



WORKING PAPER

Working Paper No. 48
FAMINE, EPIDEMICS AND MORTALITY IN SOUTH INDIA
DURING THE NINETEENTH CENTURY :
The demographic crisis of 1876-1878
A reappraisal
by
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Abstract

I propose to study, from the demographic point of view, the consequences of the famine of 1876-1878 in South India (Madras Presidency and Mysore State). My intention here will be a limited one, trying to answer the question: what was a demographic crisis under the ancient demographic pattern of colonial southern India? For this, I shall lean on the methodological experience of the works of the French historians of the XVII and XVIII centuries, particularly those pioneers works of Jean Meuvret and Pierre Goubert. According to them, the demographic crisis shall be defined bringing to the fore the three fundamental traits that characterise it: a marked rise in the prices of staple food-stuff, a peak of mortality and, at the same period, a fall in the conceptions. The second question I would like to raise is: how does the demographic régime work after the crisis to get the population recovered? To put it briefly, I am trying to give an historical element of answer to the question which was posed by Morris David Morris one time: What is a famine? To understand this question in an historical perspective will enable us to understand the shift, in the long run, from one type of crisis (let us say acute crisis) to another type (latent crisis), in the light of the process of the demographic transition in southern India.

The crisis of 1876-78 can be qualified as an acute crisis, where the peaks of mortality and prices coincide with a decline in the conceptions. Whatever how we understand the relationship between famine mortality and epidemic mortality it is almost indisputable that in the background stands the agrarian crisis. Generally, when the crisis is only an epidemic crisis, we don't observe any important increase of the prices of staple food-stuff.

(ii)

The problem of the conceptions is more delicate: in most of the case, acute famine goes with the fall of the conceptions, which is not the case for an epidemic-except during the influenza epidemic of 1918. We can contrast an acute crisis with a latent crisis where there is no relation-or a smooth one-between prices and mortality movements.

The crises are defined here by there structures, i.e. the system of relations between prices, mortality and fertility, and not by any qualitative judgement about mass starvation or hunger. Those judgements say something about the intensity of the crises but nothing about their structures.

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Till now a majority of the demographic studies have, for reasons very much understandable, placed the accent on the evolution of fecundity and the spreading of family planning, that is to say, on the problems of contemporary India. Some important works have retraced the evolution of certain demographic indicators since the beginning of the 20th century, like for example, infantile mortality, age at marriage or migrations, but few studies focus on the demographic system of India in the XIX century and on the major crises which had an influence on them. Generally, the interest for historical demography, its methods and its problems, is very recent in India, whereas this discipline is well-established in European countries.^{1/}

In this article, it is proposed to study the demographic consequences of the famine 1876-1878 in South India (Madras Presidency and Mysore State). For this, we shall lean on the methodological experience of the works of the French historians of the XVII and XVIII centuries, and particularly, those of JEAN MEUVRET and PIERRE GOUBERT^{2/}. The demographic crisis shall be defined bringing to the fore the three fundamental traits that characterise it: a marked rise in the prices of staple foodstuff, a peak of mortality and, at the same period, a fall in the conceptions. This analysis shall be extended by studying the mode of development and the type of epidemics which spread during the crisis. Lastly, we shall ponder over the consequences of the crisis on the demographic system and on the recuperative mechanism which ensures the revival of the fecundity after the famine. Essentially, our intention is demographic. By proposing a new approach to the Indian demographic crises of the past, we would like to bring in an historic element of answer to the question which was posed in another context, by M. David Morris : What is a Famine?^{3/}

The subsistence crisis which develops in South India in 1876-78 has its origin in a series of climatic accidents that occur during the mid-1870s. The drought which culminates in intensity in 1876 follows the torrential rains of October and November 1874, but it represents the culminating point of a crisis that holds sway with an intensity and with variable modes in time and in space from 1875 to 1877. In 1876, the pluviometric deficit goes up to nearly 70 per cent as compared to the normal rainfall in the interior dry zones like the districts of Kurnool (average rainfall 1873-1882: 26.6 inches), Cuddapah (27.6 inches) or Chitaldrug (24.8 inches). But in these regions, where the rains that are useful from the agricultural point of view are concentrated during some months of the year (from June to September for the interior regions dependant on the south-west monsoon, from October to December for the districts all along the coromandal coast which receive the return of the north-east monsoon), the seasonal distribution of the precipitations is more important than their annual quantity. Thus, in 1876, the S.W. monsoon shows a deficit of 50 per cent to more than 60 per cent in the districts cited previously, whereas the N.E monsoon is weak by 30 per cent to 40 per cent in the districts of Tanjore (average 1873-82: 40.5 inches) and Madurai (30 inches), but by 70 per cent to 80 per cent in the region of Madras (45.7 inches). Hence the drought that rages owes its intensity at once to the relative differences in the annual and average seasonal rainfall as to the prolonged character of this deficit over many years. Situated in a dry region which hardly receives more than 25 to 30 inches of rain, the plain of Mysore and its extensions form this zone of insecurity where the dry cultivations, still possible and often tried, are very uncertain. And if the monsoon rains are late or less abundant, the agricultural production gets compromising, the prices shoot up and the crisis gets established.^{4/}

THE CRISIS WITH REGARD TO PERIOD

Mortality and Staple food-stuff price

The study of the chronology of the crisis is based on the experimentation of the data of the registra^{tion}/office which, in spite of the completeness rate of less than 50 per cent, are found to be coherent.^{5/} The tables 1 and 2 represent the annual evolution of deaths and births; if the birth figures are shifted by 12 months, one gets the overall movement of conceptions. The chronology of the crisis is different as per the region considered.

The deaths in the Madras presidency which are close to the average between 1871 and 1874 increase by 25 per cent to 30 per cent between 1875 and 1876; they are multiplied by 3 in 1877 and record a further increase of 60 per cent in 1878 before coming down considerably in the subsequent years. But the mortality crisis that extends over three years for the whole of the Madras presidency lasts only for one year, 1877, in the state of Mysore, the heart of the famine. Only that the crisis, though more brief, is more virulent: the deaths go up from the index 85 to 381 and come down equally fast to index 115, except for the slight rise in the deaths in 1879 and 1880. In the two regions, the conceptions decrease in a characteristic manner during the crisis and reach the indices 55 and 24 respectively in 1877. However the fall in the conceptions overflow from this year and affects largely the period 1876-78. After the crisis, the revival of fecundity seems to be much more marked for Mysore than for Madras (with indices 188 and 124 in 1881 respectively).

The food-stuff that is retained by us is the elousine coracana which is the staple cereal in the dry zones and the price sensitivity of which is perfectly reflected in the economic climate. On the whole, the concordance is good

between the evolution of mortality and that of the price, between the demographic crisis and the subsistence crisis. For the entire Madras presidency, the prices increase by 45 per cent in 1876, they are multiplied by 3, like for the deaths, in 1877, and by a little above 2 in 1878. The rise is still 62 per cent and the eleusine finds back its pre-crisis level only after 1880^{6/}. However, already a difference is perceived in the flexibility of evolution of the two phenomena: the prices come back more slowly than the mortality to their levels that existed before the crisis. The monthly movements confirm these similarities and differences (Tables 3 and 4 and graph 1).

-- In November and December 1876, the prices of eleusine are multiplied by 2.2 and 3 (increase of 120 per cent and 200 per cent) immediately followed by the first peak of mortality, the deaths increasing by nearly 90 per cent with regard to January 1876.

-- Till the month of April, the prices and deaths decrease, then go up and culminate together in August 1877: the eleusine is multiplied by 3.6 (increase of 260 per cent) and the deaths by 3.2 (increase of 220 per cent).

-- From the month of September, the prices diminish regularly till in January 1878; during the same time, the mortality also goes down but with a secondary peak during the months of November and December.

-- In 1878, the first six months of the year are marked by a tendency towards increase of the prices of eleusine which culminates in July (increase of 180 per cent), then slowly brings in a general movement of fall till the end of 1880. In the same time, the fall in the mortality is prolonged till the month of June, then a first peak is found in August (increase of 27 per cent with regard to 1876) and secondarily in December. In 1879, the level of mortality is less than what it was before the crisis.

The complexity of the relationship between the demographic crisis can be stated precisely by comparing the districts where the chronology of the mortality differs considerably. We have retained three of them: the districts of Salem and Kurnool, both being representative of the interior dry zones, and the city of Madras (graph 1).

- Salem District: The deaths increase regularly after December 1876 till their peak in July, August-September 1877, when they are multiplied by more than 7 with regard to the same months in 1876 (increase of 640 per cent); during the same period, the price of eleusine is multiplied by 6. The two crises coincide perfectly in 1877. But in late 1878-early 1879, a 34 per cent increase in mortality is recorded whereas the prices although still high, are clearly in the decline.
- Kurnool District: in December 1876, the maxima of prices and of mortality coincide, the eleusine is multiplied by 3.7 (increase of 270 per cent) and the deaths by 6.3. The second maximum of price is in July (increase by 430 per cent) but it corresponds only to a secondary peak of deaths. It is only in the month of November that the deaths culminate (multiplied by 6.5) whereas the prices are at a low. The same shift is found again with a lesser amplitude in 1878: the prices culminate in June (increase of 160 per cent) and the deaths in September (increase of 108 per cent with regard to 1875).
- Madras City: the shift between the two series is much more considerable in this city than everywhere else. The very sudden rise in December 1876 which multiplies the price of eleusine by 3.8 is reflected by a rise in mortality, but the latter culminates in March 1877 (the deaths are multiplied by more than 4) when the prices have fallen. Inversely whereas the prices go up till the month of August (increase of 280 per cent), the mortality precedes them and culminates in

July (increase of 280 per cent). A seasoned peak of mortality is also recorded in September 1878, whereas the prices decrease regularly. Lastly, the case of the northern districts of the presidency should be mentioned where the mortality does not increase in 1877 and 1878, whereas the price of the eleusine doubles.

Two primary conclusions can be drawn from this comparison. On one hand, the data for the whole of the Presidency mask the diverse regional realities. At this time, the grains' market is not yet standardised. In the districts that are most severely affected by the famine, the prices are frequently multiplied by 4 and by 5 and the deaths by 6 or 7, whereas at the other extremity (GANJAM, VIZAGAPATAM), the prices are hardly doubled and the mortality does not vary. On the other hand, if the time factor of the subsistence crisis is considerably identified in the various regions considered, the coincidence is not always very good with the mortality peaks. On the whole, the two crises coincide rather well during the two primary maxima of late 1876-early 1877 and in July-August 1877. But in the second part of the crisis, the secondary mortality peaks no longer correspond to the evolution of prices the tendency of which is towards a progressive fall till 1880.

Famine Mortality and Epidemic Mortality

If the coincidence is not perfect between the two series, it is because of other causes of mortality than the dearness of grains. Between 1866 and 1886, the population undergoes the assaults of many epidemics. (Table 5)

For example, the cholera is endemic, the attacks in the second half of the XIX century are very violent in 1860-65, 1870 and 1884, and the small-pox rages in 1868, 1873 and 1884. All the epidemics culminate in 1877. However, cholera picks

up in virulence in 1875 but crumbles down from 1878 onwards; the deaths through fevers, the increase of which towards 1870 conveys perhaps more of a better recording than an increased intensity, are still considerable in 1878 and 1879; it is the same in the case of small-pox and, to a lesser degree, of the intestinal diseases. Thus sometimes the epidemics break out before the crisis and often prolong through the years.

The monthly evolution of deaths through major causes from July 1876 to the end 1877 enables the sharpening of the relationships between famine and epidemics.^{7/} The most remarkable fact, as the Table 6 shows it, is the peak of cholera in January 1877 and its progressive decrease till June and July. The deaths due to cholera represent 50 per cent of the total deaths for the months of January. Now, we have just shown that during this period, the first peaks of prices and of mortality coincided. Hence, our conclusions must be qualified: if the high prices cause death, they do not do so all alone but cholera has an equal share in it. What happens of it six months later during the second peak of maxima? In August 1877, cholera does not seem to pick up in intensity. During the first 8 months of the year, it has already caused 306,000 deaths, which leaves about 51,000 additional deaths for the remaining 4 months if we are to accept the similarity between the annual and the monthly data from different sources. But, during the same period, it is the deaths due to small-pox which increase considerably (February-March), and of course the deaths due to fevers in June-July and August, as it is the same probably for intestinal deaths. Thus in August 1877, cholera, small-pox and fevers put together account for 86,866 deaths over a total of 173,933, being exactly 50 per cent. On the basis of these remarks, it can be stated that the peaks of mortality of the years 1878 and 1879 are the epidemic mortalities which grow over a base of famine.

Numerous factors favour the unleashing and propagation of these epidemics: the mal-nutrition and the under-nourishment, bringing about a recourse to a veritable famine feeding based on habitually non-comestible plants. The vagrancy and crowding in the camps, the migrations and afflux towards the cities and, of course, in the case of cholera, the drying up of the traditional sources of water supply and the dirtying of water sources that are still in use.^{8/} All the famines of the XIX century have been accompanied by small-pox epidemics. The isolation was impossible and the vaccination hardly widespread. Although in 1877 the number of vaccinations was doubled in the presidency, the only systematic campaigns were held only in the camps. The malaria would deserve a special attention. Absent in the interior regions during the drought of 1875-76, the malarial fevers flare up again only after the cyclone of May 1877 and particularly after the torrential rains of September and October. The anopheles vector reproduces only in the stagnant waters bathed in sunlight, a typical case of dry zones; the rainfall deficiency, through the drying up which it provokes brings about its momentary disappearances; the first rains which herald the end of the crisis favourise its re-growth. Lastly, it should be noted that the famine is accompanied by a measles epidemic though this cause of death has not been the subject of any particular recording.^{9/}

These data enable the sharpening of the classical theory of subsistence crises since Meuvret. If the epidemic is always second and follows the rise of staple food-stuff price which comes first, taking up the formula of Pierre Goubert, it has to be precisely stated what is the epidemic that is in question. Cholera seems virulent only in the beginning of the crisis, before the relay could be taken up by small-pox, digestive epidemics and then malaria. As it is, all these diseases are common evils of that period which the crisis only helps to intensify. Thus, in the background the hike in the prices of foodstuffs and the rigidity of their fluctuations lead to the high prices of the grains being the determinative cause of mortality.

THE CRISIS WITH REGARD TO PLACE

The decrease of the population

The famine affects essentially the interior countryside (Table 7): the total for the Mysore state goes down between 1871 and 1881, as also for the peripheral districts of the Madras presidency. All the North-eastern districts and the majority of coastal districts, with the exception of Nellore and Madurai, record a population increase between 1871 and 1881. In South India, the extension of the famine is found in surrounding zones, around two distinct foyers: the one with a N.W-S.E alignment is represented by the districts of Chitaldrug, Tumkur and Bangalore and the other, more towards the north, affects the Kurnool district. At the taluk level, negative growth rates of more than -5 per cent are observed between 1871 and 1881.

But the growth rate between the census periods are only the annual mean averages over an interval of 10 years. Now the crisis properly so called, that is to say the period during which the population went down lasted for only one to two years at the maximum. Before and after this period, the population increased at variable rates according to the regions. To precise this point, two population estimations are at our disposal: the one obtained in the Mysore state in the month of January 1878, the other in the Salem district of the Madras presidency in the month of March.^{10/} Between the end of 1871 (the period of the first census) and the beginning of 1878, the population decreases at an average annual rhythm of -5 per cent to -10 per cent in Mysore State and of -3 per cent to -6 per cent in Salem District. For the latter, the distinction between the sexes reveals an average decrease that is higher for men (-4 per cent) than for women (-3.3 per cent). This is a probable consequence of differential migrations in times of crisis, to which we shall come back later.

However, the crisis appears in all its catastrophic dimensions if we take the hypothesis that the population has increased regularly till those months preceding the famine.^{11/} In the absence of complementary informations, we have retained a growth rate of 0.7 per cent for Mysore State and 1.5 per cent for Madras presidency which seems to us to be closer to the reality of the years 1864-1874.^{12/} We have made the population grow during five years (from end of 1871 to end of 1876) and calculated the fall between this date and that of the studies of 1873 cited earlier. In 12 to 18 months, the population goes down at an average annual rhythm of 18 per cent to 20 per cent for Madras presidency and 20 per cent to 42 per cent for Mysore State. In numerous taluks the rates of fall in the growth are close to or above 50 per cent : Hirivur Taluk (-54.4 per cent) and Davangere Taluk (-53.4 per cent) in the district of Chitaldrug, Dodballapur Taluk (-52.9 per cent) in the district of Bangalore and Kunigal Taluk (-49.3 per cent) in the district of Tumkur. It is probable that in the beginning of 1878, a considerable part of the population finds itself uprooted from its native soil. However, one can consider that some compensations operate between taluks and that the calculations made are not altered in a significant manner.

Crisis, overpopulation and migrations

It is around the 1860s that the pair Population-Subsistances constitutes a dominant problem at a time when the changes in the national and international economic circumstances force the British government to a total re-orientation of its policy in India.^{13/} Faced with a recurrence of subsistence crises between 1830 and 1880, the colonial administration is divided into two tendencies: some think that these crises testify to a maximum height attained by the population where nothing could be done to change it, others are convinced that the situation could be improved and that the migrations,

which ought to be encouraged, constitute an efficient escape out-let.^{14/} These two points of view have in common the erroneous opinion that India is overpopulated.

With a view to bring about a factor of answer to these questions, we have studied the correlation between the density of the population in 1871 and the growth rate between 1871 and 1881 for the taluks of the Madras Presidency and Mysore state. There is no correlation between the two variables ($n=233$, $y=0.377$). At the most, a study of the problem at the district level might induce one to reverse the conclusion: the coastal regions with a heavy human concentration are those which record a moderate growth during the crisis; often they are the ones where the water resource developments have enabled an intensification of cultivations, particularly that of rice and have brought about a heavy demographic growth through an immigration movement. A strong density is not synonymous with demographic excess and the relationship between population and subsistences does not arise in an identical manner between the dry regions and the irrigated regions, nor even uniformly between the different dry regions. In fact, the study of this relationship has to be taken up at a regional scale in the light of a twin interrogation: had there been a considerable population increase in the XIX century and if so, what had been the driving force? Had there been, during the same period and increase in the agricultural production? In other words, do the demographic revolution and the economic revolution go together?^{15/}

During periods of acute crisis, the reaction of the administration is to encourage the departures of people from the continent towards other British colonies: Burma, Assam and particularly Ceylon which accounts for more than 80 per cent of the emigrants originating from the south between 1875 and 1885.^{16/} During the second half of the XIX century, each major subsistence crisis is marked by a peak in the

arrival of families of coolies in the plantations of Sri-Lanka. Whereas between 1860 and 1869, 671,837 entrants in the island are recorded, 1,054,572 are counted for the period 1870-79 and only 540,058 between 1880-1889. Between the 1st October 1876 and the 31st July 1877, being approximately the duration of the crisis, the departures towards Ceylon touch 195,693 persons, being the annual equivalent of 234,832 individuals, of whom 23 per cent are women and 10 per cent children, as against the average annual figure over the three previous years of 105,158 persons, with 17 per cent women and 7 per cent children.^{17/} If one adds 20 per cent to those to take into account the departures towards other directions, one arrives approximately at the figure of 300,000 emigrants during the period of crisis, which is an increase of 200 per cent. Still, a certain under-recording which some authors do not hesitate to evaluate at 50 per cent, has to be admitted.

Despite the uncertain and sometime contradictory data, what were the demographic consequences of those migrations on the crisis of 1876-1878? On one hand, these movements are doubly selective according to the sex and the age and according to the region of departure. Between 1870 and 1876, out of a sample of 170,000 persons, all destinations mixed up, it is found that 63 per cent are men, of whom 45.2 per cent are between 20 and 39 years of age and 27.3 per cent between 20 and 29, and 37 per cent are women, of whom 18.3 per cent are between the ages 20 and 29. On the other hand, if lot of emigrants for Burma and Assam are recruited from the northern districts like Ganjam and Vizagapatam, the essential manpower that works in Ceylon is Tamilian coming from some districts, Tinnevely, Ramnad or Salem and from specific village zones. But the impact of these migrations can only be measured in terms of the outstanding balance of migrations. Now, the end of 1870s is marked by a decisive reversal of the demographic structure of migrations towards

Ceylon, linked to the slump in coffee, victim of a parasite and of the competition from Brazil, and its replacement by the tea and later by the hevea (rubber tree plantations) Thus the years of crisis 1876-78 record a massive return of the agricultural workers. In spite of all, the outstanding balance of migrations, which is negative is slightly more than 200,000 persons for these years. From 1879 to 1886, during full demographic recovery, the returns from are more than the departures towards Ceylon; the balance of migrations is positive but it would not exceed few tens of thousands of individuals. The tendency gets inverse only in 1881 when the migrations towards the island pick up again their tendency to increase. Thus, it is seen that over a short period and under twin economic circumstances of crisis in Ceylon and in India, the migrations do not necessarily arrest the movement of the population. As it is, if the consequences of these migrations have been fundamental for the Ceylonese society, their overall impact on the demography of South India remains marginal. Only a monographic study would enable us to measure the long term effects of it.

The interior migrations which grow up with the famine have deeply upset, at least throughout the duration of the crisis, the demographic structures of urban and rural circles. Evaluated data is hardly available to appreciate these movements in their totality. In the 1881 census, that is two years after the end of the crisis, these migrations do not seem to have left any trace: 95 per cent to 98 per cent of the population of whom a census was made reside in their districts of birth. But, during the crisis the testimonies are numerous that describe the afflux, towards the cities, of hungry peasants, fleeing their villoges and abandoning their wives and children, in search of a job or some aid of the colonial authorities.^{18/} These movements are noted right from the end of 1876. They affect all the major places of the districts and the capital of the province of

Madras. In December, 19,000 persons are fed in this city. And in an effort to arrest the afflux of the migrants, control posts are opened in the neighbouring district of Chingleput with a view to fix the population in the labour or aid camps. At Bellary, the relaxation provoked on the urban market by a supply of grains attracts the peasants from the surrounding countryside to the city, and it is in vain that the colonial authorities try to get the far-away markets supplied by the local peasants; and the mortality of the livestock had disorganised the traditional means of transport. In the month of January 1877, 30,000 to 40,000 poor people from the districts of Chingleput, North Arcot, Nellore and Cuddapah are put in 4 camps in Madras and 25,000 of them were picked up from the streets by the Police. During the months of July and August, the population crosses the Tungabhadra from the State of Mysore and the provinces of the Nizam of Hyderabad and goes in search of aid towards Adoni and Kurnool, one of the most severely affected regions. The cholera epidemic which rages is rapidly spread by this migrant population which often dies before reaching the city. "The roads appeared like a battle field," writes a witness "the roadsides were strawn with the dead and the dying. Those who arrived half-naked to the camps^{had} to be clothed. And it became more and more difficult to find valid cattle to ensure the transport of aid".^{19/}

Other witnesses note that these migrations do not affect all the social groups in an identical manner. Crossing a North Arcot town, a journalist is struck by the desert-like character of this centre. Only those who were well-off, it seems, had stayed back, the Brahmin families who appeared to be well-to-do and whose wives and children were lavishly dressed. These evocations do not fail to recall what Pierre Chaunu writes about the big European agrarian crises of the XVII century: "one of the major dangers of the bad harvest, the unleashing of big migrations of the poor towards the point of aid, 20 to 30 per 100 of the marginals really hungry, 10 per 100 hungry

on the way in search of food, all the prophylactic barriers toppled, it is death on the march. It is not hunger that kills but a sudden growth in the traffic, a multiplication of virulence".^{20/} The city of Madras is a good illustration of it. It characterises itself at once by a strong mortality and a strong birth-rate^{21/}, for the population that is most affected by the crisis is not so much the urban population as the migrants who flow in there. And, the independence that we noted between the curve of deaths and the curve of the prices of clousine clearly shows that it is a question of mortality due to epidemics, which confirms the higher level of birth-rate.

THE CONSEQUENCES OF THE CRISIS

The sex-wise and age-wise impact of the structures

The Table-8 indicates the structures per quinquennial age groups for the whole of the Madras Presidency in 1881 according to the intensity of the famine. The regions the most hardly struck by the crisis are characterised by a pronounced withdrawal of the base (0-4 years) and a lesser significance of the group of 50 years or more. This decrease in the proportions of the extreme age groups, consequence of the famine which preferentially attacks the young and the old, brings about a relative boosting of the adult population. Thus, in the zones less attacked by the famine, the children of less than 10 years of age represents nearly 28 per cent of the population, the active population of between 10 to 49 years about 60 per cent and those above 50 years form 12 per cent; in the famine zones, these proportions are respectively 24 per cent, 65 per cent and 11 per cent.

The conjunction of a brutal hike in infantile and juvenile mortality in 1877 and of a fall in the birth rate in 1878 explains the collapse in the number of young children between 0 and 5 years of age. Whereas in 1871 this number represented 18.3 per cent of the total population of the Madras Presidency and 17 per cent for the State of Mysore, the respective proportions in 1881 are 12.7 per cent and 9.5 per cent. The difference is still bigger for the districts that are in the heart of the crisis: Chitaldrug 18.3 per cent in 1871 and only 8 per cent in 1881 (-10.3 per cent), Tumkur 17 per cent and 7.4 per cent (-9.6 per cent), Kurnool 16.3 per cent and 6.6 per cent (-9.7 per cent), Bellary 16.3 per cent and 7.9 per cent (-8.4 per cent).

But one can further precise the impact of the famine on the first age groups. The census which took place in 1878 in Salem district distinguishes, for each sex, the population of less than 10 years of age and that for above 10 years. Totally, the decrease of those above 10 years is always stronger for the male sex than for the female sex; between 1871 and 1878, the number of adult population went down by 19.3 per cent against only 13.3 per cent for the female sex; the decrease frequently goes up to 20 per cent and is equal to or above 25 per cent for taluks; it touches nearly 29 per cent for the men in Thiruchengode Taluk. The differential migrations according to the sex takes into account to some extent the adult masculine over-mortality during the crisis. Inversely, in the infantile and juvenile (less than 10 years of age) population the decrease is more marked for the feminine sex but the differences are much closer: the decrease is of 29.6 per cent for the girls and 28.2 per cent for the boys. The decrease in the numbers is frequently more than 30 per cent: it is 38 per cent for the girls of Thiruchengode Taluk and more than 44 per cent for the masculine sex of Hosur taluk (Salem District). However, to

enable comparison, the differences between the two big age-groups have to be brought to an amplitude of equal class. Calculated on a decennial basis, the decrease in the adult population is of the order of only 1 per cent to 2 per cent, being about 10 times less than the juvenile population.

So brutal an evolution is found strongly on the pyramids of these districts. The graph 2 illustrates for the populations of Kurnool and Salem this alternation between the full age-groups in 1867-71, 1881-85 and 1886-91 and the depleted age-groups in 1876-80 which are blurred in the data of a whole presidency or a state. This alternation rises the problem of variations of the demographic system in a crisis circumstance.

Crisis and demographic system

As the age-wise structures in 1871 reflect it, as much for the Madras Presidency as for the Mysore State, the famine touches a population which has known at least one decade of demographic expansion, in spite of the cholera epidemics of 1860s. The motivating factor of this growth remains to be determined. It is possible that results from the full age-groups consecutive to a previous crisis coming to the reproductive age, thus illustrating the cyclic fluctuations of the old demographic system. However, the fact that this expansion should be general to South India leads us to predict other explanatory factors. In the years preceding the first census, a growth rate of 1 per cent and more seems to us to be quite probable, corresponding to a birth-rate to the order of 45 to 50 per 1000 and a mortality rate of about 35 to 40 per 1000.^{22/}

One can have a first estimation of the intensity of the crisis by relating the deaths recorded in the civil registration in 1877 to the births of 1878, that-is-to-say in general, to the conceptions of 1877. (Table 9)

That year, all the districts of the Madras Presidency are characterised by a deaths-conceptions ratio which is more than one. In other words, even in the districts that are less touched by the crisis (Ganjam, Godavari), the famine had been sufficiently considerable to limit any natural excess in 1877. Besides, the extreme deviations are very considerable, from 1 to 30. Three major zones stand out: the districts where the crisis is intense and the birth-death deficit is maximum (index more than 10); the districts hardly touched by the crisis, where the deaths do not exceed twice the births; lastly the districts in an intermediary situation, the index varying from 2 to 10.

The ratio children/women in the population is a summary indicator of the level of fertility but it has the advantage of being calculated regularly at each census (Table 10). The high level of fertility in the years prior to the crisis is confirmed by the high values of these ratios in 1871: they are to the order of 0.721 for Madras Presidency and 0.681 for Mysore State. These ratios reveal a zone of strong fertility which is in fact the hinterland of Madras (Chingleput, 0.842, South Arcot, 0.841), contrasting with the very feeble level of the capital (0.437). At the end of the XIX century, the population growth of the city of Madras results from a movement of immigrants from the surrounding countryside of a strong fertility.

Whereas in 1871 the ratios are contained between 0.60 and 0.85, in 1881 they spread out between 0.30 and 0.66 only. The fall is 30 per cent for the whole of Madras Presidency but it touches nearly 50 per cent for the Mysore State. In the coastal and northeastern districts the fall is hardly considerable from 5 per cent to 10 per cent, and it is practically nil for the city of Madras. Inversely, the ratios crumble down in the interior dry zones: for the districts of Kurnool, Tumkur and Chitaldrug, the fall touches

about 60 per cent. In any case, the variation of the number of women in the reproductive age has an influence, among other things, on the number of births.^{23/} If one compares the number of women from 15 to 49 years of age in 1871 and 1881 one finds an average decrease of 12 per cent for the Mysore State but nearly 18 per cent for five districts of Madras Presidency (Kurnool, Cuddapah, Bellary, Anantapur, Salem), of which it is more than 24 per cent for the Kurnool district alone (Table 11). But fertility rate being constant the decrease in births is of the same order of importance as the decrease of the number of women, all things being moreover equal. The fall of children/women ratio is essentially due to the decrease of children below 5 years of age. Many reasons explain the fall in the birth-rate during the crisis.

- Demographic reasons: the number of women exposed to the risk of conceiving varies under the effect of the mortality and the disturbances in the nuptiality rate.

- Medical and sanitary reasons: the general state of under nutrition brings about a loss in the weight of individuals from 20 per cent to 30 per cent. Thus the tests carried out in the camps reveal that the men who weighed on an average 50 to 54 kg. did not weigh more than 35 kg. whereas the weights of women which on ordinary days was 43 to 45 kg. fell to 28 kg.^{24/} According to the authors of "The Biology of Human Starvation", human beings can tolerate loss of weight to the tune of 5 per cent to 10 per cent with relatively little functional disorganisation. At the other extreme, they cannot survive losses above 35 to 45 per cent of their weight.^{25/} However before bringing alone the death, the loss of weight explains perhaps the stoppage of the ovular cycles for women. According to the works of Doctor Frish, mentioned by Jaques Dupâquier, a loss of 15 per cent of the fatty tissues could account for amenorrhea of famine^{26/}, well hinted at by W.Gornish in 1876-78, and for the fall in fertility during a subsistence crisis.

- Lastly, the social reasons: the majority of the couples find themselves separated particularly under the effect of the migrations, of the promiscuity which is prevalent in the aid camps, etc...

The post-crisis recuperation: is there a self-regulatory population mechanism?

Since 1879, the fall of mortality and the rise in birth-rate bear witness, on the whole, to the revival of demographic growth. In any case, it is in the early years of 1880 that the process of recuperation attains all its vigour.

If one compares the growth rates for the decades 1871-80 and 1881-90, for the taluks of Mysore State and the districts of Madras Presidency, the correlation is very strong between the two series ($n=87$, $r=-0.727$). The more the decrease had been between 1871 the higher had been the growth rate during 1881-1891. During this last decade, the population increased on an average from 1 per cent to 2 per cent per year and sometimes more, like 2.5 per cent for the Tumkur district and 3 per cent for the Chitaldrug district. In all the cases, it is a question of a natural growth after 1881, the migratory phenomena being able to be neglected at this scale.

The hike in the children/women ratio brings to light the revival in the fertility of the years 1886-90. If the values of ratios in 1881 and 1891 are compared, an average increase of 20 per cent can be noted for the whole of Madras Presidency and more than 58 per cent for Mysore State; but the ratios are multiplied by 2 or more for Bellary and Kurnool districts (increase by 100 per cent or more). In 1891, and in 1871, the regional variations of fertility are identical. However, despite this demographic revival, the children/women ratios keep up values that are about 20 per cent less than

those of 1871. All these happen as if the demographic system of South India did not find again, after the famine of 1876-78, the high level that characterised it before the fertility in the 1880s. But how can we account of the recovery of the fertility after the crisis?

Now one knows, thanks to the works of the historian Jacques Dupâquier, of the cogs in regenerator mechanism after a demographic crisis in the French society of Ancien Regime^{27/}. Let us resume it briefly. In the XVII century, the fertility is far from attaining the physiological maxima of a demographic system called natural. The mortality is high, close to that observed for the Madras city in 1888-91; the nuptiality was late, from 25 to 27 years for women and men, and the proportion of the permanently unmarried was non-negligible, from 7 to 10 per cent. Under these conditions, the number of baptisms related to that of the marriages hardly exceeded 4 or 5. And, on the whole, the French population had to be close to the stationary state. Such a fragile system ought to have brought about, under the effect of demographic crises, enormous fluctuation in the numbers. Now as J. Dupâquier has shown in the case of the Parisian Basin, the level and distribution of population have remained almost stable till in 1740. Hence, it has to be supposed that fertility and mortality are not independent parameters. On the contrary, any variation of one of the two provokes, through reaction on the other, a return to the stable state. Thus the big crises are followed by a lowering of the age at marriage and by an increase in conceptions which more or less rapidly compensate the effects of the past mortality. What were these figures in South India in the second half of the XIX century?

In 1881 and 1891, the average age on first marriage is about 24 years for the men in Madras Presidency and 15 years for the women. The difference between the spouses is 9 years

and definite celibacy non-existent. It is probable that in 1877, the nuptiality calendar has been upset by the famine, but the delay ought to have been rapidly made up for because, by the end of the XIX century, the behaviours are characterised by a very big stability for the two sexes. Though the age at marriage before the crisis of 1876-78 may not be possibly calculated, it can be affirmed with certainty that it has not changed during this period. One conclusion becomes hence necessary: it is not the variations of the marriage rate which provide the key to the recuperative mechanism after a crisis. The difference between India and France of the Ancien Régime is due, it seems to us, to the relationship between the family structures and economic structures. It is known that in Old France, "no marriage was possible without an establishment (on some land)---- Thus in the entire rural France there was a coincidence between land exploitation and family"^{29/}. No land to be exploited, no marriage: there were balanced population and subsistences.

If one makes the hypothesis that in the XIX century, in India, the widespread model of family is not the nuclear family, but the complex households (joint family and extended families), the marriage does not correspond to the establishment of a couple on a land which is owned by the couple, but its integration into the body of an economic and social unit which exists already. And, if the demographic regime had to function with a nuptiality model at once intensive and precocious, it was necessary for the village society to have the economic capacities to integrate the new couple in its fold. Were the migratory flux between the high fertility hinter land and the low fertility city of Madras enough to absorb the demographic excess of the countryside? Is this scheme valid for the whole of the urban milieu in the XIX century? If not, how is it that there is a relationship between population and subsistences? In fact, one wonders whether there had not been a self-regulating mechanism of population in South India

during this period. To talk of self-regulation presupposes a context of demographic stability, the existence of a ceiling imposed by the state of development of economic and social forces. Now generally, the XIX century is a period of demographic growth even though this growth was unequal in time and in space. In this context, there cannot be any "Self-regulated system", but rather some differential strategies of adaptation, at once regional and partial, to the economic structures on the part of the village population.

CONCLUSION

Let us resume briefly the characteristics of this crisis. Between 1875 and 1877 a drought which is expressed by an average annual rainfall deficit of 50 per cent to 60 per cent brings about an increase in the prices of staple foodstuff which get easily doubled and trebled, and often increase by four times and five times. During the same time, a brutal soaring up of deaths, at least multiplied by 5 to 10 over a period of few months and, in the annual span, a fall in conceptions to the tune of 50 per cent and often more. These then are the characteristic traits of an ancient type of agrarian crisis, associating the economic and the epidemiological aspects, the one which brings about those "hunger deaths or the deaths due to hunger diseases to deaths due to diseases triggered off on the routes travelled by the sowers of hunger death"^{30/}.

Many questions remain in suspense thus showing the limits of the model of the Ancien Regime crisis. In South India, the variations of the nuptiality in times of crisis do not seem to be fundamental and they are not at the heart of the recuperative mechanism. One finds oneself not only in a model of marriage at puberty, say pre-puberty, but also in a context of population growth. What was the motive force of this growth? What is the role of the colonial factor? Are the crises of the XX century yet acute crises of latent crises? Some regional researches ought to enable to throw some light on the demography of India at this period.

NOTES

- 1/ On the development of historical demographic in Europe, see Dupâquier, *Histoire et Demography, Population*, Special Number, September 1977, pp. 299-322; D.V.Glass and D.E.C.Eversley, *Population in History*, essays in historical demography, London, Edward Arnold, 1965; For India, see in particular Dharma Kumar, *New Prospects for historical demography in India*, in *Population Statistics in India*, ed. by A.Rose, D.B.Gupta and G.Raychaudhuri, Vikas Publishing House 1977, pp.379-382. But there is a new wind, it seems, see Paul R. Greenough, *Prosperity and Misery in Modern Bengal, The Famine of 1943-1944*, New York, Oxford University Press, 1982, 342p.; Michelle Burge McAlpin, *Subject to famine, Food crises and Economic change in Western India 1860-1920*, Princeton, Princeton University Press, 1983, 288p.; for a general view, see *The Cambridge Economic History of India*, Cambridge, Cambridge University Press, vol. 11: c.1757- to c.1970, 1983, 1073p.
- 2/ Jean Meuvret, *Les crises de subsistance et la demographie de la France d'Ancien Regime*, in *Etudes d'histoire economique, Cahiers des Annales*, Paris, A. Colin (E.P.H.E.), 1971, p.271-278; Pierre Goubert, *Beauvais et le beauvaisie de 1600 a 1730, Contribution a l'histoire sociale de la France au XVII siecle*, Paris, S.E.V.P.E.N., 1960; see also the articles of these two authors in *Population and history*, op.cit.
- 3/ Morris David Morris, *What is a Famine?* *Economic and Political Weekly*, 1974, vol.IX (44).
- 4/ This drought apparently is the most intense that South India had known between 1870 and 1950. However, by placing the accent on the meteorological accident, we do not intend to reduce "the general situation to the agrarian situation and to that of climate", as Pierre Vilar writes; in colonial India, not any more than in Ancient Europe, the meteorological accident does not take into account the crisis but it is very much the factor that unleashes it, Pierre Vilar, *Reflections sur la "crise de l'ancien type", "inegalite des recoltes" et "sous-developpement"*, in *Conjoncture Economique Structures Sociales, Hommage a Ernest Labrousse*, Paris, Mouton, 1974, 1974, p.37-58.
- 5/ Between 1871 and 1880, the masculin/ ratios of birth are between 105 and 107 and those of the deaths are around 110. The coherence is all the more striking as in periods of crisis the functioning of the civil registration is defective. As W.C.Cornish, Sanitary Commissioner of the Madras Presidency, wrote: "The truth is, the famine has

disorganised our village establishments to such an extent that the actual numbers who have already perished will never be known. Hundreds and thousands of people have died away from their homes, have fallen down by the roadsides, and their bodies have been left to be eaten by dogs and jackals", quoted by William Digby, *The Famine Campaign in Southern India 1876-78*, London, Longmans, Green & Co., 1878, vol.1. p.83.

- 6/ In 1877, the price of rice is multiplied by 1.9 and that of sorghum by 2.7; in 1878, they are respectively multiplied by 1.9 and 2.2; they get back to their pre-crisis level only in 1880.
- 7/ The difficulties of the historians and demographers are well known in distinguishing between famine mortality and epidemic mortality, in the absence of causes of death, in the France of XVII and XVIII centuries. But the data enabling this distinction do exist, as in our case, that one can question oneself about the nosography used and about the sureness of the diagnoses. Thus fevers and intestinal disorders are some hardly precise diagnostic symbols of various diseases and can mean, among others, malaria, typhus, dysentery or small-pox; see for example, Jean Meuvret, *Demographic crisis in France from the sixteenth to the eighteenth century in Population in History*; op.cit., pp.507-522.
- 8/ William Digby, *The Famine Campaign in Southern India*, op.cit.vol.I.
- 9/ W.R.Cornish, *The sanitary and medical aspects of the famine of 1876-77*, Madras Government Press, 1878; A.Porter, *The diseases of the Madras famine of 1877-78*, Madras Government Press, 1889; on the problems of malaria, see Eric Meyer, *Depression et malaria a Sri Lanka 1925-39, L'impact de la crise economique des annees 1930 sur une societe rurale dependante*, Thesis, Paris, 1980, 2 vol.
- 10/ The investigation in the State of Mysore is similar to a sampling: it relates to 73% of the total strength that were subjected to a census in 1871 and the population is calculated by NOBLI. For the district of Salem, it relates to a complete census of the present population. In January 1878, the crisis can be considered to be over for Mysore, which is not exactly the case in the month of March in Madras Presidency. The respective sources are C.A.Elliot: *The History of the Mysore Famine of 1876-78*, Calcutta, Office of the Superintendant of the Government Printing, 1878, and W.R.Cornish, *The influence of famine on the growth of population*, Madras, no date.

- 11/ This hypothesis is confirmed by the age-wise structures in 1871 and by the contemporary evidences, see in particular Srinivasa Raghavaiyangar, Memorandum on the progress of the Madras Presidency during the last forty years of British Administration, Madras, 1893.
- 12/ The rate of 0.7% is the one retained for South India by the Indian demographers, A.Das Gupta, S.S.Gupta, M.Ghose and A.K.Dutta, Estimates on the 19th century population in India, Bulletin of the Socio-Economic Research Institute, Calcutta, NO.1, 1969, pp.22-32. Towards 1870, the demographic dynamism of the Madras Presidency could be the recorded consequence of a strong birth rate consequent to a prior crisis, the Guntur famine of 1833, for example.
- 13/ This problem could not have imposed itself as a dominant one, and hence legitimate, with so much of force if it had not met with the statistical objectivisation of the census reports which the statisticians have produced from 1860s onwards. It is because of the fact that the phenomenon could be objectivised, that is to say designated in categories and statistical tables that the famine could be constituted as a political problem and as a stake in the political battle between the social groups. On the modifications of the colonial situation, see D.A. Washbrook, The Emergence of Provincial Politics, New Delhi, Vikas Publishing House, 1977.
- 14/ S.Ambirajan, Malthusian Population Theory and Indian Famine Policy in the Nineteenth Century, Population Studies, 30.1.1976, pp.5-14.
- 15/ The elements for an answer can be found in D.A.Washbrook Economic Development and Social Stratification in Rural Madras: The Dry Region 1878-1929 in, The Imperial Impact: Studies in the Economic History of Africa and India, G.Dewey and A.G.Hopkins, ed., London, the Athlone Press, 1978, pp.68-82.
- 16/ For an overall presentation of the migration problem at this period, see Dharma Kumar, Land and Caste in South India, Cambridge, Cambridge University Press, 1965, chp. VIII; for migrations towards Ceylon, See Eric Meyer, Migrations internes et migrations externes a Sri Lanka (Ceylon): une approche historique, L'Ethnographie, 77-78, 1978, pp.185-197.
- 17/ Ferguson, Ceylon Handbook and Directory, 1902.
- 18/ William Digby, The Famine Campagne, op.cit. vol.I.

- 19/ Quoted by William Francis, Bellary, Madras District Gazetteer, 1904, p.121.
- 20/ Pierre Chaunu, L'Europe classique, les Grandes Civilisations, Paris, Arthaud, 1970, p.233.
- 21/ In 1877, the gross mortality rate recorded by the civil registration is 119.4 per 1000 and in 1878 the gross birth rate is 38.4 per 1000.
- 22/ These estimates are deduced through retrospective calculation by applying a mortality-type to the age-wise structures. Here, instead of using an arbitrary population model, we have used the mortality table of the Madras city calculated by M.G.Stuart for the period 1888-91; the life expectancy at birth is around 25 years for the two sexes, the infantile mortality rate is 295 per 1000 for the male sex and 261 per 1000 for the female sex; the table agrees fairly well with the modele Nord de Princeton, niveau 4. H.G.Stuart, A life table for the city of Madras, Census of the Madras Presidency, 1891; for a presentation of this table, see Roland Lardinois, Une Table de mortalite de l'Inde du sud a la fin du XIXe siecle: Madras 1888-1891, Population, 1977, 3, pp.684-693.
- 23/ Massino Livi Bacci, Les Repercussions d'une crise de mortalite sur la fecondite: une verification empirique, Annales de Demographie Historique, Paris, Mouton, 1978, pp. 109-127.
- 24/ W.C.Cornish, The sanitary and medical aspects of the famine of 1876-77, op.cit., A.Porter, The diseases of the Madras Famine of 1877-78, op.cit.
- 25/ A.Keys, J.Brosek, A.Henschel, O.Mickelsen, H.L.Taylor, The Biology of Human Starvation, Minneapolis, the University of Minneapolis Press, 1950, 2 vol.
- 26/ Emmanuel Leroy Ladurie, L'Amenorrhée de guerre et de famine, Annales, Economie, Societe, Civilisation, Paris, Armand Colin, 1969, pp.1589-1601.
- 27/ Jacques Dupâquier, La population française aux XVII^e et XVIII^e siècles, Paris, PUF, 1979, 128 pages; La population rurale du Bassin Parisien a l'époque de l'époque de Louis XIV, Paris et Lille, EHESS, 1979, 440 pages.
- 28/ Jacques Dupâquier, La population française aux XVII^e et XVIII^e siècles, op.cit. p.68.

- 29/ Elements for reflection can be found in the work of Tom G.Kessinger, Vilyatpur 1848-1968, Social and Economic Change in a North Indian Village, University of California Press, Berkeley, Los Angeles and London, 227 pages. The problem remains raised for the regions of India which had known a demographic stagnation in the XVIII-XIX centuries, see for example B.L.Bhadani, Population of Marwar in the Middle of the Seventeenth Century, The Indian Economic and Social History Review, vol. XVI, 1979, no.4, pp.415-426.
- 30/ Pierre Chaunu, La Civilisation de l'Europe classique, op.cit. p.233.

ANNUAL GROWTH RATE OF THE POPULATION BETWEEN 1871 AND 1881
(Districts of the Madras Presidency and Mysore state)

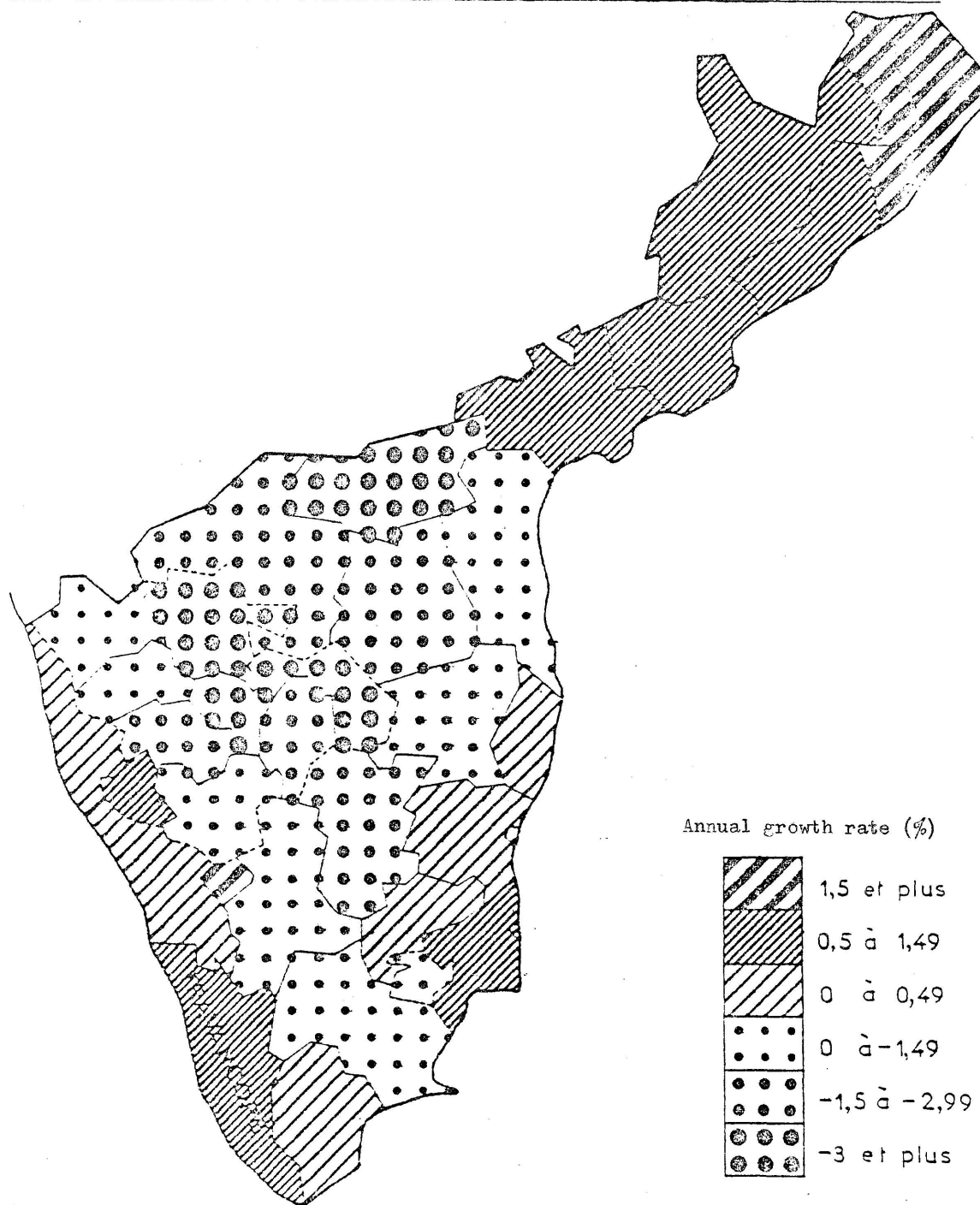


Fig.1. Monthly numbers of deaths and price indices of ragi for same districts of the Madras Presidency(1875-1880)

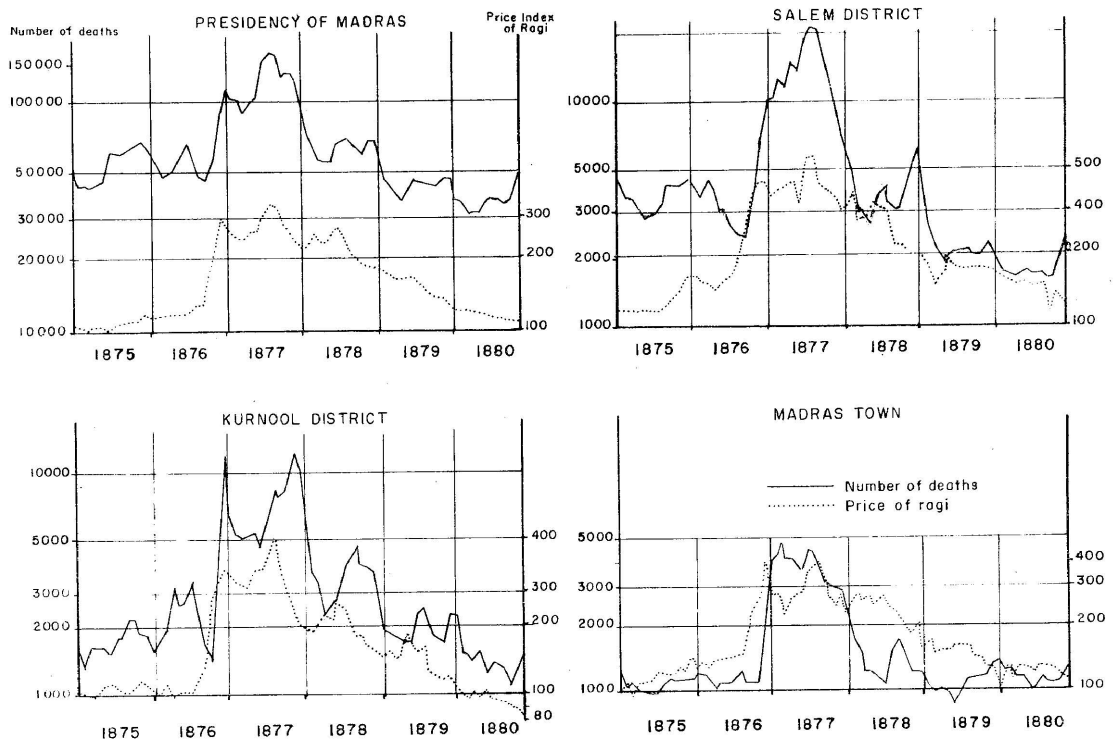


Fig.2. Age distributions of the population for the districts of Kurnool and Salem 1871-1881-1891

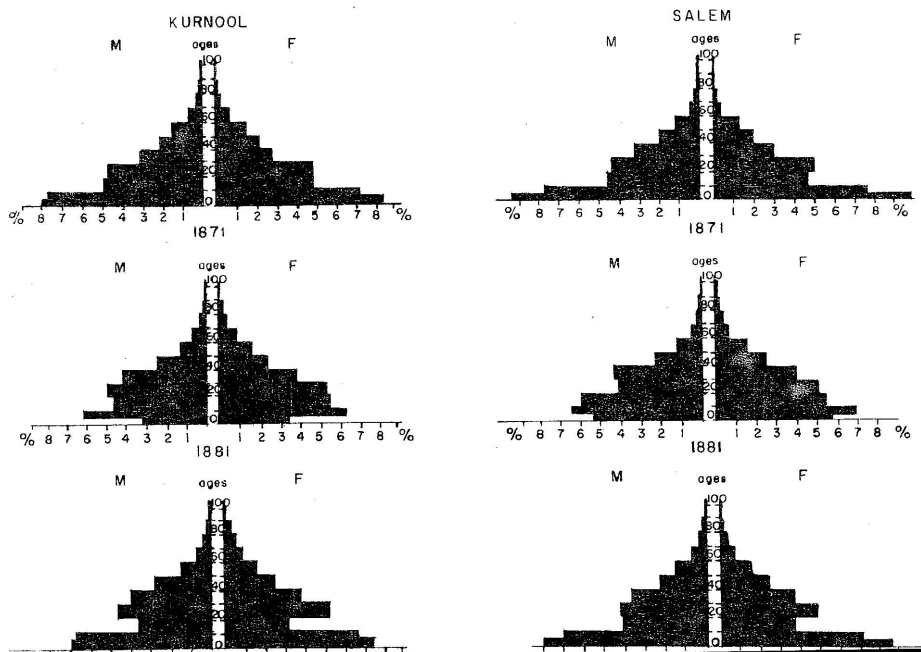


TABLE 1 : REGISTERED DEATHS AND BIRTHS IN THE PRESIDENCY OF
MADRAS (1871-1883)

(Source: Sanitary Reports of the Madras Presidency)

YEARS	DEATHS		BIRTHS	
	Numbers	Index(1)	Numbers	Index(2)
1871	444,371	87	517,109	81
1872	508,182	99	554,379	87
1873	513,232	100	538,123	84
1874	521,329	102	580,709	91
1875	641,260	125	638,771	100
1876	680,384	133	632,113	99
1877	1,556,312	305	477,447	75
1878	810,921	159	348,657	55
1879	549,390	108	477,762	75
1880	454,101	89	659,991	103
1881	465,682	91	731,866	114
1882	470,700	92	751,104	117
1883	541,930	106	791,774	124

(1) Average 1871-75/1879-83 : index 100

(2) Average 1871-76/1880-83 : index 100

TABLE 2 : REGISTERED DEATHS AND BIRTHS IN THE STATE OF MYSORE
(1871-1882)

(Source : Sanitary Reports of the State of Mysore)

YEARS	DEATHS		BIRTHS	
	Numbers	Index(1)	Numbers	Index(2)
1871	58,218	91	33,921	63
1872	57,990	91	45,602	85
1873	53,340	84	42,574	79
1874	51,230	80	38,010	71
1875	51,276	80	34,846	65
1876	54,255	85	34,402	64
1877	2,43,166	381	24,013	45
1878	73,343	115	12,782	24
1879	80,291	126	49,666	92
1880	79,822	125	87,315	163
1881	71,240	112	99,521	185
1882	70,892	111	1,00,784	188

(1) Average 1871-76/1878-82 : index 100

(2) Average 1871-77/1879-82 : index 100

TABLE 3 : MONTHLY NUMBERS OF DEATHS REGISTERED IN THE PRE-
SIDENCY OF MADRAS (1875-1880)

(Source : Sanitary Reports of the Madras Presidency)

MOIS	1875	1876	1877	1878	1879	1880
January	51,353	61,962	116,195	110,243	67,982	46,069
February	41,918	55,432	104,717	73,301	50,976	35,963
March	42,700	47,537	103,652	68,131	44,635	36,086
April	41,782	49,244	89,133	55,785	40,136	32,982
May	42,694	51,696	104,086	54,027	36,604	33,268
June	44,536	56,750	108,517	55,355	38,605	33,345
July	61,468	65,513	150,719	65,985	45,713	37,151
August	60,263	54,994	173,933	70,017	45,655	37,410
September	59,721	47,665	167,994	67,852	44,580	36,853
October	61,221	45,053	141,622	62,590	43,549	36,336
November	64,930	56,511	148,393	59,530	43,631	39,479
December	68,674	88,027	147,351	68,105	47,324	49,159
TOTAL	641,260	680,384	1556,312	810,921	549,390	454,101

TABLE 4 : EVOLUTION OF THE MONTHLY PRICE INDEX OF RAGI FOR
THE PRESIDENCY OF MADRAS FROM 1875 TO 1880 -
AVERAGE 1870-1874 = 100 - (Source : Reports of
the Administration of the Madras Presidency).

MOIS	1875	1876	1877	1878	1879	1880
January	102	112	286	222	182	127
February	102	114	263	238	182	123
March	101	116	256	263	175	120
April	103	116	256	244	167	120
May	103	116	270	244	169	119
June	101	115	278	263	169	115
July	104	120	323	278	169	115
August	105	128	357	250	161	114
September	108	130	345	217	149	111
October	108	156	294	200	143	111
November	109	217	270	196	139	110
December	115	303	250	192	135	103
<u>Annual</u> <u>average</u>	105	145	287	234	162	116

TABLE 5 : ANNUAL NUMBERS OF DEATHS REGISTERED IN THE PRESIDENCY OF MADRAS FROM 1866 TO 1886 BY CAUSES OF DEATH (Source : Sanitary Reports of the Madras Presidency)

YEARS	CHOLERA	SMALLPOX	FEVERS	INTESTINAL DISEASES	TOTAL
1866	200,961	23,106	110,102	-	334,769
1867	33,205	27,907	112,511	-	173,623
1868	8,036	34,330	105,692	-	148,058
1869	21,034	17,448	132,346	-	170,828
1870	55,867	11,252	151,027	-	218,146
1871	17,656	20,823	192,469	38,928	230,948
1872	13,247	39,074	214,148	39,387	305,856
1873	340	51,784	222,843	36,397	311,864
1874	313	48,343	226,220	37,993	312,869
1875	94,546	24,775	252,042	37,484	408,847
1876	148,193	23,469	230,092	38,176	439,930
1877	357,430	88,321	469,241	133,366	1,048,358
1878	47,167	56,360	374,443	48,083	526,053
1879	13,296	17,840	285,477	23,218	339,831
1880	613	14,529	209,940	19,622	244,704
1881	9,446	15,776	203,542	18,961	247,725
1882	23,604	20,159	188,561	19,958	252,282
1883	36,234	37,975	203,786	22,098	300,143
1884	75,476	61,247	215,977	28,775	381,475
1885	58,109	34,726	218,786	31,209	342,830
1886	12,417	17,129	221,679	27,379	278,604

TABLE 6 : ANNUAL NUMBERS OF DEATHS FROM CHOLERA, SMALLPOX
AND FEVERS FOR THE PRESIDENCY OF MADRAS FROM
JULY 1876 to DECEMBER 1877(Source : Famine
Mortality Report)

Months	Cholera	Smallpox	Fevers	Total
July 1876	18,641	1,398	19,778	39,817
August	10,363	1,244	18,687	30,294
September	5,265	1,192	17,959	24,416
October	3,280	1,150	18,216	22,646
November	7,894	1,551	22,671	32,116
December	31,183	2,818	24,950	58,951
January 1877	58,737	4,946	21,412	85,095
February	51,095	6,829	18,565	76,489
March	43,511	9,657	21,716	74,884
April	30,797	8,818	21,316	60,931
May	37,028	6,787	25,405	69,220
June	25,862	6,003	31,278	63,143
July	27,501	6,420	43,778	77,699
August	31,342	6,794	48,730	86,866
Septembre	24,501	7,392	49,085	80,978
Octobre	10,390	8,302	49,226	67,918
Novembre	8,416	8,034	65,693	82,143
Decembre	7,292	8,266	71,275	86,833

TABLE 7 : EVOLUTION OF THE POPULATION OF THE PRESIDENCY OF
MADRAS AND THE STATE OF MYSORE FROM 1871 TO 1891
 (Source : Census of India)

DISTRICTS	<u>Population Index 100</u> <u>in 1871</u>		<u>Growth Rate (%)</u>	
	1881	1891	1871-1881	1881-1891
<u>PRESIDENCY OF MADRAS</u>				
Ganjam	115	125	2,5	0,8
Vizagapatam	109	130	1,6	1,2
Godavari	103	130	1,3	1,5
Krishna	107	-	0,7	1,8
Nellore	89	106	- 1,3	1,8
Cuddapah	83	94	- 2,0	1,3
Kurnool	74	85	- 3,2	1,4
Bellary	80	96	- 3,5	1,9
Chinglepet	105	121	0,5	1,5
Madras Town	105	117	0,2	1,1
North Arcot	90	108	- 1,1	1,8
South Arcot	103	123	0,4	1,7
Tanjore	108	113	0,8	0,5
Trichinipolly	101	114	0,1	1,2
Madura	96	115	- 0,5	1,8
Tinnevelly	101	113	0,1	1,2
Coimbatore	94	114	- 0,7	1,9
Salem	81	100	- 2,2	2,0
South Canara	105	115	0,5	1,0
Malabar	105	117	0,5	1,2
<u>TOTAL</u>	99	113	- 0,2	1,1
<u>STATE OF MYSORE</u>				
Bangalore	81	95	- 2,3	1,7
Kolar	74	91	- 3,2	2,0
Tumkur	66	84	- 4,5	2,5
Mysore	93	107	- 0,7	1,4
Hassan	83	99	- 2,1	1,8
Shimoga	100	104	0,0	0,4
Kadur	95	107	- 0,6	1,2
Chitaldrug	71	95	- 3,6	2,9
<u>TOTAL</u>	82	98	- 2,3	1,9

TABLE 8 : STRUCTURES BY AGE AND SEX OF THE POPULATION OF
THE MADRAS PRESIDENCY IN 1881 - SMOOTHED DATA -
 (Source : Census of India)

Age	FAMINE ZONE			NON FAMINE ZONE			TOTAL		
	Male	Female	M/F %	Male	Female	M/F %	Male	Female	M/F %
0-4	5.24	5.55	94.4	6.74	7.11	94.8	6.15	6.50	94.7
5-9	6.70	6.89	97.3	6.90	6.95	99.2	6.82	6.93	98.5
10-14	5.87	6.00	97.8	5.66	5.75	98.4	5.74	5.85	98.2
15-19	4.87	4.93	98.7	4.70	4.71	99.8	4.77	4.80	99.4
20-24	4.55	4.51	100.8	4.21	4.20	100.2	4.34	4.32	100.5
25-29	4.44	4.31	103.0	3.93	3.91	100.6	4.13	4.06	101.6
30-34	4.24	4.04	104.9	3.69	3.63	101.6	3.90	3.79	103.0
35-39	3.65	3.56	102.6	3.30	3.25	101.5	3.43	3.37	101.9
40-44	2.83	2.78	101.7	2.66	2.62	101.6	2.73	2.68	101.7
45-49	2.12	2.15	98.6	2.11	2.10	100.1	2.11	2.12	99.5
50-54	1.59	1.72	92.1	1.66	1.74	95.1	1.63	1.73	94.0
55-59	1.20	1.40	85.6	1.30	1.46	89.4	1.26	1.44	87.9
60 +	2.15	2.71	79.3	2.57	3.14	81.6	2.41	2.99	80.6
All ages	49.45	50.55	97.8	49.43	50.57	97.7	49.42	50.58	97.7

TABLE 9 : RATIOS DEATHS IN 1877 / BIRTHS IN 1878 FOR THE
DISTRICTS OF THE PRESIDENCY OF MADRAS

(Source: Sanitary Reports of the Madras Presidency)

<u>DISTRICTS</u>	<u>DEATHS FOR</u> <u>ONE BIRTH</u>	<u>DISTRICTS</u>	<u>DEATHS FOR</u> <u>ONE BIRTH</u>
Kurnool	28,5	Trichinipolly	3,8
Cuddapah	20,7	Madras Town	3,1
Bellary	18,2	Tinnevely	2,9
Nellore	13,3	South Canara	1,9
Salem	12,7	Krishna	1,7
North Arcot	11,5	Malabar	1,5
Madura	8,1	Tanjore	1,5
Coimbatore	8,2	Vizagapatam	1,2
Nilgiris	5,6	Godavari	1,1
South Arcot	5,4	Ganjam	1,1
Chinglepet	4,3	<u>TOTAL</u>	4,5

TABLE 10 : RATIOS CHILDREN 0-4 / WOMEN 15-49 IN THE POPULATION
OF THE PRESIDENCY OF MADRAS AND THE STATE OF MYSORE
IN 1871, 1881 AND 1891 (Source: Census of India)

DISTRICTS	RATIOS			INDICES		
	1871	1881	1891	1881-base 100 in 71	1891-base 100 in 81	1891-base 100 in 71
<u>PRESIDENCY OF MADRAS</u>						
Ganjam	0,722	0,656	0,536	91	82	75
Vizagapatam	0,708	0,637	0,550	90	86	78
Godavari	0,710	0,614	0,614	87	100	86
Krishna	0,735	0,516	0,627	70	121	85
Nellore	0,682	0,428	0,593	63	138	87
Cuddapah	0,594	0,303	0,523	51	172	88
Kurnool	0,639	0,252	0,562	39	223	88
Bellary	0,641	0,302	0,608	47	201	95
Chinglepet	0,842	0,605	0,729	72	121	87
Madras Town	0,437	0,422	0,477	97	113	109
North Arcot	0,776	0,479	0,640	62	133	82
South Arcot	0,841	0,555	0,650	66	117	77
Tanjore	0,678	0,534	0,542	79	101	80
Trichinipolly	0,715	0,501	0,575	70	115	80
Madura	0,746	0,465	0,588	62	127	79
Tinnevelly	0,756	0,543	0,600	72	110	79
Coimbatore	0,778	0,503	0,648	65	129	83
Nilgiris	0,795	0,487	0,589	61	121	74
Salem	0,765	0,411	0,699	54	170	91
South Canara	0,634	0,529	0,571	83	108	90
Malabar	0,761	0,692	0,611	91	88	80
<u>TOTAL</u>	0,721	0,499	0,601	69	121	83
<u>STATE OF MYSORE</u>						
Bangalore	0,654	0,347	0,552	53	159	84
Kolar	0,666	0,310	0,553	46	178	83
Tumkur	0,678	0,267	0,597	39	224	88
Mysore	0,662	0,406	0,562	61	138	85
Hassan	0,715	0,371	0,577	52	156	81
Shimoga	0,664	0,441	0,518	66	117	78
Kadur	0,687	0,376	0,540	55	144	79
Chitaldrug	0,786	0,294	0,665	37	226	85
<u>TOTAL</u>	0,681	0,358	0,567	53	158	83

TABLE 11 : COMPOSITION OF THE WOMEN'S AGE GROUP 15-49 IN
1871 AND 1881 (Source : Census of India)

REGIONS	1871	1881	<u>DIFFERENCES</u>	
			Numbers	% in 1871
<u>Madras Presi-</u> <u>dency</u>	8,061,031	7,988,468	- 152,563	- 1,9
which Kurnool	248,238	187,391	- 60,847	- 24,5
Cuddapah	356,177	289,482	- 66,695	- 18,7
Bellary	425,290	347,707	- 77,583	- 18,2
Salem	494,193	430,341	- 63,852	- 12,9
<u>Total</u>	1,523,898	1,254,921	- 268,977	- 17,7
<u>State of Mysore</u>	1,262,088	1,107,330	- 154,758	- 12,3