Planners at state, regional and LGA level are using the results to identify local health problems and implement strategies that can reduce the large differentials in health status between LGAs.

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GLOBAL HEALTH INEQUALITIES: THE CHALLENGE TO EPIDEMIOLOGY

Martin McKee
Professor of European Public Health
London School of Hygiene and Tropical Medicine

THE SCALE OF INEQUALITY

In 1998, of every 100 15-year-old boys in Iceland, 91 could expect, on the basis of current levels of mortality, to survive until the age of 60. Among a similar group of Zambian boys, only 22 could have a similar expectation. Male life expectancy at birth is similar in Russia and Ghana, but the underlying causes are very different.

The scale and diversity of the variation in mortality between countries has fascinated researchers for years. If we can begin to understand these differences, maybe we can gain some insights into the causes of inequalities in health within countries. This article examines the inequalities in life expectancy between countries, discusses the quality of global data sources, and describes how many analyses fail to recognise the complexity of attributing causality.

A first question must be: how good the data are on which such comparisons are based? There are two major issues. The first is whether they cover an adequate spectrum of ill health. A major achievement of the program on the Global Burden of Disease has been to highlight the importance of conditions that have a greater effect on disability than on death, such as mental health.[1] Unfortunately, most comparisons are limited to data on mortality. While the World Health Organization does publish data on disability adjusted life expectancy,[2] this involves the application of standard weightings for particular conditions to diverse populations and they are not based on directly collected data on disability in each country. Further, the correlation between unadjusted and disability adjusted life expectancy is very high (r = 0.96). Many countries do collect some information on health status, typically from household surveys, but comparability is limited.[3]

The second issue is the quality of mortality data. It is necessary for information to be accurate with respect to population denominators, numbers of deaths, and their causes. A substantial proportion of the world's population never officially exist, in that neither their death nor their birth will ever be recorded by any government agency. This is especially likely in areas of conflict, where there are often large-scale movements of population and where registration systems are a low priority. Even in countries that appear to have well-functioning registration systems there may be considerable discrepancies between official data and that gathered by household surveys. Data on infant mortality are especially problematic, even among some groups in advanced industrialised countries.[4]

Consequently, data from many countries must be treated with a degree of caution. Nonetheless, it is apparent that, even allowing for considerable errors in some countries, the expectation of a healthy life varies enormously.

EXPLAINING INEQUALITIES

Early work identified the importance of economic factors, a relationship that is still apparent, at least for poorer countries. Thus, among countries with a gross domestic product per capita of up to about US$5,000, greater wealth is clearly associated with longer life expectancy (Figure 1).

There are, however, some exceptions. Life expectancy at birth is about a year longer in Sri Lanka than in Malaysia, even though the latter is more than twice as wealthy as the former. Similarly, life expectancy in Costa Rica is 25 years longer than in Gabon, although both are at a similar economic level.

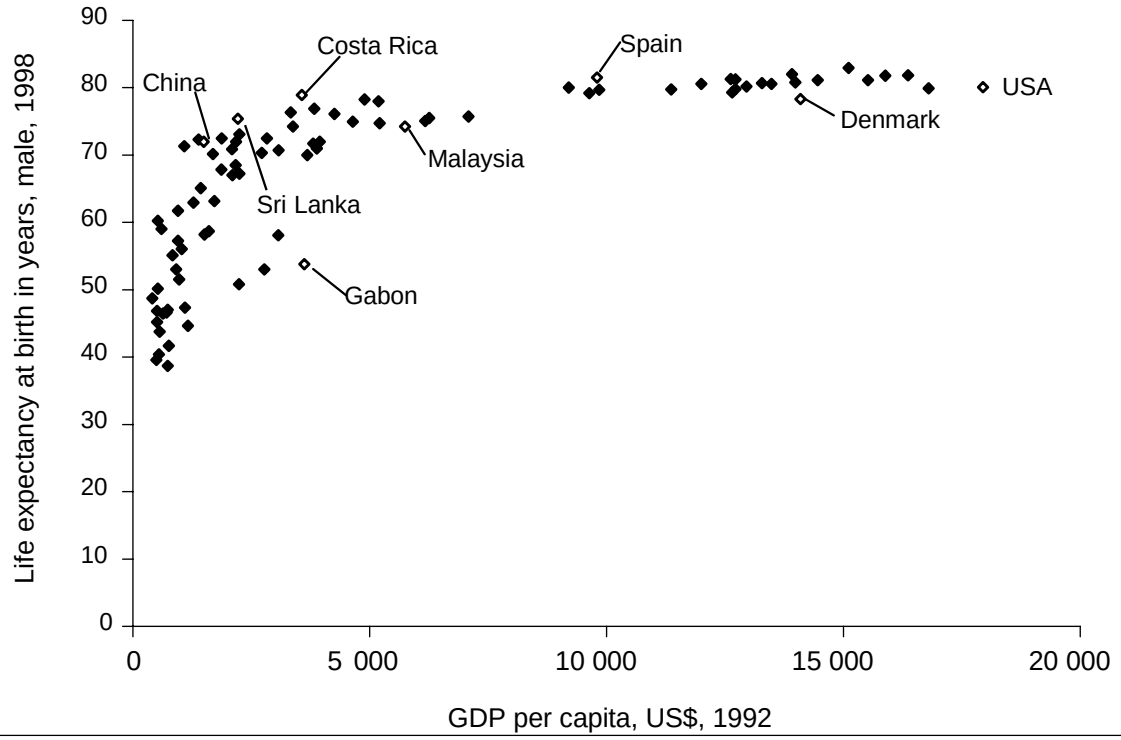
In a study of global determinants of life expectancy, Hertz et al. argued that the underlying determinants of life expectancy included a clean water supply, nutrition, and literacy rates. They went on to examine the circumstances of three outlying countries: Costa Rica and Sri Lanka, which performed better than expected; and Egypt, which performed worse.[5] They drew attention to the high level of investment in education and basic infrastructure, accompanied by land redistribution in Costa Rica and Sri Lanka. In contrast, in Egypt, social investment was very limited, primarily because of the large amount of government revenues spent on defence, a very different situation from that of Costa Rica that had abolished its army some years previously.

In wealthier countries different factors apply. Above a national income of about US$5,000 per capita the relationship between wealth and life expectancy almost disappears. Thus, while the United States of America is fives times as wealthy as Costa Rica, this brings only one year of additional life expectancy.

Although the magnitude of the differences is much less than among poorer countries, considerable diversity in life expectancy remains among wealthy countries. One of the most widely cited explanations for this variation is that proposed by Wilkinson, who argues that countries with less equal income distributions have lower life expectancies.[6] This view has been challenged by Judge, who has shown that the relationship disappears when household incomes are adjusted for family size, as well as pointing out some other problems with the data used.[7]

FIGURE 1

THE ASSOCIATION BETWEEN MALE LIFE EXPECTANCY AT BIRTH AND GROSS DOMESTIC PRODUCT (GDP) PER CAPITA EXPRESSED IN US$



Wilkinson's approach continues a long tradition of comparative studies that have sought explanations for current patterns of mortality in a limited number of present-day factors. Earlier work has examined, for example, health care inputs (interestingly, finding a negative association).[8]

It is now apparent that such analyses are over-simplistic, for several reasons. First, they tend to be driven by the easily measurable. This immediately eliminates many potentially important factors to which exposure is difficult to measure. Examples include diet, climate, and those components of the environment that increase risk of injury. Even where data are available they may be measuring the wrong thing. For many potential explanatory variables, such as diet, alcohol or cigarettes, data are often only available on sales and take no account of informal (or illicit) production or smuggling. Data on consumption may measure the wrong thing. Thus, many surveys of alcohol consumption have assessed average weekly consumption although it is now apparent that the pattern of drinking is equally important.[9] The high level of cardiovascular disease and injuries in Russia can only be understood by taking account of the extent of binge drinking.[10]

Second, they take no account of context. A word used in one country may not mean the same in another. Comparisons of health care inputs often include numbers of hospital beds even though a bed, on its own, contributes nothing to health care. It is the number and quality of the staff that come with it, and the tools at their disposal that really count. These are much less easy to measure.

Third, very few factors operate in isolation. Risk factors often interact in ways that remain unclear. Thus, a diet rich in fruit and vegetables reduces the risk of many cancers where an exogenous carcinogen is involved, such as those of the lung, colon or stomach.[11] This may go some way to explaining the disproportionately high death rate from lung cancer in Hungary and the somewhat lower rate in Spain, despite comparable patterns of smoking.

Diet and smoking cannot be considered in isolation from the societal and economic factors that often constrain the choices available to people. Culture, although imperfectly understood, is also important. The much lower level of life expectancy in Denmark than in its neighbour, Sweden, while attributable to some immediate causes such as higher rates of lung cancer and cirrhosis, also reflects a fundamental cultural difference in the perception of the importance of individual choice in the two countries.[12] Culture is also shaped by geography, which influences patterns of agriculture and thus diet. The potential effect on health can be seen in southern Europe, which owes some of its long life expectancy to the benefits of a Mediterranean diet.[13]

Culture and economic factors combine, as in the rapidly increasing death rate in sub-Saharan Africa. HIV–AIDS is obviously a key factor, but a comprehensive analysis must also take account of the pervasive poverty, the low status of women, the high prevalence of other sexually transmissible infections, and the lack of availability of affordable treatment.[14]

Genetic factors may also play a role, where a population has been subject to one type of evolutionary pressure for centuries but where a new risk factor emerges. This is exemplified by the increase in type II diabetes among Pacific Islanders. Selection of those best able to survive episodic famine created populations that are especially susceptible to an abundance of food, the thrifty genotype theory.[15]

However the main limitation of such analyses is their failure to take account of the time over which different factors act. In some cases the link with identifiable risk factors is apparent. For example, smoking rates in a population are largely fixed by the time people leave their teens but many of the health consequences will only become apparent many years later. The death rate from lung cancer among Russian men has been falling since the early 1990s but this is because of the reduced supply of cigarettes between the end of the Second World War and the death of Stalin.[16] Changes in alcohol consumption lead to changes in alcohol-related malignancies approximately 20 years later.[17] Current levels of heart disease in France are more closely associated with risk factors 20 years ago than now.[18]

What has been less apparent until recently is the effect of conditions in early life on adult disease. There is now a large body of work linking growth in the womb and early childhood with a wide range of conditions including stroke, ischaemic heart disease and type II diabetes.[19] The consequences are apparent at a population level. Thus, Portugal stands out from the rest of western Europe in terms of its death rates from stroke and stomach cancer, both of which are at levels comparable to those in eastern Europe.[20] These two conditions have only one thing in common, that they are driven largely by conditions in the womb and early childhood. The significance becomes clear when it is recalled that conditions in Portugal in the 1950s and 1960s were much closer to those in Poland than in its neighbour, Spain.

CONCLUSION

In this brief review it has only been possible to touch on one aspect of the inequalities in health among countries. Other important issues include the impact on these differences of future developments arising from the process of globalisation,[21] as well as the complex relationship

between migration and health.[22] Neither has it been possible to explore the contribution of health care to patterns of health, even though it is clear that many people in developing countries are dying because of shortages of essential drugs.[23] In industrialised countries differences in the quality of health care are now having a visible effect on disease outcomes at a population level.[24]

The wide inequalities in health among nations pose substantial challenges to epidemiologists. New approaches are needed that take account of the difficulties of disentangling the causal chains involved. This will involve a combined effort by demographers, epidemiologists, political scientists, basic medical scientists and others. There is a need to recognise that research based on individuals may not answer questions about the health of populations,[25] and also that, contrary to the prevailing view among many funding bodies, understanding the human genome will not solve all our problems.

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