regimes. True, as their history and social structure suggest, Indian populations do possess a lot in common and the similar evolution of demographic indicators in various regions bears witness of this homogeneity. Yet, some of the most interesting trends noticed in this country have to be related to their appearance in their regional context; fertility decline in Kerala and Punjab, urbanisation in industrial states, sex-differentials in mortality in north-western India.

This call for 'deconstructing' Indian demography into its regional frontiers has already been heard by the historians and the demographers who have attempted to examine population dynamics in a longer perspective.¹ The massive quantity of information and data which the British started to gather during the nineteenth century includes demographic data which are attracting more and more attention; the interest of historians has slowly moved away from colonial India's political events and structures towards a better understanding of its social history. Demographic phenomena and their constant interaction with the fabric of the society were no doubt eminently local phenomena before a more recent period during which various communication networks (transportation, politics) have come to develop and make internal distances (a little) shorter.

The present work aims precisely at describing the demographic transformations which took place in a geographical enclave, from the last

¹ For various regional studies, see the pioneer work on Indian historical demography, Tim Dyson. ed. India's Historical Demography: Studies in Famine, Disease and Society, London, 1989.

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century till the eve of the large-scale family planning campaign in the 1960s. The period under review (ca. 1870–ca. 1960) encapsulates the turning point of Tamil Nadu's demographic history (the inter-war period) and it is not a coincidence that it should correspond with a longer period during which the Tamil country experienced a real opening-up: people, goods and viruses came to be more easily exchanged with the rest of India and the outer world, and the region's relative demographic and economic isolation started to dissipate.

The region examined here became an administrative unit only during the 1950s when all the Tamil-speaking areas in south India were clubbed together to form the state of Tamil Nadu (previously Madras state). Most of Tamil Nadu was previously part of a much larger, multilingual Madras Presidency which extended westwards to the Arabian Sea (Malabar) and northwards along coastal Andhra. Whereas most historical studies have followed the administrative boundaries as they had been defined by the colonial authorities we prefer to use as much as possible present-day boundaries which we believe are more representative of the socio-historical patterning of south India. Therefore the data examined here pertain solely to the Tamil part of the Madras Presidency and are based on a statistical reconstruction that starts from the current administrative division of the states.2

Crisis and instability: The old régime

No periodisation could be more arbitrary than that based on the availability of statistics. Unfortunately demographers can hardly avoid using 1871 as a baseline for a historical perspective on Indian demography because of the tremendous changes in sources brought about by the first 1871-72 census in several parts of the subcontinent. We will therefore devote a small, separate section of this paper to the pre-census period. Possible changes in the demographic growth during the nineteenth century such as the alleged mortality increase at the turn of the century still lay hidden behind unreliable statistics dating back to the first population estimates gathered by the British in south India.

The beginning of the colonial period

At the occasion of the first modern census of 1871 Tamil Nadu's population amounted to more than 15 million inhabitants. The most populated district of Thanjavur contained 1.85 million inhabitants as against only 100,000 for the small hilly district of the Nilgiris. Though population was not evenly distributed in the region there was hardly any empty tract at this time. The troubled period of the late eighteenth century which preceded the completion of colonial control over south India had left Tamil Nadu in a state of desolation, especially where Maratha armies and Anglo-Mysorean wars had heavily disturbed rural society and forced numerous peasant communities to flee. Against this background, the first part of the last century was a period of demographic redistribution and consolidation in Tamil Nadu.

Population dynamics dating from this period are however insufficiently documented. The first population counts attempted by the British yielded dubious figures which are extremely difficult to interpret.3 The demographic data which are available come from estimates established indirectly (from village heads for rural areas) and present a large variety of deficiencies (including overestimates). Even in the districts which were the first to fall under British control the results of the pre-1871 population censuses do not appear to have been much more accurate than in the rest of the Madras Presidency.4

For all their flaws these figures are the only ones from where to start our analysis and the picture of the region they tend to project is rather that of a global, sustained population growth after the first third of the nineteenth century. Estimates arrived at by Bhattacharya place the growth for the whole of the Madras Presidency at a level of 4.6 per 1000 during 1801–71 and of 11.4 per 1000 during 1841–71.5 Demographic increase of the Presidency during the later 1871–1921 was of same order (6.1 per 1000) and only marginally higher for Tamil Nadu (6.3 per 1000). The figure for 1801–71 is at best a brief summary of seventy years of a demographic régime characterised by a high level of instability. The first decades probably experienced a rather low level of natural increase, often totally offset by mortality outbreaks. The 1841–71 period, with its buoyant annual growth

2 See the appendix. This paper is based on parts of my doctoral dissertation: Christophe Z. Guilmoto, Un siècle de démographie armoise: évaluation des sources et analyse de l'évolution de la population du Tamil Nadu de 1871 à 1961, Paris, forthcoming.


4 Baker suggests that districts where the colonial administration was set up earlier display statistics of a better quality. But the irregular demographic evolution of an old British territory like Salem (with numerous peaks and troughs between 1800 and 1871) offers no confirmation on this point. See C.J. Baker, An Indian Rural Economy 1880–1955: The Tamilnad Countryside, Delhi, 1984, p. 83.

5 Durgaprasad Bhattacharya, 'Historical Demography in India—Scope, Source and Materials and Some Crucial Problems in Outline', communication presented in the Symposium on Historical Demography in India, Bangalore, 1985. One should keep in mind that although these tentative figures are far from being undisputable (see our estimation below), they offer more reliable estimates than the census data.
above 10 per 1000, marked the end of a long period of stagnation. The first reason behind this instability was of course the recurrence of subsistence crises which usually followed climatic accidents. Whilst the worst famine to visit south India during this century (Guntur famine in 1833-34) spared Tamil Nadu to a certain degree, the region nevertheless experienced several grave demographic crises, starting with a dearth in 1799. Five years later, from the end of 1804 till the 1807 monsoon, the Coromandel Coast, usually favoured by more generous rainfalls endured a long famine. Again, in 1812-13, 1824, 1825, 1847 and 1865-66, several Tamil districts met with severe subsistence crises, localised dears which degenerated into regional famines after successive monsoon failures. Moreover, epidemics would break out regularly, cholera and smallpox first of all, without being necessarily linked to famine conditions: As demographic recovery seems to have often offset the impact of such crises, the data available do not allow us to gauge the actual dimensions of these mortality outbreaks.

Use of the 1871 census age-distribution may permit us to offer certain comments on the demographic situation in Tamil Nadu at that time. Its population is extremely young, with about 39.8 per cent aged less than 15 years while only 12.1 per cent of the population are above 50. Yet, it would be hazardous to take the age distribution literally. Even after correcting for the specific age definition chosen by census authorities, the age distribution displays a dramatic level of distortion, especially at younger ages. Sufficient to prove that the population aged 0-19 years represents a mere 61 per cent of that of the 0-9 years: no known demographic catastrophe seems to have affected Tamil Nadu in say 1855-65 and could account for this strange age distribution. From the proportion below 15 years in 1871 and the estimated 1841-71 growth rate mentioned before Tamil Nadu's population can

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be identified with a stable female population with a life expectancy at birth of 27.6 years. If this model is taken as representative of Tamil Nadu, birth and death rates would have been respectively of 49.1 per 1000 and 37.7 per 1000 at the middle of the nineteenth century. A similar estimation procedure based on the low 1801-71 growth rate would lead to an unlikely life expectancy of 20 years and shows the fragility of our data base.

Other estimates for India as a whole generally point to a much higher death rate than 37.7 per 1000 L, and P. Visaria set the death rate at about 45 per 1000 between 1750 and 1850. They also mention the possibility of a mortality reduction in Madras during the first half of the last century. Further analysis of the pre-1871 populations counts might shed some light on this period if indirect estimation procedures prove capable of untangling the available data base.

It is still adventurous to offer comments about the consequences of colonisation on early nineteenth century's demographic situation. The end of south Indian wars after the final defeat of Tipu Sultan undoubtedly inaugurated a period of peace at the turning of the nineteenth century after several decades of widespread troubles and it is reasonable to think that it had a positive influence on Tamil Nadu's demographic growth (if only by reduction of war-induced mortality). More difficult to appraise is the effective impact of the new economic policy of the colonial power on the standard of living of the rural population and its indirect influence on the level of mortality and natality. Opinions expressed at this time are inclined to see very favourably the economic changes which took place since the beginning of the last century. During this period, the tax policy was no doubt extremely severe with probably a positive effect on food availability and nutrition. Famines and epidemics which regularly afflicted the Presidency of Madras bear testimony of the hardships faced by the Tamils under their new rulers; obviously, even if the crises may not have originated from the implementation of the new colonial policies, their frequency and extent


Using doubtful population figures for 1801, a British apologist was quick to ascribe the demographic increase to the benefit of colonial rule ('an eloquent testimony to the Pax Britannica') which followed years of civil wars (several of them precisely fuelled by colonial incursions). See F.J. Richards, Salem, Madras District Gazetteers, Madras, 1918. Vol. 1, p. 90.

See for example S. Srinivas Raghavaiyangar, Memorandum on the Progress of the Madras Presidency during the Last Forty Years of British Administration, Madras, 1893. For this author, the second part of the century clearly benefited from the loosening of the fiscal structure.
indicate that the British could not control them before the next century. But the level of mortality was not as high so to cancel the dynamics of sustained demographic growth over the last century and particularly during its second half. This relative prosperity was probably facilitated by the scope for internal redistribution which existed after the widespread devastations of the eighteenth century’s wars and the subsequent severe depopulation of certain rural tracts (with numerous deserted villages).

Demographic growth at the turn of the century

From the 1870s onwards the evolution of Tamil population can be followed with incomparably better accuracy. The first source is henceforth the large amount of data derived from the decennial census-taking initiated in 1871. The introduction of civil registration before 1870 represented a further step towards the consolidation of the demographic control apparatus. From 1871 to 1921 the population increased in Tamil Nadu by 36.7 per cent. The yearly growth rate of 6.3 per 1000 is rather high in comparison with other Indian provinces; during the same period the growth rate was of 4.7 per 1000 in the southern provinces and of 3.7 per 1000 in the whole of British India. Before looking into the components and episodes of these fifty years, it might be of interest to summarise the demographic regime by general demographic indicators. At the provincial level the age-distribution remained fairly stable and moderately affected by mortality fluctuations. Thus the proportion below 15 years, which is often used by indirect estimation techniques, varied within a narrow range of 37.4-39.8 per cent in the six censuses (1871-1921).

The general level of mortality during this period was not much different from what was estimated for the nineteenth century. Using similar estimation procedures we get an average death rate of 37.1 per 1000 corresponding to a life expectancy at birth of 27.7 years for both sexes. With a birth rate of 45 per 1000, fertility would seem to have dropped compared to our previous estimates for 1841-71, but irregularities in the 1871 age distribution might also be the major explanation for this gap in birth rates. However, when converted into fertility rates, these birth rates lead to less than 5.5 children per woman, a relatively low value in a population characterised by early and almost universal marriage among women. Tamil Nadu’s growth was not evenly distributed. Some six districts recorded a rapid increase of more than 50 per cent. Apart from the Nilgiris, a small plantation district in the Southern Ghats which attracted a considerable number of migrants, areas with the largest growth were agricultural districts which benefited from the introduction of new commercial crops and their integration into a larger economic system (rail link, exports). If variations between districts remain however limited, two sub-regions, Thanjavur and Dharmapuri (then part of a larger Salem district), stand out owing to their low demographic increase. Thanjavur which comprises the rich Kaveri delta, is a clear example of an old agricultural district which has become saturated after a long period of famine-free growth; because of its geographical position, it became the first supplier of migrants for Ceylon and later Malaysia. On the contrary, Dharmapuri was never densely populated because of its low agricultural potential; in 1921 it had not yet fully recovered from the terrible impact of recurrent mortality crises (famines, plague outbreaks). As can be deduced from this brief presentation, Thanjavur and Dharmapuri, in spite of sharing a low level of demographic progression, have little in common. What needs to be stressed at this juncture is the minor role played by urbanisation and industrialisation during this period. The level of urbanisation stagnated during 1881-1921 between 12 per cent and 16 per cent as growth of cities and towns was

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**Table 1**

<table>
<thead>
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<th>Year</th>
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<th>1881</th>
<th>1891</th>
<th>1901</th>
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<th>1931</th>
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<th>1961</th>
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<td>15498</td>
<td>17981</td>
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<td>20910</td>
<td>21629</td>
<td>23472</td>
<td>26267</td>
<td>30119</td>
<td>33487</td>
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<td>Growth tr*</td>
<td>-1.2</td>
<td>9.4</td>
<td>10.7</td>
<td>4.6</td>
<td>10.9</td>
<td>11.9</td>
<td>14.7</td>
<td>13.1</td>
<td></td>
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<tr>
<td>Rate of natural increase per 1000</td>
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<td>14.7</td>
<td>7.1</td>
<td>8.1</td>
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<td>8.2</td>
<td>11.3</td>
<td>13.7</td>
<td>11.2</td>
<td></td>
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</tbody>
</table>

Notes:
(1) Exponential growth and natural increase computed from reconstructed Tamil Nadu population (see appendix).
(2) 1941 and 1961 censuses are very probably underestimates of the true population of Tamil Nadu.

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15 See Lardinois, ‘Deserted Villages’.
16 Tamil Nadu’s population has been reconstructed in its present state boundaries; see appendix.
17 Estimates are arrived at by fitting to the 1921 population a stable population; the yearly growth rate used for 1871-1921 is however corrected for out-migration and amounts to 7.9 per 1000. See Table 1 for decennial estimates.
barely greater than that of rural parts of the province. Even in Madras which was the regional capital, mortality was high enough to offset the consequences of in-migration and led to a growth rate similar to the regional average. Obviously, scope for population expansion was severely limited in most parts of the region by its already dense population and its poor economic diversification; emigration became the main check to a general aggravation of the demographic pressure on land.20

Instability

Yet, as said previously, this picture is but a summary of a rather troubled period which comprises frequent mortality crises, some cases of short-term demographic decline and decades of relatively rapid growth. As fluctuations of the birth rates were less important than those of the death rates, mortality and its oscillations appear to be the main factor determining the demographic régime.

In spite of its numerous limitations hinted at previously, civil registration statistics offer the only source to investigate annual variations. If we assume the level of under-registration to vary linearly during any decade, comparison between yearly values and moving averages (over 11 years) allows us to identify accidental deviations. The first interesting measure is the variability of these indices, i.e., the frequency and the extent of divergences between averages and observed rates. Between 1875 and 1920, the mean deviation of the civil registration death rate around the moving average is of 12.5 per cent in relative terms. The level of variability turns out to be smaller for the birth rate with a mean deviation of 6.4 per cent in relative terms. Conclusions are easy to draw: the old demographic régime in Tamil south India which displays broadly similar trends over long periods is nevertheless characterised by intense short-term instability mainly determined by mortality fluctuations.

Leaving aside for the time being the extreme crisis of 1876-78, we shall now concentrate on the period 1881-1921 to give a more detailed description of mortality trends in Tamil Nadu. The instability of mortality rates during this period is of course solely due to mortality peaks. The few years like 1921 and 1922 during which death rates were at least 10 per cent below the trend value are marked by unusually high under-registration rather than by any mortality jump, a feature also noticed in the birth rates. During several years, the gap between observed and average death rates was superior to 10 per cent and these years (1884, 1891, 1906, 1918) correspond to regional mortality crises felt in a majority of Tamil districts. As to natality, we have already seen that its variations were both less frequent and less ample; however, in this case, severe drops below the trend values like those accompanying famine conditions did occur.

Looking at Figure 1 which plots civil registration values, it seems that apart from 1876-78 and 1918, variations were of minor importance. However, these are regional data which may not do justice to the different subregional circumstances: district data display different patterns and indicate a higher frequency of demographic crises at the local level.21 Compared to the 4 years of regional disturbances mentioned above, there are not less than 23 years between 1880 and 1920 during which significant mortality outbreaks were recorded at the district level; and among those 23 years, district mortality was during 13 years 20 per cent above the average level. Using Dupâquier's index which classifies crises by magnitude, several local crises reach level II (medium) or III (strong).22

Coming back to the district perspective, Thanjavur and neighbouring Tiruchirappalli are noticeable by the lesser variability of their vital rates. Mortality crises are less frequent, less intense and never result in subsequent drops in the birth rate. The first cause for this favourable situation is the relative prosperity of this subregion where a large part of the cultivated areas is irrigated all the year long by the Kaveri river and produces a large part of the rice consumed in the region. Thanjavur, which enjoys a healthier climate than the interior, is deemed to have escaped most famines since Hyder Ali's 1781-82 invasion.23 On the contrary, semi-dry areas in the interior where food crops have always been limited to poor millets seem to be plagued by recurrent mortality outbreaks, be it because of food shortages, epidemics or natural calamities. Coimbatore, Salem and the Arcot districts counted among the parts of the Presidency which were identified by British authorities as 'subject to famine' at the end of the past century. Had we more civil registration data at the taluk level, we would be in a position to delineate with greater details the geography of mortality risk in nineteenth century Tamil Nadu as large districts often included heterogeneous tracts (towns, irrigated or arid areas, hills).

20 On Tamil Nadu's migration history, see Christophe Guilmoto, 'Le cycle migratoire tamoul, 1831-1931', Revue Européenne des Migrations Internationales, 7, 1.

21 Since the computation of rates at the district level is made difficult by frequent administrative changes, we have used the variations of the absolute numbers of births and deaths.

22 Dupâquier's index measures the amplitude of crisis from the variation between observed and average deaths expressed as a ratio of the standard deviation of the number of deaths. In spite of its usefulness to compare crises in different settings, the use of standard deviations in the computation is problematic for, as we believe, the variability of death rates (i.e., the standard deviations of the number of deaths) is itself an important component of a specific demographic régime. Changing variability (in time or space) greatly reduces the comparability of this index between different observations. For a review of related questions, see Alberto Palloni 'Les mortalités de crise: leur estimation, leurs conséquences', in J. Vallin, S. D'Souza and A. Palloni (eds.), Mesure et analyse de la mortalité, Paris, 1988, pp. 215-50.

Madras city, a separate district in the Presidency, constitutes a case apart. For reasons linked to the early implementation of civil registration acts (starting in 1867) and to the stronger bureaucratic control on the city's inhabitants, registration has long been of a quality unequalled elsewhere in the province. The data available were good enough for the computation of a life table in 1891, one of the first tables ever produced in south India. Its results point to a very low life expectancy at birth of about 24.5 years, a result which is at variance with regional estimates (vide supra). As the 1880s were not particularly affected by unusual mortality conditions, the Madras figure is most probably an underestimate of the actual life expectancy. It is however beyond the scope of this paper to discuss the numerous hypotheses on which this life table's computation is based; we might as well consider it representative of the sole city of Madras which many other indicators such as the infant mortality rates tend to designate as the most insalubrious place in the region at this period.25

Crises, little and big

Undoubtedly, the 1876-78 crisis was the most dramatic event in what is known of Tamil Nadu's demography. Various famines or epidemics before the establishment of British rule on south India were reported by local traditions or by Europeans, most notably the Jesuits who were the first to settle permanently in the Tamil country. However, the 1876-78 crisis which took place between the first two censuses in the Madras Presidency is the first which demographic sources permit us to describe.26 It has thus been possible to assess its impact on the different regions and social groups, and for instance to show the vulnerability of the children, the elderly, the males compared to the women as well as that of the groups which the crisis entirely deprived of their economic capacities (labourers, artisans).

It started after two bad monsoons which by mid-1876 had already caused strong inflation. The subsequent monsoon failure at the end of the year sent the prices soaring to record values for about two years. The Government which had not immediately recognised the gravity of the situation


A special post-famine census was even conducted in a few taluks in 1878. Nineteenth century's sources include, among others, the Census of India report for 1881 and the Review of the Madras Famine, 1876–78, Madras, 1881, which contains studies by W.R. Cornish.
tried first to limit its intervention to the cheapest way to rescue the affected areas, i.e., through relief work offered to the able-bodied population. Even when relief-camps had turned into hospitals, certain officials still attempted to reduce the rations given to starving people. After the Special Census of 1878, there were people such as Kennedy to contend that the loss of population was limited to 68,000 inhabitants, "some, but not all, of which may be attributable to the distress that has prevailed." For the whole of Tamil Nadu which was in no way more affected than the rest of the Presidency, the excess mortality was rather around the million mark, with another 370,000 births averted during 1876–78.

If starvation caused by the inability of people to purchase food was the primary factor, the etiology was very diverse because of the role played by the epidemics of cholera and, to a lesser extent, smallpox, which broke out after some time, diseases of ill-defined characteristics such as 'fevers' (often malaria) or 'bowel complaints' became prominent; the specific impact of famine on these various diseases is less easy to evaluate even though observers such as Cornish stressed the connection between malnutrition and diarrhoeas, dysentery and dyspnoes. The well-established link with the fall in birth rates, more accentuated in areas where the crisis killed a larger proportion of the population, was of course due to the parallel decline in the number of conceptions resulting from famine amenorrhoea and the general social disruption. Certain indices suggest also that spontaneous abortions or still-births increased drastically during this period.

The differential impact of the famine in the Tamil region lead to well-documented variations in death rates and intercensal growth. Most affected were the northwestern districts such as Salem (Dharmapuram), Coimbatore and North Arcot located close to the State of Mysore which was the hardest hit place in south India. But the impact of the famine was felt everywhere in Tamil Nadu, including in places like Thanjavur reputed to be immune to food shortages.

However, one of the main interests of the examination of subregional units is to unveil the dynamics at work during the spectacular recovery which followed the crisis, a phenomenon which has not so far received all the attention it deserves as a crucial feature of the old demographic system. During 1881–1891, Tamil Nadu's population progressed at a record pace of 14.7 per 1000 (15.3 when corrected for migrations), a growth rate never to be recorded again before the 1960s. And if the increase of birth rates in a time of continuous improvement in registration hampers an easy interpretation of recorded changes, taluk data come in handy: they show a strong positive link between 1871–81 losses and later 1881–91 or 1881–1901 gains for the 80 units for which comparable data are available. Thus, among the 28 taluks which had lost more than 5 per cent of their population owing to the famine, 20 of them recorded spectacular growth greater than 20 per cent per decade during the next decade.

Among the possible mechanisms of this demographic resurgence over 20 years, the influence of migration is of limited consequence; according to the data classified by district of birth and of residence, no particular Tamil district seem to have benefited from unusual immigration in 1891, except for Madras and the Nilgiris which were always the first recipients of intra-regional migration streams. As to international migrations which had intensified during the famine years, they are unlikely to explain much of the population recovery during the next decades as the Tamil migrant population in other British colonies (such as Ceylon, Burma and Malaya) kept on increasing during this period.

Mortality improvement was also too limited to account for the formidable growth recorded in certain famine-stricken areas.

The Census of 1891 suggests that the recovery was rather due to the changes in the age structure of famine districts. On the contrary, the child/woman ratio which represents a crude indicator of fertility did record


Present-day Tamil Nadu covered 86 (1871) and 99 (1891) taluks of south India, most of them in the Presidency of Madras. The correlation coefficient (r) between 1871-81 and 1881–91 (resp. 1881–1901) is of -0.593 (resp. -0.597); these values contrast with correlation coefficients between decadal growth rates which are usually almost zero.

Return migrations from Ceylon were actually quite significant during the early 1880s, mainly because of the collapse of coffee plantations. However, the increase in the number of Tamil migrants outside India in 1881 and then 1891 shows that the migration balance was still negative for Tamil Nadu during this period. See Guilmoto, 'Le cycle migratoire tamoul', pp. 102–13.


This hypothesis is poorly supported by the figures produced. See Census of India 1891, Vol. XIII–The Report on the Census, p. 44.


18 Review of the Madras Famine, p. 102.

19 From the 1876–78 civil registration data, we computed the ratio of famine vital rates to average 1881–1921 rates. These ratios for both mortality and natality were then applied to the estimated vital rates during normal years: the excess of deaths and the deficit of births for 1876–78 were finally calculated by applying these vital rates estimated for 1876–78 to the estimated 1876 population of Tamil Nadu.

20 Thus, it can be noticed that the minimum number of births was reached in March 1878, corresponding to conceptions in June 1877. The mortality peak came later (August 1877) and might have brought about a large number of miscarriages among already pregnant women.
a significant increase in 1891 over 1881, confirming the role of fertility in the recovery. We are left with only two factors to explain the fertility upsurge observed after the crisis: intensification of nuptiality and increased marital fertility. But the snag is that these two factors are deemed inoperative in Indian historical context. With a very low age at marriage and almost universal marriage, the flexibility of the whole system seems very restricted. In the Western historical experience, nuptiality assumed a regulatory role, as is well-known: during post-crisis periods, nuptiality was both more intense and early than on the average, allowing the young couples to take advantage of the reduced pressure on land. Such a functioning appears to be impossible in nineteenth century south India where the proportion of spinster is both fixed and negligible; moreover, with age at marriage close to puberty for women, there seems to be little scope for increasing fertility through earlier marriages. On the other hand, marital fertility, in the absence of any kind of deliberate birth control during this period, cannot increase unless sizeable (and unlikely) changes in breast-feeding duration took place. Thus there seemed to be no scope for a post-crisis fertility response.

These arguments are simply not tenable any more. The mean age at marriage for women in the province oscillated in the range of 15.6-16.4 years between 1881 and 1921. But in spite of such narrow variations, the regulatory role of nuptiality cannot be discarded. The mean age at marriage did drop from 16.0 years in 1881 to 15.6 in 1891, its lowest value ever, from where it came back to 16.4 in 1901. Moreover, the percentage of women currently married at the age 15 to 29 years increased significantly in 1881 by almost 5 per cent; this rise was even higher in famine-afflicted districts such as Salem which had lost 20 per cent of its population in 1871-81. In this district, the proportion of single women aged 15-19 years, a pivotal age group for the nuptiality system in south India, went down from 38.7 per cent in 1881 to 25.5 per cent in 1891, and then rose back to 32.7 per cent in 1901 and 35.8 in 1911. On the contrary, this proportion remained at the level of 24 per cent in 1881 and 1891 in Thanjavur, a district left almost untouched by the 1876-78 crisis and the subsequent recovery. As marriages were never recorded on a yearly basis, we cannot expect to establish the exact timing of the nuptiality changes which occurred in Salem from decadal census data. But the link between nuptiality and the demographic recovery is undeniable, and so is the link between mortality increase and post-crisis nuptiality intensification.

It is still too early to give a final answer to the question of the mechanisms which brought about the post-crisis recovery. Not only is our data base too poor to compare the situation before and after the crisis (no data on civil condition available for 1871), but documentary evidence is also lacking as to the determinants of early marriages recorded during the 1880s. If certain sources mention that ‘an adverse season does exercise a transitory and slight check on matrimony’ among the poorer sections of the population, nowhere is examined the possibility of nuptiality intensification after the crisis. It is also impossible to assume that a moderate rise in the number of newly-wed women could result in tremendous population increases as observed in certain areas. Most probably, marital fertility did also increase during the post-crisis period, a hypothesis hinting at the possibility of some conscious fertility control among the married couples. The question of fertility control cannot be addressed here for total lack of data, particularly in the absence of age-specific fertility rates for these periods. However, from our knowledge of the Tamil demographic system, we may advance that the two major components of marital fertility control—abstinence and induced abortion—significantly reduced in the 1890s in order to allow a rapid reconstitution of mortality-striken families. The exact role played by abortion and abstinence in lowering fertility among women above 30 is still to be investigated. Other factors such as widow remarriages may also have contributed to the general intensification of fertility potential in the places most affected by the crisis, but are likely to have had a lesser impact than marital fertility change. Indian demographic history which has so far mainly concentrated on mortality issues (for obvious reasons of data availability) will have to get rid of its previous easy assumptions of passive fertility behaviour to reconstruct the complex demographic system of the colonial period.

If the first decade following the great famine of 1876-78 was characterised by good agricultural seasons, this period was not entirely free of mortality outbreaks; in 1884, Thanjavur and Tirunelveli, districts otherwise noted for their favourable agricultural situations, suffered from excess rainfall which brought about floods in coastal areas and subsequently from high prices and cholera. In 1891, it is the turn of the dry tracts, especially those dependent on tank irrigation, to face hardships after successive bad

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261 The first author to stress the differences in flexibility between European and south Indian matrimonial system was probably Srinivasa Raghavaiyangar, Memorandum, p. 45. Women did however marry later in Tamil Nadu than in Kerala or Andhra Pradesh, and for that matter than in the rest of the country. Except among certain high castes such as Brahmins, prepuberty alliances, with consummation immediately after the first period, were rare. The Dravidian system of alliance, with later marriages, divorces and widow remarriages, was nowhere more evident than among the Tamils. See S.N. Agarwala, Age at Marriage in India, Allahabad, 1962; T. Dyson and M. Moore, 'On Kinship Structure, Female Autonomy and Demographic Behavior in India', Population and Development Review, 9, 1, 1983.

262 H.A. Stuart, North Acreat, Madras, 1894, Vol. II, p. 301. This author mentions the recent rise in the number of child marriages. Also see the comments of the 1881 census report on the low proportion of married women in famine districts; Imperial Census of 1881—Operations and Results in the Presidency of Madras, Vol. I—The Report, p. 73.

monsoons; several districts such as Chingelput even recorded a drop in the number of births in 1892, a clear testimony of the severity of the crisis. Ten years later, a sharp increase of food prices and cholera cases followed the insufficient monsoon of 1900. According to a 1938 government report, it was actually the last case of famine conditions in the Tamil country, the impact of which was however almost invisible in the southern districts. In 1906–7 and 1911, cholera and smallpox claimed once again a large number of victims in various parts of the region, leading even to local drops in natality.

In 1918, the so-called Spanish Influenza reached the Presidency and coincided with a general conjuncture of hyperinflation inherited from war conditions. As Figure 1 shows, this was the most serious mortality crisis since the 1870s and the whole Presidency recorded 280,000 excess deaths during 1918. However, not all of them were caused by influenza as cholera and smallpox claimed also a sizeable share of the slaughter. Although the viruses hit the whole of the region, their impact was more felt in the interior than along the coast. In the inland areas characterised by semi-arid conditions and more pronounced seasonal climatic variations, ecological factors probably played a significant role in worsening the effect of epidemics, a mechanism still to be investigated. The gravity of the crisis manifested itself in the 15 per cent fertility decline recorded in 1919, a proportion even higher in districts where the influenza pandemic had succeeded to other calamities. Thus, South Arcot which had already experienced several years of distress (cyclone in 1916 and smallpox in 1917–18) and the northern parts of neighbouring Salem where plague had become endemic since the beginning of the century lost population during 1911–21.

Mortality decline and the birth of a new régime

The frequent division of Indian demographic history into pre- and post-1921 periods undeniably has the virtue of summing up a complex string of events which in a matter of twenty years completely altered the demographic situation in Tamil Nadu; a later year might have offered a more accurate milestone. During the same period, the economic situation did not remain fixed either. Dating the transformation of the economic structure would be no easier especially since rural society underwent changes ever since the British tested new tax systems in the nineteenth century. However, by the second half of the last century, the tax policy was more or less firmly established at levels which did not vary any longer except at the occasion of climatic crises. An important phenomenon at the beginning of this century is the progressive recovery of prices of agricultural goods usually linked to increased demand from Europe and the consequent lightening of taxes it implied. During the same period, rural economy underwent another transformation with a significant rise of the share of cash crops such as cotton, groundnut or sugar-cane as well as that of rice at the expenses of traditional dry crops. The full impact of these modifications of the economic context, which occurred before the 1920s, began to be felt later when the world economy was heading for a major slump.

A new régime

The major feature of the post-1921 demographic régime in Tamil Nadu relates to the beginning of the mortality decline. However, this change was not isolated; not only did the migration system undergo profound transformations in the 1920s (large-scale population exchanges with other British colonies, inception of rapid urbanisation), but fertility also registered moves unrelated to the post-crisis jumps typical of the old régime. In short, the inter-war period proved to be in Tamil Nadu an intermediate period during which most demographic indicators registered important changes; yet, the simultaneity of these different phenomena is more easily described than explained.

The most significant aspect of mortality decline lies in the evolution of the death rates at the regional level. As the following table shows the 1920s did not witness a remarkable breakthrough but rather initiated a trend of regular fall. The first decades till 1921 for which mortality estimates are available were characterised by violent jumps which would have been even more acute if we had used annual estimates. The 1871–81 estimates have not been presented as the severity of the crisis which resulted in a relative loss of 2 per cent in Tamil Nadu’s population precludes the use of indirect techniques based on model life tables; using other evidence based on civil registration data we obtained a death rate of 43.3 per 1000 corresponding to a life expectancy of 22.4 years in 1871–81. The 1921–31 mortality level was only marginally better than that obtained at the beginning of the century during a rather clement decade: However the decadal death rate of the 1920s turned out to be the lowest ever recorded in Tamil Nadu and from that period onwards it has never stopped falling till today. Interestingly enough, the evolution of mortality conditions was parallel at the national level, even though Tamil Nadu has for long exhibited a higher life expectancy.

As said previously, dating the inception of mortality decline with precision is a risky exercise, especially since the downward trend typical of mortality
Table 2

Mortality Estimates for Tamil Nadu 1881–1961

<table>
<thead>
<tr>
<th>Period</th>
<th>1881</th>
<th>1891</th>
<th>1901</th>
<th>1911</th>
<th>1921</th>
<th>1931</th>
<th>1941</th>
<th>1951</th>
<th>1961</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death rates per 1000</td>
<td>34.1</td>
<td>35.7</td>
<td>31.6</td>
<td>40.4</td>
<td>30.6</td>
<td>27.1</td>
<td>23.6</td>
<td>20.5</td>
<td></td>
</tr>
<tr>
<td>Life expectancy both sexes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>29.3</td>
<td>28.6</td>
<td>31.2</td>
<td>26.2</td>
<td>32.3</td>
<td>35.1</td>
<td>38.2</td>
<td>43.3</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>25.1</td>
<td>23.8</td>
<td>23.0</td>
<td>20.2</td>
<td>26.7</td>
<td>31.7</td>
<td>32.1</td>
<td>41.2</td>
<td></td>
</tr>
</tbody>
</table>


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though registration completeness is rather unstable, it can be safely assumed that the quality of registration was subject to similar trends for births and deaths as is obvious for the early twenties; so that the apparent stagnation of the death rate after 1925 might conceal an actual drop which improved registration tended to nullify. In conclusion, the real starting point of mortality decline is likely to be earlier than registration data would have us believe, most probably before the 1931 census, even if mortality reduction became sizeable only during 1930s.

Mortality rates are composed of several elements, including trend level and registration completeness. Yearly fluctuations around the trend are another component which is usually regarded as behaving somewhat randomly (though epidemics and therefore mortality from infectious diseases tend to follow cycles). But it is our contention that this apparently random component is a crucial indicator of the demographic régime since crises are the most conspicuous signs of the type of demographic equilibrium prevailing during a given period.

The measures displayed on Table 3 have been computed from civil registration data. For each year, we computed the deviation from the eleven-year moving average. In percentage of the moving average, this deviation can be as high as +65 per cent (1918 death rate) or -45 per cent (1878 birth rate), but it rarely exceeds the range of +/-20 per cent. From the absolute values of these relative deviations, we computed the average values for both birth and death rates over two different time periods. This gives the most precise measurement of variability, once the trend caused by demographic or other variables has been removed.

Table 3


<table>
<thead>
<tr>
<th></th>
<th>1875–1920</th>
<th>1921–1960</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean deviation around the moving average</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death rate</td>
<td>6.4%</td>
<td>3.9%</td>
</tr>
<tr>
<td>Birth rate</td>
<td>12.5%</td>
<td>6.5%</td>
</tr>
</tbody>
</table>

Sources: Computed from civil registration data for Tamil Nadu.
Note: Method of computation described in the text.

The 1920s were a period of intense bureaucratic reorganisation, in particular in the regional health administration. The yearly reports of the Department of Public Health (in Madras) kept stressing between 1921 and 1930 the improvements due to the new regulations (most notably the District Health Scheme). See B.S. Baliga, 'Some Aspects of the District Health Scheme', in Studies in Madras Administration, Madras, 1960, Vol. II. and Census of India 1931, Vol. XIV Madras Presidency, Part I Report, pp. 26–27.
Those results suggest several observations. We might first note that fluctuations are more pronounced in the case of deaths compared to births. In fact, the variability of mortality is almost twice that of natality. Examination of fluctuations over shorter periods (such as 20-year intervals) shows actually that birth and death variabilities follow parallel evolutions although at different levels. But in the most recent period, fluctuations of the death rate continue to decrease whereas the number of births is slightly more unstable than earlier.72

The main phenomenon evidenced by those figures is of course the rapid decrease of variability between the two periods since it recorded a fall of about 50 per cent for both birth and death rates. This decline was of more importance in the case of death rates and is clearly related to the progressive disappearance of major mortality crises; however, variations of lesser amplitude which we might hesitate to identify as crises because of the unreliable character of the civil registration data did also tend to subside with the passing of years. The impact of crisis rarefaction was also felt on the birth rates, though birth deficits following crises were not the only factor behind the variations recorded.

These changes are also apparent at a district level. As was previously mentioned, a large number of crises were restricted to smaller zones and had thus a limited regional impact. Large-scale demographic accidents probably disappeared faster than local crises.73 As a testimony to the growing homogenisation of Tamil demography, we may observe that other districts (Madras, Madurai) have caught up with Thanjavur, formerly reputed for its most stable demographic system. The case of Madras town is highly revealing: in spite of its being the Presidency's capital, the city's population had hardly increased for decades for a variety of reasons. Most probably the extremely bad sanitary conditions illustrated by death rates played their part in keeping the municipal population stagnant. But starting probably the extremely bad sanitary conditions illustrated by death rates shows actually that birth and death variabilities follow parallel evolutions although at different levels. But in the most recent period, fluctuations of the death rate continue to decrease whereas the number of births is slightly more unstable than earlier.73

It is a common feature of vital rates' variability observed everywhere else. The relative intensity of fertility decline following mortality outbreaks is of the same order.74 This is a clear consequence of progressive fertility control. In Tamil Nadu, it manifests itself from the sixties.75

Demographic instability in Tamil Nadu, as measured by the regional death rate's variability, was before 1921 close to the average of the district figures; there were differences between districts, but the whole region was often subject to similar fluctuations. However, during the later period marked by a lower, more stable mortality, demographic stability of the whole region became more pronounced than in the districts; this demonstrates that local crises were less and less related to each other.

See Guilmoto, Un siècle de démographie, Part II. On the rapid infant mortality decline accompanying the growth of the city's population from the 1920s onwards, see S. Chandrasekhar, 'Infant Mortality in Madras City', in Papers Contributed by Indian Authors to the World Population Conference Belgrade 1965, Delhi, 1965, pp. 167–71.

In Madras town, the number of births and deaths simultaneously fell by a third between 1941 and 1942; this gives an idea of the sudden depopulation and/or of the administrative collapse of the registration system.

Periods of excess mortality did not completely disappear in 1921. Between 1921 and 1941, a few mortality outbreaks can be spotted such as a cholera epidemic in 1924–25 in central Tamil Nadu and another one in 1935–36 in the north and the south, as well as several plague outbreaks. But the effect of these events is hardly discernible on Tamil Nadu's rates as the impact of these crises was always restricted in geographical and epidemiological terms. However, the threat of a global crisis, covering the entire region and degenerating into all kinds of epidemics, was not yet over as the little-studied war period demonstrates.

In 1940, India found itself dragged into a conflict which did not concern the subcontinent. With Japan entering the war at the end of 1941, the situation suddenly changed. Japanese armies managed a breakthrough into South-East Asia and conquered several British territories; as soon as they started threatening Burma, neighboring Bengal fell prey to complete administrative disorder which was a major factor at the origin of the famine of 1943–44. Japanese presence in the Bay of Bengal in 1942 caused a feeling of panic in Madras, notably from the month of March when a Japanese squadron threatened the Coromandel Coast and Ceylon. The city clearly overreacted and a large part of its population chose to flee into the interior as the Government temporarily transferred its capital to Ootacamund in the Nilgiris.76 Not before 1944 when Japanese advance was stopped at Kohima was the situation normalised on the eastern side of the subcontinent.

In Tamil Nadu, the first mortality outbreak dates from 1942; it is however restricted to a cholera epidemic in South Arcot and Thanjavur districts. By 1943, cholera has spread to several other Tamil districts, while other causes of deaths (including plague in Coimbatore) record a brutal increase; on the whole, the death rate is up by 20 per cent in 1943 and this is likely to be an underestimate owing to the poor functioning of the administration.77 The price of rice which stopped arriving from Burma (the main exporter) starts to increase from summer 1942 and doubles before the winter harvest. After a short decline, the prices go up again in mid-1943.
and remain at a very high level up to 1946, often three times the average price recorded during the 1930s. In the rice-growing areas, inflationary pressure and mortality jumps are less acute. In 1944, mortality remains above average everywhere but in Tiruchirappalli district and Madras city. The initial cholera epidemic is over by now and other causes of deaths (smallpox, fever) claim most of the excess mortality. The most affected districts, South Arcot and Chengalpattu, which belong to the hinterland of the capital even recorded a net loss of population during 1943-44. Several districts of the North and West witnessed in 1944 or 1945 a noticeable decline in the birth rate as a clear consequence of the mortality crisis.

In spite of the role played by cholera at the beginning of the crisis, infectious diseases did not claim the majority of the deaths. The pattern followed rather that of a subsistence crisis like the 1876-77 famine inasmuch as the dearth of foodstuffs was the first determinant of mortality increase. There is however a large difference between both contexts since in 1942-44 no climatic irregularity occurred that might be held responsible for a substantial production decline of foodgrains. It is rather a decrease of grain net availability (production + imports - exports) which created conditions favourable to inflation. The price hikes, recorded for all cereals, were even paralleled by an important rise in the price of other consumption items, even if the non-food prices display a lesser volatility due to demand elasticity.\(^5\)

As for good products, the price rise was of course directly linked to the disruption of the trade with Burma. During the preceding years, the Presidency used to import annually about 300,000 tons of rice from the fertile delta of the Irrawady. As soon as the Japanese navy threatened merchant ships the cost of cereals surged.\(^6\) This was a further manifestation of Tamil Nadu’s progressive incorporation in a world market it could not control.\(^6\) Reliance on foreign imports for its food consumption implied the usual consequences of production delocalisation: a growing vulnerability to external factors such as world market prices and international relations.


\(^{6}\) The war conditions caused inflation as early as in 1940. After Burma fell in April 1942, the Government of Bengal on which rice traders had relied for their supply decided in June to drastically reduce all exports from the province, as an immediate response, prices shot up in the Madras Presidency in June 1942 and had already doubled after six months.

\(^{4}\) A first major impact was felt during the international economic recession of the 1930s. Tamil Nadu whose agriculture had since the beginning of the century become dependent on foreign demand because of its commercial character was severely hit by the reduction of international price and demand in the 1930s. This period has been thoroughly investigated by Baker, in particular the consequences of the slump on the urban network in Tamil Nadu.

The problems faced by Tamil Nadu’s economy from the 1920s to the 1940s were in a way similar to those faced by its labour, when a large portion of Tamil Nadu’s working population tended to rely on the international labour market, most notably in other British-controlled territories. For that reason, it had to bear the consequences of changing external conditions such as the impact of the world crisis and the war on plantation employment.

This period undoubtedly marked the last regional crisis experienced in Tamil Nadu since other mortality outbreaks were of lesser intensity and area.\(^6\) Whatever its importance in regional terms, it must be stressed that the crisis was nothing compared to what Bengal and other Indian regions experienced. As noted before, Travancore State and the rest of present-day Kerala witnessed a widespread distress bordering on famine whereas Tamil Nadu on the whole recorded in 1943-44 a mortality rise of only 20 per cent.\(^6\)

**Epidemiological transition**

The new mortality system was accompanied by epidemiological transformations which only registration data allow us to describe. But here again it would be naïve to assume that the village heads who were in charge of collecting the information in rural areas were particularly accurate in determining the causes of deaths. In municipalities the situation was only marginally better. The nomenclature in which data were finally presented was itself rather crude with catch-all categories such as ‘fevers’ or ‘other causes’ accounting for the majority of the deaths in Tamil Nadu. However, yearly variations and other indirect evidence provide certain clues about the evolution during the period under review. After a presentation of the main causes of deaths in colonial Tamil India, some indications will be given here about the epidemiological component of mortality reduction.

Malaria, definitely one of the most important causes of mortality, never appeared in the official statistics before 1951. It was however known to be endemic almost everywhere in Tamil Nadu. Certain areas such as the coastal strip and the hilly tracts still covered by the jungle were more vulnerable for various ecological reasons;\(^9\) in the drier parts of the province, malaria intensity was mainly a function of the rainfall and of the type of irrigation

\(^{6}\) This is the case of the 1950 mortality rise in a context of poor monsoons and general inflation. Coimbatore, Madurai and Chengalpattu were the most affected areas.

\(^{9}\) See K.G. Sivaswamy et al., *Food Famine and Nutritional Diseases in Travancore (1943-44)*, Madras, 1945; and other publications on south India by the Servants of India Society.

\(^{9}\) Most unhealthy were the hills of the interior. Writing about Salem district, Richards for example attributes to malaria the majority of deaths recorded in the area: Richards, Salem, p. 312.
and therefore highly seasonal in character. The usual mortality increase during the winter months following the North-East monsoon is obviously linked to fever mortality of which malaria was a key component.

Cholera whose presence in Tamil Nadu was already attested in the sixteenth century was another major killer before the 1940s. Its extreme irregularity which registration data clearly reflect determined an apparently endless history of recurrent outbreaks; easily transmitted through water and food, cholera epidemics owed their violence to the poor sanitary control that existed both in villages and in cities at the turn of the century. The rich, central Kaveri valley, being hot and humid, constituted a permanent seat for the infection. Labour migration and religious pilgrimages helped the bacillus to spread throughout the whole province. Among the diseases for which we have data, cholera was undoubtedly the one with the most accentuated peaks and troughs; a cycle’s length was on the average of about six years with several years of respite between outbreaks.

Smallpox was another important cause of death in colonial Tamil Nadu, especially among children. An important difference with the diseases previously mentioned lies in the fact that vaccination existed already during the last century. It is possible that the disease, associated in the Tamil culture with the goddess Mariamma, lost some ground when the British attempted to introduce vaccination campaigns. Stuart wrote in 1898 that preventive measures met with no difficulty ‘save that arising from the apathy of the people and even of officials’. As will be mentioned below, the smallpox mortality profile closely followed that of cholera till the first world war; yet there was barely a year with no trace of the disease.

Although plague never accounted for a large number of deaths, it represented the most dreadful epidemic and caused total disruption of the social fabric wherever it broke out. The grain trade which intensified everywhere in India in the wake of railway construction facilitated the transmission of the disease, particularly in urban settlements. Almost absent in nineteenth century Tamil Nadu, the disease came from abroad via Bombay as with the 1918 influenza. In Salem district in August 1898 where plague was to become several decades later. The district’s location on the road to Mysore and its more continental climate may account for its specific vulnerability. However, Tamil Nadu was on the whole spared of the epidemics which devastated the rest of India; most probably, south India’s tropical climate with small seasonal variations of temperature acted as a check to the spread and development of the bacterium.

We have mainly concentrated here on infectious diseases that were more accurately monitored by the registration system. But as the next table shows, these diseases represent but a minor part of the total death toll during normal years such as 1930. The data presented below were collected in the larger municipalities with the exception of Madras. They provide a detailed picture of the prevailing epidemiology before the acceleration of mortality decline in Tamil Nadu and in spite of several shortcomings regarding the classification, they can be held fairly reliable inasmuch as 1930 falls in the period when civil registration coverage was at its highest level.

1930 was a year free of epidemics and therefore mortality from infectious diseases remained little important, a feature also observed in the region as a whole. As a result, the statistics shown in Table 4 allow us to measure the relative importance of a large number of diseases. The weight of diseases

| Causes of Deaths, Fifteen Municipalities of the Madras Presidency in 1930 |
|-----------------------------|-----------------------------|-----------------------------|
|                             | Number of deaths | Percentage of the total |
| Cholera                     | 454              | 22.5%                       |
| Smallpox                    | 437              | 21.9%                       |
| Typhoid                     | 340              | 16.9%                       |
| Measles                     | 272              | 13.6%                       |
| Other infectious diseases (chicken-poxy, diphtheria, plague) | 3779 | 20.1% |
| Infectious diseases         | 1659             | 8.7%                        |
| Malaria                     | 314              | 1.6%                        |
| Influenza                   | 124              | 0.6%                        |
| Other fevers                | 196              | 1.0%                        |
| Fever                       | 2434             | 12.8%                       |

These data pertain to fifteen major towns of the Presidency, among which the following Tamil towns: Coimbatore, Cuddalore, Kanchipuram, Kumbakonam, Madurai, Nagapattinam, Salem, Thanjavur, Tirunelveli, Tiruchirappalli, Vellore. All these towns had municipal health officials and thus better statistical records. See Report of the Director of the Public Health Madras, for 1930, Madras, 1931. pp. 68-71.

The number of unknown causes of deaths is minimal. The corresponding overall death rate was of the order of 27 per 1000 in these towns, a value matching our regional estimate of the death rate.

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68. Hemingway was of the opinion that cholera mortality was somewhat over-estimated due to the addition of other fevers. Its near disappearance during inter-crisis periods suggest however that this over-estimation was limited to certain years, but one may argue as well that cholera was also confused with intestinal diseases. See F.R. Hemingway, Trichinopoly, Madras District Gazetteers, Madras, 1907. pp. 196-97. On cholera, also see David Arnold, 'Cholera Mortality in British India, 1817-1947', in Dyson, India's Historical Demography.


71. See Richards, Salem, pp. 314-16, about Salem.
the populations concerned as several affections are age-specific. Though
municipal figures reflect however very contrasted situations according to
are much more important than what the less detailed data suggest. These
of the respiratory system and that of deaths due to postnatal complications
much more important than what the less detailed data suggest. These
incidence rate of tuberculosis since the disease is frequent in these age
groups. There are many other factors linked to the living conditions in
urban areas which explain why the disease developed so fast, a phenomenon
epitomised the broader transformations of the mortality régime
under way in Tamil Nadu. As to infant mortality which recorded a rapid
decline in Tamil urban areas, categories to describe it are also problematic;
it is for instance obvious that tetanus is underestimated and that it accounts
for a significant part of 'convulsions' among children below one year.
Several other diseases (deficiency, diarrhoea) also play an important role
in determining the intensity of infant and child mortality, but without
cross-classification by age, their respective weight is impossible to
determine. 

Cholera and smallpox for which data are both available and more reliable
will help delineate the schedule and the pattern of the overall
mortality decline. It should not be inferred from what follows that their
reduction was the only factor behind the global decline of the death rates,
nor that the evolution of both diseases was paralleled by other causes of
deaths. It is true that smallpox and cholera never were the main causes
of death; taken together, the two diseases did not claim more than 30 per cent
of the death toll in any single year. However, we have stressed before that
the old mortality régime was firstly characterised by very unstable vari-
atations and no other cause of mortality can better illustrate this typical
feature than epidemic mortality.

This close relation between general mortality and epidemic mortality is
confirmed by the trend as well as the variability of demographic rates
after 1921. In terms of causes of deaths, the main changes in mortality
recorded after 1921 originated from the decrease of infectious diseases.
Epidemics slowly became less frequent and less intense. Thus, whereas
smallpox and cholera had accounted for 8.0 per cent and 4.0 per cent of
all deaths during 1871-1920, their respective share in the overall
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Cholera and smallpox for which data are both available and more reliable
will help delineate the schedule and the pattern of the overall
mortality decline. It should not be inferred from what follows that their
reduction was the only factor behind the global decline of the death rates,
nor that the evolution of both diseases was paralleled by other causes of
deaths. It is true that smallpox and cholera never were the main causes
of death; taken together, the two diseases did not claim more than 30 per cent
of the death toll in any single year. However, we have stressed before that
the old mortality régime was firstly characterised by very unstable vari-
atations and no other cause of mortality can better illustrate this typical
feature than epidemic mortality.

This close relation between general mortality and epidemic mortality is
confirmed by the trend as well as the variability of demographic rates
after 1921. In terms of causes of deaths, the main changes in mortality
recorded after 1921 originated from the decrease of infectious diseases.
Epidemics slowly became less frequent and less intense. Thus, whereas
smallpox and cholera had accounted for 8.0 per cent and 4.0 per cent of
all deaths during 1871-1920, their respective share in the overall
mortality was down to 2.8 per cent and 0.9 per cent during 1921–50. This
diminution cannot by itself explain the magnitude of mortality decline;
it is for instance obvious that tetanus is underestimated and that it accounts
for a significant part of 'convulsions' among children below one year.
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infectious character experienced a similar evolution. As for the timing of the beginning of mortality decrease, it is worth stressing once again that 1921 is only an approximate temporal landmark for changes that were staggered over several decades from the beginning of the century.

In the case of cholera, the evolution was rather progressive. In Figure 2 are plotted data on cholera for the 1871-1960 period; these values represent the proportions of deaths attributed to cholera, irrespective of the intensity of mortality in absolute terms. The trend downwards is partly hidden behind frequent fluctuations of these percentages; however, it can be easily observed that from the 1910s, cholera recorded a gradual decline till its near disappearance in the most recent years. This fall is not due to a lesser frequency of epidemic outbreaks as the disease kept more or less its periodicity till the 1950s. Some of these epidemics such as the one which ravaged Kanyakumari area in 1928 could be especially dreadful even after the beginning of mortality decline. Yet, the major transformation in cholera mortality concerned the intensity of the crises which never reached 10 per cent after the beginning of the century except in 1942 (10.5 per cent). During the last three decades, under examination, the death toll attributed to cholera, even during intermittent outbreaks, was below the level reached during the most eclec tram of the last century.

Data for smallpox plotted in Figure 3 tell the same story. Its cyclical character persisted though the crises' intensity diminished. There appear to be three stages beginning with a period of extreme severity which ended before the turning of the century. After an intermediary period from ca. 1895 to ca. 1925, smallpox mortality recorded a further decline which made it an almost marginal cause of deaths in the region after 1925. What is less apparent on the curves is the evolution of cholera relative to smallpox. If one were to examine a graph on relative prevalence (i.e., the intensity of a specific disease in relation to a moving average) a striking similarity would appear which is less visible on the figures shown here: cholera and smallpox cycles tend to coincide closely even if their respective epidemiological cycles have no reason to be similar. Another important observation relates to the post-1925 period: the relative peaks of smallpox and cholera mortality have ceased to coincide as if the synergistic effect typical of crises had ceased to function. Thus if mortality decline is clearly reflected in the parallel reduction of mortality from infectious diseases, the loosening of

We have so far presented some demographic aspects of the mortality decline observed in Tamil Nadu, with little hint as to the underlying factors. As we shall now see no single phenomenon can be regarded as having triggered off mortality decline in south India. Mortality decline has been accompanied by what has often been called the epidemiological transition, i.e., a transition from infectious diseases towards chronic and degenerative ailments; the burden of death gradually moved from the younger to the older age, a mechanism which the temporary rise of tuberculosis mortality during the first part of the century (starting with the cities) clearly illustrates. The most common explanations put forth to account for the progressive disappearance of infectious diseases at the beginning of the demographic transition fall into three categories: the changing epidemiological equilibrium (the relation between hosts and parasites), better health care and sanitary measures, and improved human resistance.

Opting for the first type of argument, Klein has recently advocated that mortality decline in India was almost completely unrelated to the socio-historical context and stemmed rather from changes in the character of infectious diseases. According to him, falling death rates 'originated outside human volition in the autonomous transformation of the relationship between infectious agents and human resistance.' Progressive self-immunisation, acting along the Darwinian principle of differential survival, is held responsible for the reduced risk of mortality when sanitary and economic conditions played no role in the process. Klein attaches much importance to the alleged mortality increase before the 1920s, but as previously mentioned, such a phenomenon is hardly discernible in Tamil Nadu's demographic history as the 1881-1911 period did not experience any obvious mortality rise. Nor is the spread of malaria during the nineteenth century likely to have brought about an increase in the number of deaths like in other parts of India. Not less problematic is the hypothesis itself of progressive adjustments between the epidemiological environment and the immunity of the population. On cholera, the infectious disease for

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the cholera-smallpox nexus is itself a good illustration of the progressive stabilisation of death rates.

In quest of explanations

Though plague mortality never reached high levels in Tamil Nadu and followed a specific schedule bearing no relation with other infectious diseases, the evolution of the disease shows a pronounced decline after 1925; it totally disappeared in the 1950s.

In 1877, 1884, 1891, 1900, 1906 and 1918, the deaths for both diseases recorded a simultaneous rise typical of epidemic conditions; very few cholera or smallpox outbreaks were isolated before 1920. However, from the 1920s onwards, epidemics of cholera and smallpox appeared and disappeared independent of each other.
which change of régime has been most apparent, little evidence could be gathered to confirm (or inform) Klein's proposition. As a matter of fact, the thesis of the decreasing virulence of germs, though not altogether implausible for all diseases, sounds like a residual, speculative explanation based on the failures of other explanations rather than on strong evidence. And as McKeown has said, it would imply that all changes were largely fortuitous and occurred simultaneously, yet independently of the other social or medical transformations. It would therefore be impossible to explain why mortality decline took place at a specific time and in specific places in India. Other interpretations of the mortality reduction observed during the inter-war era can be tested more accurately. The role of the sanitary organisation is the most frequent explanation among them and we might consider it first.

Health system

In 1880, the Madras Presidency possessed not more than 3,200 hospital beds for a population of 31.2 million. Most of them were actually concentrated in large towns and were even more seldom found in the countryside. The enactment of the 1919 Act brought in changes for this Act meant that health (along with education and agriculture) fell under the jurisdiction of the provincial authorities.

Within the Presidency the reforms introduced under the District Health Scheme of 1922 were most important for the administration. The Public Health Department was inaugurated in Madras which supervised the activities of newly appointed district health officers. The previous district officer-in-charge of health had enjoyed only limited powers and the administration itself was poorly coordinated. Apart from his role in the civil registration organisation the district health officer gained authority and responsibility over the situation in his district (which he was now supposed to tour for two months every year) and over the progression of major epidemics. The authority and the resources of the Director of Public Health who replaced the Sanitary Commissioner of the Presidency greatly increased as well. The organisation in Madras was indeed praised by the Health Department was inaugurated in Madras which supervised the activities of newly appointed district health officers. The previous district officer-in-charge of health had enjoyed only limited powers and the administration itself was poorly coordinated. Apart from his role in the civil registration organisation the district health officer gained authority and responsibility over the situation in his district (which he was now supposed to tour for two months every year) and over the progression of major epidemics. The authority and the resources of the Director of Public Health who replaced the Sanitary Commissioner of the Presidency greatly increased as well. The organisation in Madras was indeed praised by the Honorary Medical Scheme was extended to the whole province in 1937: this programme made it possible for 'honorary' (i.e., unpaid) doctors to be incorporated in the public health system and coincided with the interruption of permanent recruitment of medical officers.

General opinions about the changes which took place in the health system during 1920-40 remain mixed for the Government never really renounced its laissez-faire attitude which it adopted under the pretext of budget constraints. When the Bhore Committee investigated (in the early 1940s), the Presidency possessed one care centre (dispensary or hospital) for 28,000 inhabitants in towns as against one for 43,000 in villages. The population per physician and per hospital bed was respectively 8,145 and 3,300; these figures are more or less similar to those obtained in the rest of India. Muraleedharan considers that the Government failed to reach the targets it set in 1924, mainly because demographic growth had partly increased administrative control revealed also the Madras Government's wish to do something for the medical infrastructure; in spite of an undeniable increase in the number of beds and health institutions during the previous fifty years, the health structure was still deemed totally inadequate in the early twenties. By then the ratio of population per medical centre was one for 75,000 inhabitants; needless to stress that the relative absence of such medical institutions in the countryside implied a still worse situation outside the Presidency's towns and that most villages had absolutely no contact with western medicine. In 1924, Madras town which sheltered a little more than 1 per cent of the provincial population received not less than 45 per cent of the money spent in hospitals and dispensaries. The opening of new health centres in the province faced severe problems of financing for even the 1924 budget which had just doubled could not satisfy the requirements. Faithful to its liberal philosophy the Government preferred to encourage private practice than support public intervention: in 1924 it started a new scheme (Subsidised Rural Medical Relief Scheme) aimed at inducing medical practitioners to do business in the villages. Physicians who opted for settling down in the rural areas received yearly subsidies as well as a certain volume of drugs for their dispensaries to be distributed to needy patients. At the same time dispensaries were supposed to treat all resourceless visitors free of charge.

The main advantage of the programme lies in the minimal financial involvement from the Government. Yet subsidies given to rural practitioners were not sufficient to bridge the gap between the revenues of rural and urban physicians. In 1930 the opening of new dispensaries is discontinued because of the bad economic conditions, and the number of medical institutions stagnated during the decade though the number of hospital beds kept on increasing. Typical of the government's financial caution, the Honorary Medical Scheme was extended to the whole province in 1937: this programme made it possible for 'honorary' (i.e., unpaid) doctors to be incorporated in the public health system and coincided with the interruption of permanent recruitment of medical officers.

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FIGURE 2  CHOLERA IN TAMIL NADU, 1870-1960
Percentage of Total Deaths

FIGURE 3  SMALLPOX IN TAMIL NADU, 1870-1960
Percentage of Total Deaths
nullified the progress recorded in the medical structure and because of its
general lack of interest in public health matters.73 The reforms had undoubt-
dedly a stronger impact on local bureaucracy than on the prospective
patients from the countryside: the money allocated to health administration
was not significantly higher in Madras than in other provinces.74 Therefore,
the effect of the 'health care transition' is likely to have been restricted to
areas which were most benefited, i.e. the urban parts of the Presidency.
The rapid mortality decline that we already mentioned occurring in Madras
is a perfect case in point; the city was previously reputed for its high degree
of insalubrity and its mortality rates checked population before the 1920s.
What is less clear is the extent and the consequences of the vaccination
campaigns in Tamil Nadu. Opinions are usually pessimistic about the
British' endeavours at implementing their policies of preventive inoculation.75
Moreover, the effectiveness of the vaccines against various diseases was
probably limited and as Arnold argues about cholera, mass vaccination
might have just helped to strengthen the downward trend of the death
rates.76

As to smallpox, the picture is somewhat more optimistic for there are
numerous figures pointing to the large number of people inoculated in the
last century.77 In 1902, the Sanitary Commissioner even estimated at
5,72,980 the number of lives saved through vaccinations.78 Madras pro-
vince was also singled out by the Bhore Committee for making revaccination
compulsory in the 1930s.79 There can be no doubt that a sizeable part of the
decrease of smallpox mortality that we notice at the beginning of this
century (see above) is attributable to a successful policy of mass protection.

But as observed for infectious diseases in Europe or for cholera in India,
vaccination seems to have been but one of the factors underlying the
viral and bacterial epidemics. As shown by Heston, the incidence of variola
vaccinations against smallpox were performed in Madras in 1780-81. grieving
mortality.80

Our description of mortality decline has stressed the role played by the
reduction of the annual death rates in every district of the Tamil country.
As the medical structure is unlikely to have been responsible for the
progressive disappearance of all crisis situations, we shall now address the
question of the specific factors accounting for the rapid decline of crisis
mortality.

The relationships between mortality decline and changing living condi-
tions remain surprisingly obscure. Originally, the frequent simultaneity of
climatic and demographic accidents tended to give to the climatic factor a
preponderant role in explaining the occurrence of crises. According to this
model, the unstable equilibrium reached between population and resources
collapses as soon as a bad agricultural season brings about a reduction of
grain output. Thus, the progressive rarefaction of crises could be a result of
improvements in production and distribution as well as increasing imports;
transformations of this kind tend to raise net grain availability per head and
it lessens the dependence on favourable climatic conditions. But this
theory has been criticised as it seems preferable indeed to relate mortality
risks to the actual availability of food products and especially to the
inhabitants' capacity to obtain cereals during periods of massive un-
employment or inflation.81

Reliable data necessary to describe labour conditions (wages and
employment level) are not available over the period under study. The only
evidence at our disposal concerns the evolution of local prices of various
food items since the second part of the nineteenth century. This is of course
an inadequate summary of the economic conjuncture and of its impact on
the population; thus, certain sections of the population were paid in kind
and their income was thus unaffected by inflationary pressure insofar as
their jobs were not threatened. Conversely, other segments of the working
population were entirely dependent on their wages and could also easily
lose their employment during crises; wage labourers and artisans were
among the most vulnerable of these groups and suffered dramatically
during the crises.82

To assess the importance of the connection between prices and mortality,
Salem district may offer a good illustration of the changes occurring since

73 Muraleddharan, 'Rural Health Care', p. 334. For a similarly negative appraisal, see
Ryland, quoted in A. Heston, 'National Income', in Kumar, The Cambridge Economic
History of India, p. 413. For a national perspective, see Roger Jefferies, The Politics of Health in
India, Berkeley, 1988, pp. 75-102.
74 See statistics in D. Kumar, 'The Fiscal System', in Kumar, The Cambridge Economic
History of India, p. 910.
75 Typically enough, Jefferys mentions vaccination in India only to stress that it was meant to
76 See David Arnold, 'Cholera Mortality', p. 276.
77 450,000 people were successfully vaccinated in the Madras Presidency in 1889-81. Report of
the Administration of the Madras Presidency for the Year 1889-81, Madras, 1887, p.222. In
Coimbatore where vaccination is reported to have started in 1800, about 30,000 annual
vaccinations against smallpox were performed at the end of last century. See H.A. Stuart,
Coimbatore, pp. 112-14.
Survey, p. 110.
the end of the past century as the district was already noted for its marked instability in terms of death rates. Limiting our examination to a specific sub-region allows the use of local prices rather than a regional average. Improvements in the transportation system by the end of the last century has definitely accelerated the homogenisation of local market prices through increased exchanges but did not eliminate completely the price differences between sub-regions; thus Salem prices, vis-à-vis prices recorded in rice-growing Thanjavur, remained always slightly higher on the average and were quicker to respond during crises.\textsuperscript{7}

As data are not numerous enough to perform the kind of statistical analysis common in demographic history we have restricted ourselves to the examination of the data plotted on Figure 4. These two series represent the annual relative variations of the number of deaths and those of the price of rice of second quality. The 1876–78 period is the most striking example of links between price rise and excess mortality. The sequence is even perceptible on monthly series, with a narrow time lapse between the beginning of inflation and the following mortality increase.\textsuperscript{8} After a few years mortality recorded a first rebound in 1885 parallel to that of prices. A second mortality rebound, of greater importance, took place in 1890–91 but stopped before the end of the significant price hike in mid-1892. The number of deaths rose again in 1901 as rice was getting dearer. However, the important mortality increase witnessed in 1902–3 derived firstly from the plague epidemic, a disease which became endemic in this area of Tamil Nadu at the turn of the century.\textsuperscript{9} In 1906, in spite of the additional role played by cholera and smallpox, price and mortality increases clearly coincided.

At the end of 1908 a bad monsoon caused the price to increase by 20 per cent in the district, but only for a few months. The mortality peak in 1909–10 was rather due to plague and cholera which visited the area. During approximately the same period the price of rice and that of other cereals started to increase regularly, a trend which was to culminate at the end of the 1914–18 war. Owing to the expansion of the grain trade in the region and in the country as a whole, prices recorded in Salem marketplaces followed a trend parallel to that of the region; the link with international prices also became stronger.\textsuperscript{10} The hecatomb following upon the influenza epidemic in 1918 preceded the last bout of inflation in 1919 which

\textsuperscript{7} Price data may be found in A Statistical Atlas of the Madras Presidency. Madras, 1963.
\textsuperscript{8} See Roland Lardinois, 'Une conjoncture de crise démographique en Inde du sud au XIX\textsuperscript{ème} siècle'. Population, 2, 1982, p. 376.
\textsuperscript{9} Civil registration data do not reflect accurately the severity of the epidemic. See however F.J. Richards, Salem, p. 315.
\textsuperscript{10} See P.J. Thomas and N.S. Sastry, Commodity Prices in South India, 1918–1938, Madras, 1940.
had already provoked rioting and looting in several towns of the Presidency.41 After 1925 prices started to tumble as a direct result of the long recession which had reached the Western countries. From that period till the war, prices seem to bear little relationship with the mortality fluctuations: various epidemics (cholera, fevers) were responsible for the few increases of the death rates with no simultaneous inflation. The scarcity which followed the disruption of trade with Burma during the war has already been commented upon; let us simply stress here that in a very vulnerable area such as the semi-dry Salem district, the formidable price hike caused only a moderate mortality increase recorded in 1942-43.

This examination leads to several observations. Although several of the mortality crises were linked to the price rises, epidemics have often played a somewhat independent rôle (plague, influenza). The impact of the increase in price on death rates was far from mechanical and gaps between both phenomena are frequent. What the example of Salem shows is that this discrepancy between price and mortality rises became more pronounced over the years. This ‘uncoupling’ of inflation and death rates is discernible from the 1920s onwards. The last instance of a crisis brought about by severe inflation during the Second World War is a further proof of the death rate’s decreasing elasticity in relation to food prices as a major crisis was averted in the Madras Presidency.

Discussion: Mortality, production and nutrition

McKeown has adopted the radical opinion according to which progress in medicine (before the introduction of antibiotics) and in hygiene conditions were not as effective as nutrition improvements in bringing down mortality from infectious diseases.42 In Tamil Nadu’s case the perspective is broader: an increase in grain availability would have meant not only better nutrition and resistance among the population against bacterial agents but also, more concretely, a reduced risk of food shortages. Yet, the data available for India do not seem to confirm that the food output increased in a significant way.43 Several examinations of the classical production data produced by Blyn point to a stagnation or a decline of the output per capita between the two world wars.44 A similar exercise using regional data for the Madras Presidency would yield identical conclusions: since the beginning of the century, the foodgrain output per inhabitant stagnated or decreased in colonial Madras as commercial crops displaced dry grains, the peasant’s traditional staple food.45

Declining per capita food output is therefore unlikely to have had a favourable impact on the state of nutrition during this period. This discouraging result has led to different interpretations. Some like Klein have simply ruled out the influence of changes in material conditions; but his hypothesis is barely testable and leaves a number of questions unsolved. For others, average food availability as given by output data is not the best indicator of living conditions and access to food. Drèze’s paper on famine prevention has precisely stressed the role of government policies in containing subsistence crises.46 By providing employment under the conditions set by the Famine Codes (rather than through mere food distribution) the Government of India managed to protect precisely some of the most vulnerable sections of the population and in spite of several shortcomings, these policies undeniably contributed to the progressive decline of famine frequency and intensity. Tamil Nadu’s experience would tend to confirm this view as no large-scale subsistence crisis ever occurred after the 1876-78 famine.47 Though the Government kept a strictly laissez-faire attitude regarding trade it did not hesitate to intervene at several occasions whenever severe distress threatened parts of the Presidency as in 1891 or in Coimbatore in 1939.48 When rice imports stopped during the Second World War the government stepped in with unusual efficiency; after concentrating on the problems of regulating food distribution it decided in 1943 to introduce rationing and compulsory requisition and to launch the Grow More Food campaign. This complete shift in policy heralded the changes to come in independent India and its immediate impact was to limit the mortality rise, especially in the larger towns where rationing was first introduced.49

**References**

- As said previously, the Government’s reaction during this last famine was both late and insufficient. See for instance William Digby, *The Famine Campaign*.
Dreze's strong case for the success of the Famine Codes goes a long way towards explaining the disappearance of subsistence crises, but this is only one component of the overall mortality decline. McAlpin cites several factors which help to contain mortality from food crises: organised relief work, railway expansion, diversification of the economy. But that still leaves unanswered the question of the specific schedule of mortality decline from the 1920s and that of the progressive lowering of epidemics since the factors mentioned preceded 1921 and affected, only indirectly, mortality from infectious diseases. As improved living conditions still seem to be the likely cause of the change, we must once again confront the puzzle of declining food production and apparent economic stagnation in Tamil Nadu during the inter-war period. For there were numerous signs indicating a real diversification of resources including the introduction of cash crops at the beginning of this century, the export of manpower to other British colonies and the development of urban employment. In rural areas, the extension of areas under rice and the development of new crops such as cotton, groundnuts and sugarcane undoubtedly represented an improvement over an earlier period when peasants had little option in selecting their crops. After 1918 as the share of cash crops kept on increasing the province had to resort to food imports to offset its deficit and prices which had risen over the preceding decades started to move downwards. The rice imported amounted to almost a third of the regional output on the eve of the Second World War and Baker contends that it represented more than half of the marketable surplus. And here we are at the core of the stagnation riddle: did the shift to cash crops and resorting to imports mean only increased vulnerability for the Tamil peasants? Why did an export-oriented crop such as groundnut spread as the region was facing an apparently severe food deficit? It is difficult to believe that the figures indicating a decrease of the grain output per capita reflect the actual level of food availability as prices were falling. On the contrary there are reasons to believe that the transformations of the crop pattern were made possible by a very important and favourable shift in the terms of trade as Tamil Nadu's peasantry preferred to buy (cheaper) food than grow it and give up commercial crops. We think this is a phenomenon which has not really been taken into account as Blyn's data on overall output give a distorted picture of the availability of foodgrains at a time of increasing imports.

As Sen has demonstrated food availability is a very imperfect indicator of food distribution as 'entitlement' greatly varies within the population, especially in periods of crisis. We have seen however that prices started declining after 1919 and in Salem's example, it coincided with the 'uncoupling' of price and mortality. There is at the same time no indication of the wages going down. On the contrary, everything leads us to believe that they did increase in several sectors, be it for industrial workers or for agricultural labour. For wage-earners it simply meant that they could re-allocate their income to other items, an evolution which was not restricted to town-dwellers.

The situation of landless and marginal peasants is of special interest not only owing to their large share in the working population, but because they constituted a most vulnerable group. And for them, economic diversification has mainly signified fleeing the villages; both rapid urbanisation which took off after 1921 and massive emigration to other colonies which peaked during the inter-war period provided the poorest sections of the rural Tamil society with alternative economic opportunities. As was the case with the internationalisation of agricultural exchanges, international migration has often been presented as a sign of a deteriorating economic situation and of the disrupting effects of colonial rule. Seen from the point of view of the migrants who chose to leave for several years (if not for good), the picture is slightly different: however hard were the conditions of life in towns and on the planters' estates, they were good enough, compared to conditions at home, to generate formidable streams of out-migration. In addition, the departure of a large part of the rural manpower eased the labour markets in Tamil Nadu, created local shortages and caused the wages to rise in most parts of the countryside.

Wage and price trends seem then to have combined to produce a significant increase of real incomes among a part of Tamil Nadu's population. Such an evolution in living standards had necessarily an impact on mortality conditions. No doubt, certain socio-economic groups stayed in a very fragile position and were probably most affected by the world slump in the 1930s. Yet, the steps taken by the Government to ensure a quick response in times of distress by generating income among the unemployed

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186 A survey conducted in 1935-36 shows that workers from the organised sector spent only a minor part (less than a quarter) of their budget on cereals and pulses. See Report on an Enquiry into the Family Budgets of Industrial Workers in Madras City, Madras, 1938, pp. 20-25. The differences in nutrition and the improvements in the countryside (with the introduction of coffee and rice in the diet) are described in P.J. Thomas and K.C. Rama-krishnan, eds, Some South Indian Villages: A Resurvey, Madras, 1940, p. 403-5. For various contemporary opinions on the impact of migration from villages, see Gilbert Slater, ed., Some South Indian Villages, Madras, 1918; Thomas and Ramakrishnan, Some South Indian Villages; Etienne Denmery, Foules d'Asie: surpopulation japonaise, expansion chinoise, émigration indienne, Paris, 1930, pp. 200-227. See also Guilmeto, 'Le cycle migratoire tamoul'.

187 See for instance Baker, An Indian Rural Economy, pp. 152-53, 174-75, 180-81. It is worth noting that Thanjavur where emigration soon brought about labour shortages was in the forefront of the agricultural labour movement.
probably helped to mitigate the effects of crisis conjunctures and therefore reduce mortality fluctuations. This conclusion is of course at variance with the bleak picture derived from Blyn’s output data. More evidence is still needed to show how food imports and other mechanisms in Tamil Nadu could make up for the apparent stagnation observed during the last decades of the British rule. Or in a broader perspective, how to reconcile the probable rise of real wages in Tamil Nadu with the growing food deficit?  

As long as these discrepancies in the behavior of economic indices remain, it will be difficult to assess the demographic consequences of the deep transformations which occurred during the inter-war period. But obviously, it would be dangerous to dismiss the role of a real economic improvement spread over a large part of the population in skipping the inception of mortality decline in Tamil Nadu.

**APPENDIX**

Population figures used in this paper correspond to the present-day boundaries of the state of Tamil Nadu (formed in 1956). For the first decennial censuses (1871–1911) these data have been obtained through back projection as district populations were difficult to evaluate from census figures owing to numerous administrative boundary changes; we first estimated the inter-censal growth rates at a district level (using taluk growth rates) and then the population figures for previous censuses through back projection. The growth rate for Kanyakumari district for the 1871–81 period had to be estimated differently as no census was taken in Travancore before 1875. Age data were derived from district figures after appropriate weighting.  

Intercensal migration balances were obtained through two different indirect techniques as original data were deficient. The growth rate of the Tamil-speaking population at an all-India level (i.e., including Burma up to 1931) was used as a first proxy for Tamil Nadu’s natural increase after demographic transition in south India / 289  

difficult task as age misreporting has always been acute in Tamil Nadu. Without reliable distribution of deaths by age from the civil registration sources, age distribution and growth rates were the only inputs. Whereas crude age data were kept as published in the census volumes, intercensal growth rates had to be corrected for census under-enumeration (in 1941 and 1961). Direct use of ready-made techniques often provided unlikely results; as a matter of fact, robust techniques such as the Demeny-Shorter method or the Preston-Bennett method did not yield reliable estimates. Life expectancies were computed with the help of the method of stable population. Death rates were then derived by using standard mortality tables and a method recently developed by Coale.  

No reliable estimate could be obtained for infant and child mortality rates as the necessary data were missing.  

Civil registration which was introduced in the late 1860s and made compulsory in most parts of the Madras Presidency was never in a position to provide reliable data.  

At its highest the level of completeness of the system reached 85 per cent in the 1930s. As this paper has indicated, the level of under-registration was sizeable and variable enough as to preclude most comparisons between different periods or different regions except on a short-term basis.

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108 We are thus very far from the situation of registration data in regions like Berar studied by Dynson.