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**Famine Demography: An Introduction**

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## **FAMINE DEMOGRAPHY: AN INTRODUCTION (\*)**

by

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## Famine Demography: An Introduction

Tim Dyson and Cormac Ó Gráda

Most dictionary definitions of ‘famine’ equate it with food scarcity and widespread hunger. They tend to remain silent on the demographic aspects, although the extra mortality caused by famines offers one easy and obvious gauge for ranking famines. By this reckoning, for example, the Great Irish Famine of the 1840s was the greatest in nineteenth-century Europe. By the same token some of the modern famines highlighted in media accounts are ‘small’ by historical standards. Excess mortality, however, is only one aspect of famine demography. Famines typically reduce births and marriages too, and the migrations that they often give rise to may either increase or reduce the death toll. There are differences also between *how* modern famines kill and how historical famines did so. Modern famines differ too in *who* they kill; they tend to be more class-specific and they seem even more likely to target males than females than famines in the past. Moreover, famines often have demographic causes as well as consequences; and their consequences may be long-term as well as short-term.

The human toll of famines is often difficult to measure. Part of the problem is conceptual. Famine deaths may be hard to separate entirely from deaths from epidemic diseases such as cholera and malaria. Moreover, the dividing line between deaths resulting from food crises and deaths resulting from a background of endemic malnutrition is often hard to establish. In addition, civil registration is frequently either lacking or the system placed under great strain at the height of a crisis. For example, in the absence of civil registration, estimates of famine deaths in Ireland in the late 1840s depend upon assumptions about population growth in the years preceding it and net emigration during it. Similarly our estimates of excess mortality in the Ukraine in the early 1930s or in China during the Great Leap Forward famine are sometimes built on poor data and debatable assumptions. In more recent times estimating excess mortality from famine in sub-Saharan Africa is often little more than educated speculation and is complicated by the coincidence of warfare and civil disruption. On the other hand, the demography of some famines is extremely well documented.

The range is well represented in this book, which offers ten case studies on the demography of famines, historical and modern. Some of the studies are in effect attempts to override the defects of the available sources, while others draw on the wealth and detail of primary source material available. Three of our case studies concern Asian (India and Japan), two African (Burundi and Madagascar), and four European famines (Ireland, Finland, Greece, and Russia). Only America is missing, but this is because famines have had a small impact on the history of that continent (however, on Brazil see Davis, 2001:7). A final chapter reviews the evidence on the gender bias of famine mortality.

## Review of chapters

Our review is broadly chronological. We therefore begin with two chapters which address the Great Irish Famine of the 1840s. As in most of the famines analysed in this volume, the main cause of excess mortality was not literal starvation but infectious disease. The best-known data source on the human toll of the Irish famine remains the detailed ‘tables of death’ constructed by William Wilde for the 1851 Irish census commissioners. Wilde’s data are seductive: his cross tabulations record deaths by age, sex, cause, location and date. However they are also notoriously defective. In their critique of Wilde’s efforts here, Joel Mokyr and Cormac Ó Gráda propose a range of corrections to them, and produce a nosological profile of the famine by province based on their revision. Two plausible nosological points emerge. First, the worse-hit a region in this famine, the higher the incidence of starvation and dysentery-diarrhoea, and the more likely were these to be proximate causes of death. Second, the proportion of famine-related deaths due to ‘fever’ tended to be fairly constant across Ireland’s provinces, although the *incidence* of fever of course increased sharply in the worst-hit provinces. The revised data also help to distinguish between excess mortality due to hunger-induced diseases such as dysentery, and that due to diseases such as typhoid fever, which are less the product of hunger than of the social disruption that usually accompanies famine. Mokyr and Ó Gráda reckon that up to half the mortality was due to diseases of the second kind.

They then turn to a brief comparative analysis of the causes of famine mortality, emphasising the contrast between the Irish pattern which was replicated, broadly speaking, in nineteenth and twentieth century India and Russia, and that found in ‘modern’ environments such as the Warsaw ghetto or the Netherlands during World War II. Their results prompt some reflection on the role of medical science in influencing the causes of famine deaths (compare Johansson, 1999). A main reason why more recent famines differ from those further back in time is that we now understand better the role that infectious diseases play during nutritional crises. Yet despite medical advances, in the twentieth century there have been famines where infectious disease were the main killers (e.g. in Bengal in 1943-4 or in Ethiopia in the 1970s and 1980s) and famines where they killed few (e.g. in Greece in 1942-3 and in the western Netherlands in the ‘Hungerwinter’ of 1944-5). In the famine conditions obtaining in the Warsaw ghetto during 1941 and 1942, where medical practitioners kept count of the causes of the mounting death toll, only 2,503 of 82,624 deaths were attributed to typhus against 18,245 to starvation (Kowalski et al. 1946: 12).

The implication seems to be that where infectious diseases are endemic in non-crisis times they also bulk large when crisis strikes. In such instances, something like the connection posited by Thomas McKeown between medicine and mortality rules in reverse. McKeown famously claimed that in nineteenth century Europe the decline in mortality preceded major progress in medical technology. However, in the twentieth-century Third World, it is the diffusion of medical techniques that has lagged: contagious diseases such as typhoid and cholera often persist despite the existence of the medical knowledge required to deal with them.

A careful analysis of epidemics during past famines can therefore help us towards a better understanding of what precisely happened in the past. It is also quite obvious that such knowledge has limited relevance to famines we may be facing today or in the future. The understanding of the epidemiology and aetiology of infectious diseases and the physiology of the symptoms, and the knowledge of how to treat patients suffering from basic ailments such as fever and diarrhoea will remain with us, even if antibiotics lose some of their effectiveness

with the proliferation of drug-resistant strains. Moreover, even in the presence of severe food scarcity, the complete collapse of hygiene and personal care can usually be prevented.

About one-in-four of those who perished during the Great Irish Famine died in workhouses and workhouse hospitals. The chapter by Timothy Guinnane and Cormac Ó Gráda aims to offer a better understanding of why workhouse mortality was as high as it was, how it varied across Ireland, and how it affected different groups such as women and children. Established under the Irish Poor Law of 1838, the workhouses were funded from local taxation and managed by staff chosen by the local board of guardians. Thus their operation offers a preliminary analysis of the role of local factors or ‘agency’ in determining variations in mortality across Irish regions during the famine. The chapter provides examples of both the case study and the comparative approach. Individual case studies yield examples of both good and bad workhouse management. Close analysis of workhouse registers and qualitative data offers insight into crucial factors such as the quality of health care in the workhouses and the competence of the guardians. Accounts of individual workhouses focus largely on how they were managed during the crisis. However, management quality is arguably endogenous, and the relative poverty of a poor law union clearly influenced the magnitude of the task faced by any local agent. This suggests the need for a comparative approach. So Guinnane and Ó Gráda also include a cross-sectional analysis of Ireland’s 130 poor law unions in order to determine which unions under- or over-performed, controlling for the economic and locational conditions that confronted them. The authors employ econometric methods and cross-sectional information on poor law unions before and during the famine to examine which unions were most badly hit by the crisis and identify, after controlling for exogenous factors, those that did unexpectedly badly or well.

Kari Pitkänen’s paper on Finland addresses the issue of sex bias. During the Great Finnish Famine of the 1860s, which killed more than one hundred thousand people out of a population of 1.8 million, and also during several other periods of excess mortality in Finland in the preceding decades, Pitkänen finds little evidence for consistent sex differentials in mortality. However there is one significant exception. In 1868, the peak year of famine in a decade of famine or near-famine, men did suffer more than women. A closer examination of the data, however, reveals that even in 1868 sex differentials in mortality increases were limited to certain regions and age categories. Pitkänen’s paper rightly draws attention to the important distinction between proportional and absolute mortality increases. He notes that higher baseline (i.e. standard) levels of female adult mortality can help account for lower proportional increases in female mortality compared to male. When absolute increases in famine mortality between the sexes were compared for most of these Finnish famines, the differentials largely disappeared. However in 1868 males still show greater absolute mortality rises. Overall, Pitkänen’s evidence suggests that neither sex had an inherent biological disadvantage in resistance to the particular infectious diseases mainly responsible for the mortality increases during these calamities. Only in 1868 were men in certain age categories and in certain regions more likely to succumb than women. Pitkänen argues that this outcome was most likely linked to famine-induced temporary migration, which also tended to be age- and sex-selective. Moreover he stresses that in 1868 many undernourished Finnish men worked in miserable conditions on government relief work sites, where death rates were high. This consideration too may help account for the excess male mortality of 1868.

Moving from Finland in the 1860s to India some three decades later, Tim Dyson's chapter examines two interrelated famines which occurred in the region of Berar during the 1890s. Dyson's emphasis is on famine as a *process* and the knock-on effects and synergistic interactions which can occur. Because Berar had good vital registration data some firm conclusions can be drawn about the demographic consequences of these famines. The sequence of events in both disasters was similar. Poor monsoon rains around June-August threatened a crop failure around November-December. The death rate during the first year of famine was unexceptional. Rather, the major death peak occurred in the second year when the population was greatly weakened by prolonged starvation, and the returning rains triggered outbreaks of diseases like malaria and dysentery. Mortality rose tortuously during the second year of famine to peak in August during the monsoon, but it then subsided rapidly, presumably chiefly because, as in normal years, health conditions improved with the passing of the rains. The main decline in the birth rate occurred in the third year of the process, and in the fourth year there was a birth rate 'rebound'. Other things equal, the second of two close famines is likely to be an even worse event, and this was certainly the case in 1899-1900 compared to 1896-97. The famine of 1896-1900 reduced Berar's population by about 5 per cent. Dyson estimates that period life expectancy in 1900 fell to only 9 years, and the registered infant mortality rate was 415 per thousand. The poorest sections of society died the most. Deaths of Hindus increased more than those of Muslims. Male mortality seems to have increased slightly more than that of females, the differential being greater for adults. Consequently the population sex ratio after the famine was more feminine. Marriages were delayed and there were major rises in widowhood. Interestingly, distress migration produced a limited, temporary urbanisation in Berar; and it also caused a significantly higher registered urban death rate compared to rural areas. In absolute terms the famines killed young children and old people most, causing a change in population age structure. Interestingly there was little change in the ratio of registered stillbirths to live births. Accidents and suicides increased noticeably. Without doubt, the existence of a relatively sound database (e.g. relating to monthly rainfall and vital events) gave Berar's sanitary commissioners a better understanding of the potential for dangerous cumulative chain reactions. However, because of a lack of preparation, the sheer scale of the crises, and the generally niggardly attitude of the colonial administration towards famine relief, the 1890s was a time of interlocking, cumulative disaster in Berar.

The next chapter, by Arup Maharatna, also deals with the demographic consequences of famines in India, but from a slightly wider temporal perspective. Using time series data on prices and deaths by cause, Maharatna explores the intimate relationship between famines and outbreaks of specific diseases during several famines which occurred between the 1870s and the first decade of the twentieth century. His prime purpose is to question those previous analyses of Indian famines which have seen the associated mortality as being primarily due to the occurrence of epidemics - analyses which may therefore have seemingly implied that the famine mortality was partly independent of the conditions of acute under-nutrition and mass starvation which prevailed. Maharatna is also sceptical of the suggestion that severe under-nutrition may have had a protective effect against diseases such as malaria. The paper shows that there is a fairly clear, although somewhat lagged, correspondence between the development of famine distress (as reflected by rising food prices) and the occurrence of famine mortality. During the prime period of famine almost all major causes of death showed a rising trend, indicative of mounting under-nutrition among the population. That said, as Maharatna indicates, the precise timing of peak mortality from specific diseases was also partly shaped by climatic and environmental factors (e.g. the timing of the rains in the case of malaria, and shortages of drinking water in the case of cholera) and by patterns of

migration and crowding (e.g. in relief camps) that themselves were due to the famine conditions. The data show clearly that the seasonal distribution of famine mortality fairly closely reflected the usual seasonal distribution of deaths in these populations. But, as Maharatna emphasises, what was different in these crises was the occurrence of widespread hunger and starvation which, therefore, must be seen as ultimately responsible for the greatly elevated scale of deaths. Very much, this chapter refocuses attention squarely upon mass starvation as the principal underlying cause of famine mortality in India in the past.

The connection between prices, scarcity, and excess mortality addressed by Maharatna is a traditional one. In the cases of the famines he addresses high prices probably did reflect increased scarcity. However, this does not rule out the possibility, highlighted by Amartya Sen and others, that famines can occur without increases in food prices: a reduction in the purchasing power of some group may suffice. Moreover, high prices could reflect bubbles due to speculative hoarding or panic buying, rather than genuine supply shortfalls, but in that case too they could result in starvation and increased mortality. How markets function during famines remains an under-researched field (Sen, 1981; Ravallion, 1996).

In the next chapter Christian Thibon offers an analysis of famines in the central African country of Burundi over the past century or so. The outcome, based on a combination of oral and written sources, is a complex one, in which shifting economic and epidemiological conditions played an important role. Neither conventional documentary sources nor communal memory alone reveals the full story, but a good deal can be extracted from the analysis of mission records. In demographic terms the broad outline of the history of Burundian food crises is severe famines in the late pre-colonial era, followed by severe local dearths in the 1920s, and the last major natural famine, referred to as 'manori' in popular memory, in 1943-4. Thereafter there was a hiatus, brutally broken by the inter-tribal conflagration in 1972 which resulted in huge mortality (perhaps one in ten of the entire population). Since then famine-induced mortality crises have largely given way to localised but sometimes endemic hunger or malnutrition.

In the next chapter Serguei Adamets contrasts the histories of famines in pre- and post-revolutionary Russia and the Soviet Union. He shows that from the mid-nineteenth century the geography and intensity of famine began to change, and it seemed as if Russia might be experiencing its final famines. However the three massive crises of the early Soviet era killed far more people than any of the famines of the previous century. Adamets offers a critique of earlier estimates of excess mortality during the early 1920s and 1932-33. These estimates have been constrained by poor data, and influenced successively by Stalinist censorship and Cold War politics. Consequently he proposes his own alternative estimates, and exploits detailed Soviet civil registration data from the 1930s in order to offer new insights into the age and sex characteristics of excess mortality and the main causes of death. The analysis of causes of death allows the identification of those illnesses contributing most to the widening of the gender gap during the famine of 1932-33. Interestingly the era of famine in the Soviet Union did not cease until after the famine of 1946-47.

Focusing on events on the Greek island of Syros in the early 1940s, the chapter by Violetta Hionidou uses that island's death and birth registration records to extend our knowledge of the demographic consequences of the famines which afflicted Greece during World War II. Census data for the period no longer exist. But Hionidou's analysis constitutes a fine illustration of the value of registration records by themselves, especially if, as in this case, they are both detailed and of high quality. Because of the singularity of circumstances on Syros, this chapter's conclusions have considerable significance for our general

understanding of famine demography. Recall first that this was a situation of famine in Europe during the middle of the twentieth century, a fact which should underscore that *any* population can potentially be subject to famine, especially during times of war. For practical purposes the island's population - which was overwhelmingly *urban* - was completely cut off from the outside world. Even fishing was prohibited. So neither food, nor people, could get in or out. Mortality increased very steeply fairly soon after food supplies first became short. The main period of famine deaths was between September 1941 and November 1942. Standards of public hygiene being reasonably good on Syros, there was no real problem with infectious disease. Instead, the island's doctors certified people as dying mostly from causes which directly reflected famine - such as hunger, starvation and general exhaustion. Differentials in mortality mirrored differentials in access to what little food there was. Thus deaths in rural areas increased, but less sharply than in the towns where most people had no links at all to the countryside. Again, male mortality increased most, the excess over females being greatest between ages 15 and 40.

Interestingly, this excess male mortality seems to have been particularly pronounced during the early stages of the famine. Hionidou argues convincingly that the evidence is more consistent with a physiological than a cultural explanation as to why men died more. There was also a decline in fertility corresponding to the increase in mortality. Hionidou maintains that this decline directly reflected the mounting famine stress - and that it probably operated through decreasing fecundity because of increasing malnutrition, coupled with a widespread loss of libido. Finally, the events on Syros are another example of two food crises occurring in short succession; there was a less serious famine during the first half of 1944. The second crisis saw little excess mortality, but there was a significant reduction in fertility.

Finally in this review of famines in their chronological order, we come to events in Madagascar in the mid-1980s. The chapter by Michel Garenne, Dominique Waltisperger, Pierre Cantrelle and Osée Ralijaona use vital registration data for Antananarivo, the island's capital city, to explore the effects of a quite severe food crisis which happened during 1985 and 1986. Garenne and his colleagues tell us that after achieving political independence in 1960 Madagascar's economy deteriorated, especially from around 1971. Household incomes and food consumption fell significantly, and mortality increased slowly between about 1976 and 1984. This was a period during which the country effectively isolated itself from contact with western countries. However, the reestablishment of links in the mid-1980s led to the introduction of structural adjustment policies, and from this there followed an approximate tripling of the price of rice, the staple food, between July and December of 1985, as government food subsidies were removed. This caused a crisis for the inhabitants of Antananarivo, a large fraction of whom were already living at levels of calorie intake which were around, or below, internationally recognised minimum levels. Thus whereas in 1984 average life expectation in the city was around 51 years for males and 58 for females, by 1986 these figures had fallen to 45 and 53 years respectively. Clearly excess mortality was much greater for males than for females, the sex differential being especially sharp in young adulthood. An important aspect of the Antananarivo registration data - which are of good quality and fairly complete - relates to the detailed information on cause of death. The data show that the single category of 'malnutrition' was responsible for 55 per cent of excess deaths to people aged under 15, and 34 per cent of excess deaths to people aged 15 years and over. For both age categories deaths due to 'diarrhoea and dysentery' were the second most important cause of excess mortality. And for adults there was also a sharp increase in deaths from 'other cardiovascular diseases'. The data also indicate an increase in suicide. Garenne and his colleagues conclude with the observation that recognising the fact and nature of a crisis are essential for remedying it. However, this 'silent' famine went almost unnoticed, in

contrast to a - possibly related - outbreak of malaria which hit the city in 1988 and which did receive wide public attention. Interestingly too, the effects of the food crisis remained hidden in the results of the 1992 Demographic and Health Survey mainly because, due to small numbers, the survey grouped data into time periods of five years in length, so obscuring the famine.

The final two chapters in the book are somewhat different in that rather than focusing on particular crises at specific times, instead they consider famines in comparative perspective. The chapter by Osamu Saito addresses Japanese famines in long-run historical perspective - in fact, for the period stretching from the seventh to the late nineteenth century. To do this Saito examines carefully some novel data sources and he adopts an innovative weighting approach when gauging the changing severity of famines (and epidemics). The frequency of famines during the Tokugawa period (1603-1868) was probably less than in late medieval times. And, indeed, during the Tokugawa period there was some limited further reduction in famine frequency - even though major countrywide famines still occurred during the 1780s and the 1830s. However famines virtually disappeared in Japan from the 1840s onwards. Saito also addresses the changing causal basis of Japanese famines. In this context the period from the fifteenth to the seventeenth century saw a gradual move away from dependency on dry-field cultivation towards the cultivation of a newly introduced 'red' rice variety which needed wet-field sites. This gradual shift in growing patterns required considerable investment in agricultural infrastructure (e.g. irrigation canals), but it meant that from being a major cause of famines, 'drought' became only a minor cause. Thus, especially from the seventeenth century onwards, it was the occurrence of cool winters (which restricted crop growth) that became the major cause of famines in Japan. Finally Saito addresses the issue of how much famines affected population growth. Here, as he notes, particularly following the work of Watkins and Menken (1985), it has become rather fashionable to discount famines as major regulators of population growth. However, the Japanese case contradicts any such new orthodoxy. Thus focusing particularly on the Tokugawa period, Saito shows that famines were a major factor governing the rate of population growth. And they were much more important in this respect than were epidemics. Much of this demographic regulatory effect of famines seems to have operated through the reduction of fertility, and the effect was especially pronounced simply because the usual level of marital fertility was only moderate. Indeed, it was the elimination of famines after about 1840 that laid the basis for sustained population growth in Japan.

The final chapter in the book is by Kate Macintyre. It addresses a feature which appears in nearly all of the preceding chapters - the fact that excess male famine mortality appears to have exceeded that of females. Accordingly Macintyre's chapter has two related objectives: first to establish, and second to account for, this phenomenon. Of course, the suggestion that the mortality of males is raised by slightly more than that of females during famines is not new. However, as she remarks, sometimes social scientists have rather shied away from the indication - indeed, occasionally they have almost denied it - perhaps partly because it seems at odds with the view that in most societies it is the women who have the worse deal in life. Accordingly, Macintyre assembles data from a lot of different famines, in very diverse populations, places and times, to establish the point beyond reasonable doubt: famines increase male mortality by more than that of females in most cases. Moreover, this happens even in the most patriarchal of societies. The few studies which appear to be exceptions to the rule are usually based upon questionable data. The 'female mortality advantage' tends to be greatest between roughly ages 20 and 45 years (which, of course, are also the main years of reproduction for women). Having established that this female advantage is not the outcome of faulty data, she turns to the much more difficult issue of

causation. Here there is no shortage of possible explanations - both biological and social - which she proceeds to consider. The very frequency of greater male than female famine mortality suggests to us that, ultimately, it has a *biological* foundation. This may have arisen out of evolutionary processes, which are then conditioned, and often strengthened, by a host of other considerations in different contexts. Macintyre herself notes that studies of mammals tend to show that females have a basic mortality advantage over males during times of stress, which may well reflect their more pivotal role for purposes of reproduction and species survival. Of the several possible biological mechanisms she considers, the fact that women have higher reserves of body fat is certainly an attractive explanation. Moreover, it is interesting to note that because fat is an asset which presumably reduces with time (as the body's reserves are run down) it may help to explain Hionidou's finding for Syros that the female mortality advantage reduced as the famine itself progressed. Finally, however, Macintyre emphasises that any biological mechanisms will be overlain by a host of possible social considerations (not all of which necessarily benefit women). In this context she mentions women's fundamental role as child-carers and home keepers, and their sometimes more harmonious relationship with nature. She notes too that today aid agencies and famine relief operations often work on the basis of 'women and children first'. And she concludes by underlining the complexity of the phenomenon and the need for future research to employ different, yet complementary approaches.

## **General discussion**

Having provided a foretaste of what each chapter holds, we now focus on some of the broader considerations which arose from the discussions at the meeting at the Fondation des Treilles, only some of which have been touched on in the preceding review. To avoid repetition and because they have been covered by others (e.g. see Watkins and Menken, 1985; Bongaarts and Cain, 1982; Hugo, 1984) we will not dwell too long on the most basic demographic consequences of famines. The core facts are simple: deaths tend to increase, births tend to decrease and people tend to migrate out of the afflicted area. However Table 1 offers a more detailed listing of the demographic consequences of famines, both short and longer term, with some comments and qualifications. Of course, the statements made in Table 1 are generalisations. What actually happens in a crisis will depend upon the particular circumstances which prevail.

**Table 1 - THE DEMOGRAPHIC EFFECTS OF FAMINES:**

**SOME GENERALISATIONS, COMMENTS AND QUALIFICATIONS**

<i>Generalisations</i>	<i>Comments/qualifications</i>
	<i>Mortality</i>
1. Mortality increases during times of famine	Possible exceptions: lesser food crises; and cases where conditions associated with famine (e.g. drought) lead to a reduction in certain diseases (e.g. malaria) and/or lead to the provision of adequate famine relief measures.
2. Famines usually involve an amplification of the 'normal' seasonal distribution of deaths	This amplification may be complicated and overlain by famine-induced outbreaks of particular diseases (e.g. measles, typhus). However, knowledge of the normal seasonal distribution of deaths in a population is useful for helping to limit the volume of famine mortality.
3. Increased under-nutrition is the principal underlying cause of famine mortality; it reflects a lack of access to food among a part (or, rarely, all) of the population	In environments with high loads of infectious disease many famine deaths will involve such diseases; however, in low infectious disease environments many famine deaths will be attributed directly to causes such as 'malnutrition' and 'starvation'.
4. Especially in poor agricultural populations, famines and epidemics often interact synergistically	Famines can cause epidemics (e.g. through migration and crowding); epidemics can cause famines (e.g. by disrupting agricultural activities). So while at the individual level there may be synergistic links between malnutrition and infectious diseases, analogous interactions can also occur at the aggregate level.
5. The largest number of famine deaths happen to young children; this age group and the elderly experience the greatest absolute increases in death rates	Compared to normal times these age groups are under-represented after the famine (see effect 16 below).
6. The greatest proportional increases in death rates tend to occur at ages where death rates are relatively low during normal times	In high mortality populations this means that the greatest proportional increases may occur at around ages 10-45; but in low mortality populations infants and young children may also experience significant proportional mortality increases.
7. The mortality of males increases by more than that of females	Excess male mortality is especially pronounced in the prime adult years; the near-universality of this phenomenon points to its having an underlying biological basis (e.g. relating to differential levels of body fat). It seems that the greater the role of starvation in mortality the stronger is this effect.

8. The frequency of suicide increases during famines

There are good grounds for thinking that this happens, at least during the most severe crises. It may well be that men are more likely to commit suicide than women.

9. Famine mortality varies inversely with socio-economic status

Perhaps this is obvious, but it is worth stating. The rich, at least, are usually able to access sufficient food supplies. However famines today may be more class-specific than in the past.

### *Fertility*

10. The build-up of famine conditions causes a lagged decline (lag duration approximately 9 months) in births

The timing of the decline in conceptions usually corresponds closely to the increase in famine stress. A fertility reduction is probably an even more common feature of famines than is a mortality increase (see effect 1 above).

11. Famines induce a decline in the frequency of marriages.

This almost always happens, as marriage plans are abandoned or postponed.

12. Social and psychological factors contribute to fertility decline in all famines; biological factors tend to operate only in the most severe and lengthy crises

The first two types of factors (examples, respectively, are spousal separation through sex-selective migration and a reduction in libido) work through reduced coital frequency. Anovulation due to severe malnutrition is probably the most important of the various physiological mechanisms.

13. Soon after the end of famine there is usually a short-term increase - 'rebound' - in births

Due to effect 10 above, a higher-than-usual proportion of women are at risk of becoming pregnant at the end of the famine. Moreover, the various famine-induced constraints on coital frequency and fecundity cease. Equally there is a re-bounce in the marriage rate as normalcy returns.

### *Migration*

14. Migration is a feature of most famines. People move in search of food/work

Migration as a famine response has probably increased during the modern era with improvements in transport and communication. Migration tends to be selective (e.g. by sex).

15. Famine migration can have either positive or negative mortality effects, for the migrants, those they leave behind, and therefore for the total population

Migration can weaken people and spread disease. But as economies have generally become more diverse, and transport and communications have improved, so migration has probably come to have a net beneficial effect on the overall level of famine mortality.

### *Population structure and longer term effects*

16. Because of effect 5 above, other things equal, the post-famine population age structure has proportionally more people aged 10-45 than applied pre-famine

Consequently, other things equal, the crude birth rate tends to be higher and the crude death rate lower than they would otherwise be for an extended period following the end of the famine.

17. Because of effect 7 above, other things equal, the post-famine population structure is more feminine than applied pre-famine	This effect too tends to contribute to a slightly higher crude birth rate over the medium run than would otherwise prevail. It is additional to effect 13 above, which is of relatively short duration.
18. Together effects 16 and 17 boost the rate of natural increase over the medium-run, speeding demographic recovery	Again, this effect is other things equal.
19. Famines have long-run consequences for the health of affected survivors	Several analyses support this, most notably those relating to the Dutch 'hunger winter' of 1944 (e.g. see Lumey 1998). However, for most famines the data to demonstrate such long-lasting consequences do not exist.

It is often claimed that famine is an ineffective remedy against population pressure because population growth tends to fill the resultant demographic vacuum. In Finland, for example, population grew much faster after the major famine of 1868 than before it, filling the void left by famine deaths after a few years. And in Ireland in the half century or so following the major famine of 1740-1 population grew faster than in any subsequent period. Yet one major demographic conclusion which arose from the meeting was that it is dangerous to dismiss the role of famines in helping to control population growth in times past. Of course, during the modern era demographic growth has been the norm. And with high levels of fertility prevailing, it has been common for developing country populations to be growing at two, three, or even more per cent each year. In these circumstances the loss of quite a large fraction of the total population can be 'made up' in a short period of time. Simple arithmetic tells us that even a population growing at one per cent each year will recover a ten per cent loss in just under ten years. However, in historical conditions moderate, rather than high fertility seems often to have been the norm and populations grew slowly, if at all. And in these circumstances - particularly if there were interactions with epidemic diseases - famines could have significant effects in limiting demographic growth. Thus here Saito shows that, even without much interaction with disease (related to its geographical and social isolation) Tokugawa Japan was probably a case where famines did play a significant role in restricting demographic growth. Even a single great crisis can have very long-lasting effects. For example, the likelihood that the population of England's south, south-east, and east midlands was less on the eve of the Black Death in 1348 than in 1300 is probably due to its failure to recover from the prolonged agrarian crisis of the second decade of the fourteenth century (Hallam, 1988: 1004-5). And in Ireland the mass migration that followed in the wake of the potato failures of the 1840s created its own dynamic. The sharp rise in the stock of Irish people abroad, highly concentrated in urban ghettos, produced a 'friends and neighbours' effect that accounted for part of the post-famine outflow (Ó Gráda and O'Rourke, 1997). Moreover, by reducing the size of the domestic market, emigration must have also reduced the scope for specialisation somewhat, and thereby reduced the population further in the long run (Whelan, 1999).

The contents of this book also illustrate that food crises often come in pairs - so-called 'bang/bang' famines. Having been weakened by one food crisis a population will be more susceptible to another, unless circumstances improve. There are several mechanisms through which an initial famine may help generate a second disaster - for example, the eating of precious seed-corn, or the generation of epidemics which in turn disrupt agricultural activities.

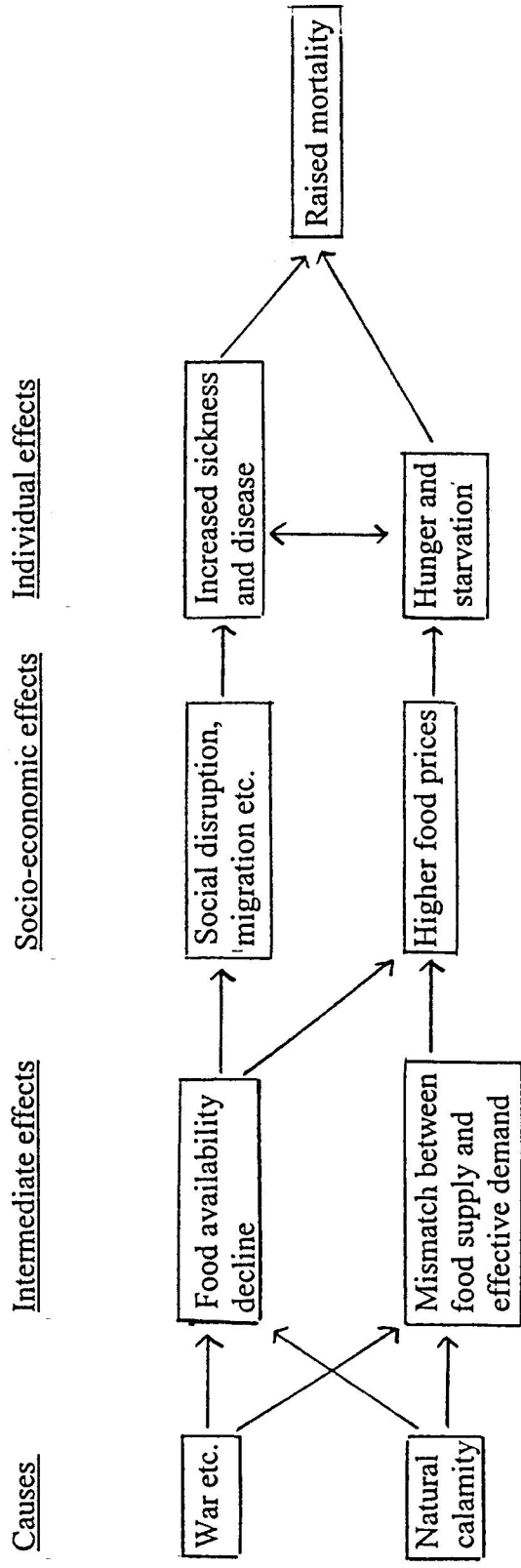
Perhaps inevitably, much of the discussion at the Fondation des Treilles was concerned with famine causation. Because they involve a series of interlocking processes, it is difficult to completely isolate discussion of the causes of famines from discussion of their effects. In this context Joel Mokyr proposed the schema shown in Figure 1. In this conceptual plan natural calamities (e.g. drought, flood, frost, a cold summer) and socio-political events (e.g. warfare, political isolation, policy-induced structural shifts, or economic disruption) constitute the two main proximate triggers of famines. And, of course, both these types of trigger can combine and interact. In turn, the triggers produce hunger and starvation *either* through a reduction in the total amount of food that is available to the population *or* through the creation of an imbalance between the effective demand and supply of food in the population. The latter situation may arise, for example, if a large section of a poor community becomes unemployed - a case which, using Sen's (1981) terminology, would be an entitlement failure in the absence of a food availability decline (FAD).

In practice, most food crises probably involve some combination of both of the kinds of intermediate effects shown in Figure 1. Food availability declines are usually implicated in famine causation (Dyson 1996: 74). In this volume FADs were involved to a greater or lesser degree in all of the famines which pre-dated the twentieth century, and in those in Burundi during the first half of the twentieth century. However, as we advance further into the twentieth century so FAD tends to play a lesser role. The famines in Russia, Greece, and Africa (as exemplified here by Burundi and Madagascar) reflect this shift.

The next component of the famine process are the economic and social effects (see Figure 1 below). Food prices rise, people migrate, and there is social disruption. In turn, these processes generate hunger and starvation and spread disease. And again, starvation and disease will probably interact. Finally, there are the various demographic effects listed in Table 1, the most important of which is the rise in deaths.

Of the two proximate triggers identified in Figure 1 it is certain that over time socio-political events - especially warfare - have become increasingly responsible for famines. Of course murderous famines have often been caused or exacerbated by wars in the historical past. But as the examples of much of Europe in 1740-41, Ireland in the 1840s or India in the 1870s and 1890s show, in the past peace was no insurance against the Third Horseman. Malthus, of course, envisaged famine as nature's 'ultimate response' to population outstripping food supply. However, in the twentieth century famines have owed much more to Mars than to Malthus. Socio-political considerations - like Stalinist ideology, ethnic divisions and post-colonial strife - have mattered more than the sheer incapacity of nature to deliver food. The case for a 'Whig' interpretation of famine decline - whereby gradual economic betterment has gradually reduced the incidence and severity of famines - may fit countries such as pre-industrial England and Scotland. And in the late colonial era in Africa a combination of 'effective government, wider markets, and some increase in average wealth' has also brought a significant reduction in famines (Iliffe, 1987). Yet as an account of global trends such an optimistic interpretation is much weakened by the importance of 'political famines' during the twentieth century (Devereux, 2000).

**Figure 1 – A simple model of famine sequences**



Note: Clearly, the above is highly simplified and incomplete. Nevertheless it is a useful way of organising one's thoughts. Inevitably real famines involve a unique combination of sequences.

Another shift in the combination of factors shown in Figure 1 relates to that between starvation and infectious disease. In most of the crises described in this book mortality was not due mainly to starvation, but rather to infectious disease. However, over time medical and administrative progress have probably produced a decline in the proportion of deaths caused by infectious diseases in famines. That decline has probably increased the relative importance of those physiological factors which place women in a stronger position to withstand famine. And perhaps this helps to explain why males were proportionately much more likely to succumb on Syros in 1942 or Antananarivo in 1985-86 than in, say, Ireland or India during the nineteenth century.

A related point is that although, as Table 1 conveys, famines have always disproportionately targeted the poor, in the past they also killed many people who were not poor but could not protect themselves against infectious disease. Indeed, in the past medical practitioners, clergymen and people engaged in relief work could be particularly at risk of death. And city dwellers too were put in jeopardy by the unwelcome arrival of famished peasants seeking relief and charity. However the studies assembled here imply that medical progress may have made famine mortality more class-specific. Developments such as penicillin, electrolytes and antibiotics have meant that richer people at risk of succumbing to famine fevers in the past can now take preventive or curative action. Thus whereas in the past the poor could count, to some extent at least, on the enlightened self-interest of the better-off to help relieve the worst of famine, either by relieving beggars or isolating suspected carriers of disease, today the motives for such action can be weaker. Moreover, for the poor the remedies just mentioned may be available in theory, but the purchasing power to make them effective is usually lacking. Describing conditions in Ethiopia in the mid-1980s an American doctor noted the 'expensive, modern materials' destined for the army, while 'we still lack cheap vitamin pills and other medicines to cure children with illnesses from the Middle Ages' (Heiden, 1992: 168).

And what of famine in the future? In considering this issue it is hard not to remark that the very meaning of the word 'famine' seems to have changed somewhat during recent years - no doubt partly reflecting changes in the 'real world'. Famine in the classical sense of widespread hunger and starvation, steeply rising mortality and, perhaps above all, social breakdown, is a relatively rare event today. Perhaps the last such episode - of famine in an almost biblical sense - occurred in Ethiopia during 1984-85. However, while still dreadful, the famines which have appeared on our television screens more recently, often from Sahelian Africa, are different, more restricted events. At least in some respects, the world has become a different place. To reiterate, the causes of most recent famines are usually much more attributable to 'man' (and unfortunately the gender of this word is all too appropriate) than to natural calamities. Warfare is usually the main contextual event, although natural events like drought may still play a role. Moreover nowadays economies are generally more diversified and there are greater chances for migration. To repeat, our knowledge of disease transmission and containment is much greater than in the past, so famine mortality tends to be restricted. International consciousness, at least potentially, is there. Supplies of food can be moved relatively swiftly, and a lot can be achieved even with small amounts of food aid. The result of these developments is that one authority has gone so far as to say that the chances of someone dying from famine in sub-Saharan Africa today have become 'vanishingly small' (Seaman, 1993:31).

But while famines in this new, more restricted sense may continue to prevail - although hopefully on a declining trend - it would be foolish to completely rule out the chances of another massive disaster - a famine of widespread starvation, a colossal number of deaths

and general social disintegration. Indeed, if we adopt a sufficiently long time period into the future, then we can be fairly certain that a famine of this type will occur. Thus in a global economic system based on comparative advantage a calamitous famine might happen if for some reason a population became cut-off from the rest of the world. The recent events in North Korea, for example, should remind us of this. It is also possible to imagine the violent break-up of a very large country in which the circumstances and sheer scale of events means that adequate supplies of food and other assistance cannot be provided from outside. There are a few major nations in Asia to which, just conceivably, this could happen. No one really foresaw the break up of the former Soviet Union. In that instance the risk of a food crisis was reduced by the provision of food aid from the West. Environmental changes may also assume an increasing role in causing famines in the future. Thus a major sudden change in the global climate would probably produce serious FADs, with particularly grave consequences for poor countries (on the past role of climatic shifts in late nineteenth-century famines see Davis, 2001).

Several other considerations might complicate responses to future famines. For example, much of the world is urbanising, fast. Although the Soviet famines studied by Adamets give us some experience of famines in urban areas, the Soviet cities afflicted in the 1920s and 1930s were small compared to the massive and still growing urban agglomerations which are found in much of Asia and Africa today. Recall too that urban populations may have very weak links with their surrounding rural areas which, in any case, in the modern world may not supply the food that they eat. Indeed, almost everywhere nowadays urban dwellers tend to have scant knowledge of how their food is produced, where it comes from, and how it is supplied. That said, major centres also tend to command the financial and political means required to alleviate the consequences of food shortage. Yet another factor which could conceivably complicate the response to a really calamitous famine in the future is the run-down of cereal stocks by the main exporting nations, based partly on the hope - alas, not always fulfilled - that this will induce cereal importing nations to build up their own supplies.

Other crucial complicating factors are denial and complacency. The rapid recent spread of HIV/AIDS in many countries is a powerful reminder of just how much harm both these factors can do. But, of course, they also operate apropos conditions of famine. Clearly, if the build-up to a food crisis is avoided or suppressed by the government, then a famine is both more likely to occur and more likely to be large in scale. Any kind of response to famine depends upon some initial recognition that a crisis is happening. Yet the instances are legion where those in power deny that a famine is occurring. Indeed, several famines dealt with in this book suffered from this element. In this context Drèze and Sen (1989; see also Sen, 1999) have argued convincingly that famine denial is more likely to occur in the absence of an independent press. That said, even where the press has some independence, politicians and administrators are still likely to find open recognition of famine embarrassing and difficult. So in the future, as in the past, denial of famine will probably operate. And to the extent that famines increasingly have largely 'human' causes, the problem may become even more acute. Politicians find it is easier to blame a food crisis on a natural calamity than to assume some responsibility themselves. It is also an undeniable but unpalatable fact that the arrival of food aid from outside can sometimes sustain the autocrats whose actions were largely responsible for the famine in the first place (de Waal, 1992).

Complacency relating to policies, is a more subtle, but related factor which may also contribute to the genesis of some future famines, both large and small. The instigation of inappropriate economic policies has been a major contributory cause to many famines in the

past. And a word of caution for the contemporary world is perhaps appropriate here. For example, currently we inhabit an international system in which policies of trade liberalisation and open markets hold tremendous sway. This is the way the world is moving, often with benefit. However, as the hidden famine in Antananarivo illustrates well, policies can sometimes be introduced from outside without proper consideration to their possible side-effects. Neo-liberal economic policies can ignore important institutional considerations. What the 'best' set of policies is for a particular location may not always be the same. More generally we echo the words of Nathan Keyfitz (1991:15) that '[i]f we have one point of empirically backed knowledge it is that bad policies are widespread and persistent. Social science has to take account of them.' For sure, bad policies will contribute to famines in the future.

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