

# **PUSHING BACK THE FRONTIERS OF DEATH**

Cunningham Lecture 1999

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ERRATUM  
page 13, last line:  
for "thirteenth-century", read "fourteenth-century"

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## **PUSHING BACK THE FRONTIERS OF DEATH**

*John C Caldwell*

The most persistent imagery in literature, particularly in poetry, is human frailty, especially the inevitability of death. 'Mortals' is a term used to designate the human race. Demography, which focuses on the major events of our existence – birth, marriage, parenthood and death – has long been interested in measuring the force of mortality and in explaining its change.

This preoccupation is not as morbid as it sounds. In modern times the news has been almost entirely good. Western countries have doubled their life expectancies from around 40 years in the mid-nineteenth century<sup>1</sup> to almost 80 years at the end of the twentieth century<sup>2</sup>. The Third World's life expectancy, taken as a whole, has climbed from 40 years in the mid-twentieth century to 65 years at its end<sup>3</sup>. If we were to enter one of those competitions to nominate the greatest advance of the latter part of the millennium, it would be difficult to overlook the pushing back of the frontiers of death and the guarantee that most people will live to old age. In Sweden, for which we have good statistics for the last two centuries, the 1800 mortality level would have meant only one-third of those born surviving until 60 years of age. In contrast, the present mortality level implies that such erosion does not take place until after 85 years.

The fact of the mortality decline is irrefutable. What is controversial is why it occurred. This lecture will draw upon research into the nature of the contemporary Third World mortality decline in order to throw light on the earlier Western decline. But, first, it will be useful to explain some of the mortality measures and their limitations.

The most frequently used measure is 'expectation of life', especially at birth, which is called 'life expectancy' in this lecture. It is the average length of life if mortality levels remain frozen at the level of a given year. In modern times, this is not the case.

In 1901, Australians recorded a life expectancy of 55 years, one of the highest in the world, but the average life span of Australians born in that year was over 60 years because mortality continued to fall<sup>4</sup>. Those 10 per cent who were unfortunate enough to die in infancy were, nevertheless, subject to 1901 mortality. So, life expectancy is an index, and a remarkably good one of mortality levels at a specific time. Even when mortality is stable its figures require interpretation. Between 1601 and 1801 life expectancy in England was never very far from 35 years, but only about 10 per cent of the population actually died between 30

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and 40 years; one-sixth or more died as babies, and those who reached 25 years, or the typical age at marriage, had an even chance of reaching 60 years and seeing a number of grandchildren<sup>5</sup>. Hence the biblical 'three score years and ten'. When mortality is swinging wildly as during a famine or epidemic, the life expectancy for a single year or even decade can drop to much lower levels than the actual average life spans of people living through the disaster. India's life expectancy was 25 years in the 1880s but only 20 years in the second decade of this century when Spanish influenza was passing through the country<sup>6</sup>.

Life expectancy for much of the Third World is now an index in another sense. The orthodox life expectancy is calculated from census population figures and birth registrations. But in mainland South Asia and sub-Saharan Africa there are no complete registration systems. In most countries life expectancies are estimated by models relating adult to child mortality levels. This is rendered difficult by markedly different ratios of adult to child mortality levels found in different societies, which is the main reason for the multiplicity of families of life tables in the Princeton and United Nations model life tables, and for the parameter  $\hat{a}$  in William Brass's system<sup>7</sup>. Before the 1970s child mortality estimates were often derived from other models based on such data as parents reporting in surveys the proportions of their children who had died, but the World Fertility Surveys and the Demographic and Health Surveys have been calculating child mortality directly from mother's retrospective reports of their histories of child birth and loss. The methods are increasingly sophisticated and most life expectancy estimates are probably not far off the mark. Annual estimates are less well based, as they depend not only on estimates for the survey year but on the subsequent projection of trends based often on doubtful data or surmise.

Surveys are infrequent and trends must be generalised, thus missing out on the real mortality fluctuations; in the West African Sahel, neither the retrospective reports nor the censuses can identify any impact of the great periodic droughts. In sub-Saharan Africa half of the countries have not had a modern demographic survey over the last 30 years, and most others have had only had a single survey. Analogies with other countries are used to make estimates of levels and trends in these cases.

Even in the West, reasonably complete national vital registration systems or population registers go back only to the late eighteenth century in Sweden, the mid-nineteenth century in Western Europe and Australia, and the late nineteenth century in the United States. Historical demographers have pushed mortality estimates back further using indirect methods of estimation developed for contemporary African populations, or by linking church records of baptisms and burials.

Infant mortality rates can be accurately estimated only by recording the deaths of children over the year following their births. When surveys are used this is usually done in retrospect or by estimating a wider range of child mortality and apportioning a fraction to infancy.

### **The causes of the mortality decline**

The Swedish population registers show that country's mortality declining from at least 1750 when the system was begun<sup>8</sup>. Back-projection methods in England show a slow increase in life expectancy from about the 1820s, but another half-century elapsed before there was consistent improvement<sup>9</sup>. Australia's life expectancy appears to have improved steadily from around 45 years in the mid-nineteenth century to around 54 years at its end<sup>10</sup>.

What, then, drove the mortality decline? One answer given for both Europe and India was the passing of the great mortality crises, especially as famine was conquered by more commercialised farming and better transport systems. English data from 1540 provide modest support for this thesis<sup>11</sup>, but the great crises had been conquered by 1750 and thereafter we must look for other explanations. Alfred Marshall, writing in 1890, attributed mortality decline to 'the growth of temperance, of medical knowledge, of sanitation and of general cleanliness'<sup>12</sup>. What is interesting, although it may be implied, is the absence of any credit being given to rises in living standards.

Subsequently, the granting of a role to medicine at this time or long afterwards was to be repeatedly attacked. Samuel Preston and Etienne van de Walle relegated it to after the introduction of diphtheria immunisation in the 1890s<sup>13</sup>, while Thomas McKeown placed it after the introduction of sulphonamides in 1935<sup>14</sup>. McKeown, a social scientist beleaguered in a British medical school, gave full credit to material improvements in living conditions, mostly nutrition, as Britain began the large-scale import of food from overseas, following the repeal of the Corn Laws, with the wealth that the Industrial Revolution was providing, and the increasing efficiency of British farming. He later emphasised that most deaths attributable to malnutrition resulted from infectious disease.

McKeown's views have a strong appeal for social scientists, especially those of postmodernist inclinations, and some have been tempted to argue that modern medicine is still a minor factor in the contemporary Third World mortality decline, because its scarcity, cost and complexity have allowed it to play only a lesser role there.

McKeown has been attacked and modified. PE Razzell denied the improvement in English nutrition and offered two reasons for the mortality decline: first, smallpox vaccination beginning in the eighteenth

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century; and, secondly, an improvement in personal hygiene (measured by the consumption of soap and washable cotton goods) that reduced the level of a range of diseases where lack of cleanliness played a role in transmission<sup>15</sup>. Preston and van de Walle presented evidence from three French cities to show the treatment of water having an impact on death rates at least as great as nutritional improvements as early as 1850<sup>16</sup>.

In this lecture, I will examine the evidence that has accumulated on the nature of the Third World mortality decline this century, and especially since 1945, to help us understand how it came about but also in an endeavour to throw light on the earlier, but overlapping, Western mortality decline.

#### **The great crises**

There is evidence from the record of both the West and the Third World that greater wealth, better administration and improved transport could bring to an end the great mortality peaks that had characterised human history since at least the Neolithic revolution<sup>17</sup>. But it has become increasingly doubtful whether their passing has been a major factor in accelerating either mortality decline or population growth. Our work on the Sahelian droughts showed that reported deaths were an exaggeration<sup>18</sup> and that their impact could not be detected in the retrospective demographic record. Susan Watkins and Jane Menken examined a range of modern crises to show that many of the excess deaths in such calamities may merely have been hastened events that would soon have happened anyway<sup>19</sup>. The impact on the long-term trend in mortality was slight because of unusually low death rates after the crisis, and the impact on population growth was nil because of rises in the birth rate. The estimate of annual death rates in England from 1539 to 1871 by Anthony Wrigley and Roger Schofield tend to support the theory in that the high death rates of the later seventeenth century were followed by two decades of relatively low mortality, and this was again the case after the hard years of the third and fourth decades of the eighteenth century. The crises affected short-term but not long-term trends<sup>20</sup>.

#### **Material well-being**

Material well-being is not identical with income, but we do have Angus Maddison's time series of estimated real per capita incomes for many countries<sup>21</sup> while we have nothing similar for nutrition, clothing or housing.

We also have time series for mortality decline<sup>23</sup>. Table 1 includes most of those countries for which there are reasonably solid estimates of when a

**TABLE 1**  
**Real Per Capita GDP (1990 Geary Khamis dollars)**  
**on the Attainment of a Life Expectancy of 50 years**

Country	Life Expectancy of 50 years	
	Date achieved <sup>a</sup>	Per Capita GDP at that date <sup>b</sup>
Sweden	1895	2,200
Australia	1898	4,000
USA	1900	4,100
Netherlands	1902	3,500
United Kingdom	1905	4,500
France	1908	3,400
Japan	1945	2,000
Chile	1945	3,600
Brazil	1950	1,600
Mexico	1952	2,200
South Korea	1955	1,200
Thailand	1958	950
Turkey	1960	1,800
China	1963	770
Egypt	1967	870
Morocco	1969	1,800
India	1970	880
Kenya	1970	900
Ghana	1973	1,260
Tanzania	1978	690
Bangladesh	1983	620
Nigeria	1995	1,100

**Sources:**

<sup>a</sup>Keyfitz, Nathan and Flieger, Wilhelm (1968), *World Population: An Analysis of Vital Data*. Chicago University Press: Chicago; Population Division, United Nations (1999), *World Population Prospects: The 1998 Revision*, vol 1, *Comprehensive Tables*, United Nations: New York.

<sup>b</sup>Maddison, Angus (1995), *Monitoring the World Economy, 1820-1992*. Development Centre, OECD: Paris.

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life expectancy of 50 years was reached and real per capita income figures (1990 Geary Khamis US dollars).

There is a pronounced downward trend over time in reaching the 50-year-life-expectancy threshold: what Australians in 1901 would probably have regarded as 'good health for all' (to use the words of the 1978 Alma Ata Declaration). The per capita incomes of those countries attaining this threshold before the First World War, in Northwestern Europe and English-speaking countries of overseas European settlement, averaged over \$3,500; those doing so in the first decade after the Second World War, the most advanced Asian and Latin American countries, averaged over \$2,000; the later countries, in Asia and sub-Saharan Africa, averaged \$1,000. Clearly, over time something else than income has been exerting an impact. It was certainly not nutrition because that probably falls faster than per capita income as we come down the table to more recent mortality onsets. Not all countries were on the trend line. Sweden, the first country to reach a life expectancy of 50 years – with the possible exception of New Zealand – did better than its per capita income suggested. Mexico and Morocco did worse.

#### **Modern medicine**

There is little debate about the impact of immunisation, nor about the extraordinary success in spreading child immunisation around the world. Levels of infant coverage climbed from 50-60 per cent in the mid-1980s to 80 per cent in the 1990s<sup>23</sup>. Access to safe water and adequate sanitary systems has increased although almost certainly not to the extent reported by the international survey programs. Without such initiatives India could hardly have reached a life expectancy of 60 years with a level of real per capita income similar to that in Britain at the end of the eighteenth century.

What is debated is how effective modern curative medicine can be in the contemporary Third World, especially in rural areas and urban slums. One can either compare the impact on an area where modern medicine has been applied with a control area where it has not, or trace the health changes in a society suddenly subjected to a more intensive modern health system. We have been associated with both approaches.

A quarter of a century ago two rural areas with similar socioeconomic characteristics were chosen in the Ekiti Division of southwest Nigeria<sup>24</sup>. For reasons of historical accident, the major village of one area had benefited from a small efficient hospital for several decades. The hospital had been continuously staffed by two doctors and a number of nurses and had an adequately supplied outpatients clinic. In contrast the other area was located 40 kilometres from the nearest hospital and 10



kilometres from the nearest pharmacy. Sample surveys demonstrated that the area with the hospital had a child mortality level (ie, the proportion of children dying before five years of age) of 23 per cent and a life expectancy of 45 years, while in the area without a hospital the child mortality level was double at 47 per cent and life expectancy eleven years lower at 34 years. These results did not surprise us as the hospital provided medicines, including antibiotics, assisted with pregnancy and birth, gave instructions in health care, implied the importance of safeguarding life, and demanded to see again those patients who were not recovering. The findings did surprise the more radical wing of the public health movement, one of whom described the report as 'the most dangerous paper ever written'. Yet much of the advice on health and recovery given by the hospital was of the type that Western health services would have given in 1900 and earlier.

The historical approach focused on the introduction of comprehensive health services to three larger populations, Sri Lanka in the period 1946-53, Kerala in 1956-71 and Costa Rica in 1970-80<sup>25</sup>. In each case there was an attempt to provide health centres to cover the entire rural population and to do this or to provide easy access to both outpatient and inpatient hospital services for townspeople. Usually, and in contrast to the Alma Ata primary health services formula, the centres had to have doctors as well as nurses. In fact, in Sri Lanka they were called 'cottage hospitals'. This forward movement in health usually occurred during a period of social renewal or revolution and most of the health staff were for a period at least imbued with a determination to understand and overcome the problems of the poor and less literate. During this time the situation was created that nearly all births took place in institutions with trained staff. In this radical period of change in health services, life expectancy jumped by twelve years in Sri Lanka and Kerala, and by seven years in Costa Rica which had started from a higher base. The rates of mortality improvement were much higher than they were in either earlier or later years.

### **The role of education**

In terms of our own research odyssey, the impact of modern medicine was not the most influential finding in the Nigerian study. More important, and surprising at that time, was the realisation that in each area the chance of a child's survival rose with the education level of the parents, especially that of the mothers<sup>26</sup>. The most striking finding was that, even in the area with little access to modern medicine, children's chances of survival rose steadily and linearly with the education of their mothers. Even if a girl had enjoyed only a year or two in a bush school with a semi-educated teacher, there was a measurable benefit, when she had

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children, in their survival. In the area where there was a hospital, the survival chances of children were the product of the gains achieved by having this institution and those accruing from their mothers' education.

In the last quarter of a century the study of the effect of maternal education on child survival has been one of the great growth areas of social demography. Because there has been a high degree of agreement in the research from diverse parts of the developing world, even contemporary China, the findings have been described as one of the most certain areas of the social sciences. The major findings are that, even when controlled for such factors as family income and access to health services, a child's chance of survival rises with increase in the education of its parents (with the effect of mother's education usually being greatest). The rise is close to being linear, and it seems to vary little with the type of school or the emphasis on health in its syllabus<sup>27</sup>. Purely Koranic schools have not been found to have this effect, possibly because they reinforce traditional behaviour<sup>28</sup>.

Where there is no access to modern health services, the mechanisms at work seem to be a greater likelihood that the mother will foresee danger to the children and forestall it, and the adoption of approaches to sickness, like insisting on rest or shelter, that make recovery more likely. Where there are modern health services, educated mothers get more assistance from them. Research in South India showed that educated mothers are more likely to take sick children to the health centre, are given more time and fuller instructions by the doctor, carry out the prescribed treatment more accurately, and are much more likely, when the treatment fails, to report this to the health staff<sup>29</sup>.

Women who have been to school do not share the illiterates' fear of new institutions, for their school was one such and it gives them a feeling of familiarity with other aspects of modernity ranging from the achievement of independence to using health services<sup>30</sup>. Shirley Lindenbaum, working in rural Bangladesh, concluded that the educated are cleaner, adopt more hygienic practices and are more careful with their children, less because of what they are taught than because this is the culture of the school<sup>31</sup>. Those who have been to school behave automatically in this way.

Was this also the situation in the past in the West? An opportunity to investigate this was provided by the fortuitous discovery of the individual schedules of the 1900 United States census. This was the first national census to record the number of children born and those who subsequently died by the age of mothers at the time of the census. These data could be converted to estimates of child mortality by the so-called 'indirect methods' developed in the 1950s and 1960s to cope with

the situation in sub-Saharan Africa where these were the only mortality information available. When Samuel Preston and Michael Haines used the indirect methods upon the retrospective 1900 data, which can be taken to represent the child mortality situation in the 1880s and 1890s, they found to their astonishment that mother's literacy (a measure that had to be used as a proxy for education) exerted an impact in lowering child mortality only one-quarter to one-half as great as that found in contemporary developing countries<sup>32</sup>.

One possible explanation is that there was little in the way of effective curative medicine with which educated mothers at that time could co-operate. Another plausible explanation suggested by experience in the contemporary Third World – although not an explanation put forward by Preston and Haines – is that preventive and curative medicine is most likely to be effective when people believe in it and co-operate to the greatest possible extent with its recommendations<sup>33</sup>. This means a belief in the infallibility of scientific medicine, and more broadly in all science. Americans of the late nineteenth century, even those who knew little about science, had faith in it. Modern science had sprung from Western culture and increasingly formed a large part of that culture. In developing countries mortality has been reduced by a twofold process involving both the import of modern medicine and the import of a belief in science that allows the medicine to achieve its impact. The major vehicle for introducing scientific attitudes has been the Western educational system<sup>34</sup>. These are conclusions about the effect of parental education on the survival of children and are framed this way because for most of the Third World there are much better estimates of child than adult mortality. Where good adult mortality information has been collected by a demographic surveillance system in the Matlab area of rural Bangladesh, a study of adult women has recently shown that their survival over the best part of two decades has been mostly determined by their educational and nutritional statuses at the beginning of the period<sup>35</sup>. It is probable that women's education is one aspect of a broader range of influences on women that gives them greater control over their lives and a greater desire to exert control, described as **female empowerment**. The various constituents of female empowerment are not easily defined and hence not easily measured. Formal education may long remain the best measured component and also the best mechanism available for achieving empowerment.

### **Culture**

If individuals and their cultures can be transformed so as to cause the forces of mortality to retreat, then perhaps some cultures start with a greater advantage than others. An examination of a range of plural

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societies showed wide variation in childhood survival between the component cultures even when education, income and access to health services were controlled<sup>36</sup>. The minor explanation is probably different emphases on the importance of child and adult survival, a situation attested by mortality data showing very different ratios of adult to child survival in societies with similar life expectancies. The major explanation is probably wide gulfs in sensitivity to death and in the importance given to warding it off.

We spent three years, 1985-87, investigating this situation in Sri Lanka<sup>37</sup>. By that time Sri Lanka had attained a life expectancy of 70 years, the same as the USSR and Czechoslovakia, four years behind Austria and Ireland, and six years behind the United States even though America's per capita income was 44 times the size of Sri Lanka's. What we found was an extraordinary sensitivity to sickness and the threat of death, with early detection of sickness, fast resort to medical attention, and impatience with treatments that were not succeeding with the result that sources of treatment were frequently changed. By all these measures Sri Lanka was very different from rural Karnataka in South India, where we had previously been working. Some of the explanation was high education levels. But much of the explanation for both the sensitivity to death and the demand for education lay in a socially and gender-egalitarian society with a Buddhist culture emphasising sensitivity in this world and not promising an afterlife.

#### **Routes to low mortality**

How, then, did these interrelated but disparate findings relate to the Third World mortality decline? An examination of the situation in the mid-1980s showed that some nations had much lower mortality than their per capita income levels deemed likely<sup>39</sup>. The front-runners were Asian Buddhist and Hindu societies, while the most pronounced laggards were Middle Eastern and North African Islamic societies. The situation in some, but not all, the latter was at least partly explained by steep recent rises in income driven by oil prices. A multivariate analysis of health rankings relative to per capita income indicated the most powerful forces to be in declining order education (female followed by male), fertility control, and the density of physicians. Nutritional levels were of less importance.

The search for explanation then turned to the great leaps forward in life expectancy, Sri Lanka in the late 1940s and early 1950s, Kerala in the late 1950s and the 1960s, and Costa Rica during the 1970s. In each case the new universally accessible health system was introduced to a population which had already attained high levels of education, and those involved in bringing the health services to poor and remote

populations repeatedly attributed their success to the intelligent and enthusiastic co-operation of these educated populations. Education alone was not sufficient. Sri Lanka's educational levels were in the early 1920s high by Asian standards: female levels were to prove to be 50 years ahead of those in Pakistan. But this was not enough to reduce mortality as was shown by life expectancies stagnating at little over 30 years and infant mortality rates well above 200 per thousand live births<sup>40</sup>. Conversely, in the mid-1980s Saudi Arabia and Libya had per capita incomes above those of Britain and New Zealand respectively, but, in spite of massive expenditure on modern hospitals, had low adult female education levels resulting in infant mortality rates 2-3 times those of much poorer Sri Lanka, and life expectancies a decade shorter<sup>41</sup>.

Sri Lanka, Kerala and Costa Rica all had democratic health systems, within easy reach of all in terms of both distance and cost. Their populations were characterised by a radical tradition which led communities to demand health services and schools and to protest forcefully if they were badly run, inefficient, or serviced inadequately. Their societies were sufficiently egalitarian to prevent rich or powerful groups monopolising health services as occurred in many parts of the world<sup>42</sup>. Their women were sufficiently independent, assisted by matrilineality in Kerala and bilateral descent and inheritance in Sri Lanka, to make decisions on their own, if necessary, to take their children or themselves for treatment.

### **Health transition**

All this evidence can be put together as a theory of **health transition**, as the mortality side of demographic transition, with the change taking place from the high mortality and fertility levels of traditional society to the low levels of both vital forces in a post-industrial world. This had essentially been the transition from familial production, dominated by subsistence agriculture, to a global system shaped by the market and international trade with most populations urban and working outside agriculture<sup>43</sup>. The transition is nearly complete. The proportion of the world's population living in towns and cities has increased from one-third in 1960 to almost half now, and will probably reach two-thirds by the middle of the 21<sup>st</sup> century<sup>44</sup>. By that time the United Nations medium population projection predicts that the life expectancy of the Third World will be over 76 years, converging with that of the First World, and, after centuries of increase, global population growth will be drawing to a halt<sup>45</sup>. Much of what has happened and will happen has been driven by rising incomes and scientific and technological progress, and the sharing of these things around the world as part of economic globalisation.

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Human beings have changed too and have accelerated the rate of mortality decline through social and behavioural change as well as the development of the new technology. This is what we have called 'health transition'. In a discussion of child survival, John Simons identified the driving forces as a commitment to survival and active participation in attempting to ensure that this is the outcome<sup>46</sup>.

The commitment to survival is the belief that death is the worst of all possible outcomes, qualitatively different from any other physical fate. It is this conviction that makes many of us uneasy about the current attempt to combine measures of disability and mortality into a single index<sup>47</sup>. Traditional society did not regard death as being unique. Given the very high mortality rates it could hardly afford to do so. Many societies regard death as ordained and hence not avoidable or tragic. Most were far more certain than we are that death was not the end. Many other joys and activities were thought worth undertaking even if there were a considerable risk. The willingness to reduce risky behaviour and circumscribe pleasures in order to raise the chance of survival a little has been a continuing strand in social modernisation.

More obvious has been the increasing willingness to intervene to protect one's child, one's spouse or oneself. The traditional agrarian family depended for its stability and its productive efficiency on patriarchal vertical control, on generation and gender differentiation, and on everyone fitting into their station<sup>48</sup>. The daughter-in-law, suspect in any case because she had been brought into the family from outside, owed her obedience to her mother-in-law and her commitment to the larger family. One of the paramount sins that could be committed by a young woman was to give priority in her concern and action to her children's risk of sickness and death, or indeed to her own or even her husband's. Where we have worked in rural South India, a young mother who revealed that her child was sick before her mother-in-law had noticed this was in a very difficult situation. The more educated daughters-in-law are more driven to take action and are more likely to get away with it because of the realisation that respected non-traditional institutions have moulded them into a different kind of human being<sup>49</sup>.

The traditional system was progressively dissolved by marketing farm produce and later land, by nucleating family residence and expenditure especially when a move to distant places was involved, by urbanisation and the move into non-traditional employment. What happened to men and women was called 'individualisation', and it was greatly speeded up by formal education which established alternative sources of wisdom and legitimisation to the older generations. Education also tended to give greater reverence to rationality and ultimately to science than had been

true of the whole society. The beginning of this change in England has been placed as early as the rise of Puritanism<sup>50</sup>. Educated people for most of the time up to the present have been more likely to use soap, to isolate family members with infectious diseases, to guard their children from danger, to use safe water or to boil it, to boil milk for babies' formulas, to accept immunisation for their children and even to insist on it, to take sick children for medical treatment, and to follow the prescribed course of treatment. Some of these changes occurred before massive vaccination or the treatment of water or the availability of effective medical therapy. Sweden, which has the longest series of trustworthy statistics, witnessed between 1780 and 1860 a fall in mortality of one-third for the population under ten years of age and of one-quarter for those 10-34 years of age. Between 1780 and 1999 the Swedish life expectancy climbed 42 years, over 70 per cent of that rise having been achieved by the late 1930s when sulfa drugs became widely used, to be followed a decade later by antibiotics<sup>51</sup>.

What has happened since 1945 is different. Antibiotics and malaria prophylactics have become cheaper and widely used in the Third World. DDT and other insecticides were used extensively. Vaccination programs have become available to most people, especially children. Health centres offer their services, although still sparingly in many countries. Education levels have risen from vestigial levels in most developing countries to nearly all children in 1999 having substantial primary schooling and increasingly some secondary schooling<sup>52</sup>. There has been substantial penetration of the Western media, first radio, then films and, now, satellite television. Independent governments proclaim a responsibility for all their citizens. The result has been a decline in mortality faster than can be explained by economic growth in many countries and owing much to the import of Western medicines, technology and education. Now China has a life expectancy of 71 years, India of 60 years, Latin America of 69 years, and the whole developing world of 64 years<sup>53</sup>.

### **Where health transition is still needed**

Perhaps the most striking contemporary example of the importance of attitudes and behaviour in reducing mortality comes from the failure of these forces to operate strongly enough to control the sub-Saharan African AIDS epidemic. The global epidemic has had only a minor impact on mortality transition, retarding it by two or three years and checking population growth by perhaps seven months, even though those already dead or infected number at least twice as many as those who died in Europe as a result of the fourteenth-century Black Death or in the whole

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world as a result of Spanish Influenza in the second decade of the twentieth century<sup>54</sup>.

The situation in sub-Saharan Africa is very different, for 70 per cent of the HIV/AIDS victims have been found there. Indeed, half the HIV/AIDS in the world has occurred among three per cent of the world's population living in ten countries of East and Southern Africa stretching from Uganda to South Africa. In Botswana and Zimbabwe over 25 per cent of the adult population is infected and a much higher proportion will be infected over their lifetimes<sup>55</sup>. The life expectancies in these two countries over the next five-year period are now 40 years<sup>56</sup> (and will probably fall lower) instead of over 60 years as had been earlier projected.

Yet research has shown that great numbers of individuals and most governments are not sufficiently awed by the rise in deaths to do all they can to contain the epidemic<sup>57</sup>. The epidemic could be contained by a substantial reduction in high-risk sex, or, if this is unacceptable, by a high level of condom use in commercial sexual relations and by making condoms easily available for adolescent sexual activities, accompanied by strong government leadership in promoting such approaches.

Many individuals believe death is so capricious that ways of life should not be greatly changed to reduce specific mortality risks. There is an extraordinary bravery about continuing to take risks. Others believe death is predestined or that it needs not only an attack by pathogens but the parallel action of malevolent forces invoked by enemies. Others, including most religious leaders, feel that it is the punishment of God for non-marital sexual activities and that ways should not be found for circumventing divine instructions<sup>58</sup>. Individuals would rather maintain the chilling silence about disease deaths that cannot be discussed than organise community resistance to AIDS. Governments are more concerned about offending religious leaders or entering the tricky political area of sexuality.

The whole reaction is an example of a health transition insufficiently advanced. The African AIDS epidemic would be defeated if both individuals and governments regarded death as undeniably the worst outcome and felt a strong immediate responsibility for taking action to avoid it. With the further globalisation of society the time will come when there are such reactions and this as well as medical advance will ensure the further progression of the mortality transition.



Notes

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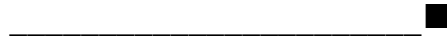
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**Professor John C Caldwell** AO, a Fellow of The Academy of the Social Sciences in Australia, is Emeritus Professor of Demography and Coordinator, Health Transition Centre, National Centre for Epidemiology and Population Health, Australian National University.