

## **SPH Conference 2005 - Key note presentations Daniel Dorling**

Remarks to the slides

1. The Geography of Social Inequality and Health. In this talk I show 30 pictures: maps, graphs and map- graphs which hopefully illustrate what a geographical perspective can bring to the understanding of social inequality and inequalities in health. At the very least the pictures provide some food for thought. The mapping of disease is rumoured to have been initiated by a medical doctor in charge of a lunatic asylum who gave his patients crayons to colour in maps by disease rate.

Maps appeal widely and can draw people into issues that might otherwise not interest them. I begin with changing gender inequalities in the rich countries of the world, move on to local health inequalities in one country (the UK) and then to new emerging global patterns to social inequality and health as depicted geographically and graphically.

2. Rich World Female Mortality Rates. This first image is a graph which looks like a contour map. Along the bottom axis are marked 150 years of time and along the side axis 100 years of age. The colours of the cells in the graph depict fifteen thousand mortality rates. The bottom left hand corner of the graph is the mortality rate of infant girls born into what are now the rich countries of the world in 1850. Between an eighth and quarter then died before their first birthday. The top right hand corner of the graph shows that by the year 2000 between a quarter and half of the women aged 100 in the rich world died then before their 101st birthday. The contours in the graph show that it is for the young that progress has been most rapid and that only one event, that of 1918, interrupts data involving more than half a billion people. Data sources are given on the slide and this work was done with Dr Jan Rigby.

3. Rich World Male/Female Mortality ratios. When the graph for men is divided by the graph just shown for women then this pattern emerges for the richest countries of the world. Note that at different times different countries enter the world's database but this does not have a great effect on the patterns shown and, if anything, ensures that countries are only included when they are sufficiently wealthy to be able to record mortality rates accurately. Before 1914 there was little inequality. The first and second world wars are evident as is the "smoking plume" centred around age 60 in 1975 (the men born in 1915). The striking inequality is the triangle to the right with an apex around age 20 in 1960 (the men born in 1940). Men of my age across the rich world are now three times more likely to die, this year, than are women of my age.

4. USA Male/Female Mortality ratios 1900-2071.

Data for individual countries shows local variation. The first world war had little effect on the USA; their smoking plume is centred for those aged a little older as men could afford large numbers of machine rolled cigarettes a little earlier and were kept alive a little longer perhaps, but in essence the pattern is the same. United States actuaries predict a remarkably uneventful future as current trends become embedded. I don't think we should be so hopeful. We are likely to live in more interesting times than these.

5. England-Wales Male/Female Mortality ratios 1840-2050. For this part of the UK, with only a twentieth of the billion overall populations, the patterns are less clear but still similar. The first world war matters more; inequalities attributable to differential rates of smoking between men and women in the past peak a little later, but by only a few years and UK actuaries are perhaps slightly more imaginative than their US colleagues, but still they are naturally conservative in their predictions. Growing inequalities in mortality at young ages are, of course, based on low numbers of deaths, but for many age groups of younger men their deaths rates remain at levels reached shortly after the second world war. Diseases of despair are on the rise for younger men in the rich world.

6. Sick/Disabled. Turning to the local and back to both sexes what might these diseases of despair be? Here are two maps of the UK each showing over 400 areas, each area drawn roughly in proportion to its population. The first map shows the proportion of people who cannot work because they were sick and disabled in the year 2001, the second shows the percentage point change in that rate since 1991. None of these rates are age/sex standardized because that confuses unnecessarily. Note the rate reaches twelve percent of the population in some areas in the north, and has risen almost everywhere over time. Physically the population now have better health than a decade ago. Geographically the worse health is where people are poorest and have become poorer.

7. LLTI 16+. Limiting long term illness rates are at their maximum in Northern and Welsh areas where up to almost a third of the population in particular places report that they suffer from an illness which limits their daily activities. These rates of illness have risen everywhere in the UK since 1991, but most away from a population circle centred on London.

8. Key to the Human Geography of the UK: The population circle of constant health, centred on London also coincides with the area from which children are most likely to attend university in the UK – A T shaped valley shown on this map where height of areas is drawn in proportion to children not attending university.

9. The geography becomes simpler over time. Simple maps of all cause and lung cancer SMR show just how simple many local geographical patterns are. (rates 40% and 120% above mean can be seen in Glasgow – some of the highest rates in Western Europe).

10. Trends in UK inequalities (Life Expectancy & income). Over time in the UK inequalities in income, both socially and geographically rose quickly in the 1980s and this was mirrored by rising and then stable and high inequalities in inequality in life expectancy between areas. Only for the most recent year of data have inequalities in income been seen to fall – 7 years after the current Labour government came to power (source BMJ Spring 2005).

11. Demand for the health industry. If even simpler geographical boundaries are used in one country then patterns often become clearer. Here are the proportion of people who suffer both poor health and a limiting long term illness in England and Wales. Note rates are lowest to the north and west of London. The rate at which the population expresses its demand varies by more than four fold between these large areas. If these rates were age/sex standardized the gap actually widens slightly.

12. Supply for the health industry. Health professionals, in this case qualified and working medical practitioners, prefer to live and work – on average – where there are fewer ill people, in university towns and cities of the south of England and in places similar to those in which they are likely to have grown up and entered university from. Thus they remain distributed geographically away from the majority of their prospective patients, even after more than fifty years of national health planning and allocation formulae. Nurses in the north make up a large amount of the gap, being the only group of health professionals in the UK who tend to be located towards where people are more ill. The inverse care law in the UK is as strong as ever.

13. A global context – the world's children. Two billion of the six billion people on earth are children and half of them are growing up in the countries of Africa, India or China. Moving from local inequalities in the UK (which contains only 0.5% of the world's children) to global inequalities in health involves reporting illness and mortality rates which were last experienced in the UK in the 1850s (where this talk began). Here is one possible map of the world's children, which can be coloured according to the rates at which they are deprived of shelter, clean water, education, health care, information, food and so on and on – but, in essence global inequalities in health can be summarised more clearly by concentrating on a dozen regions of the world rather than 200 countries. All data that follows has been derived from the UNDP world development report 2004.

14. Population. The dozen regions and their respective shares of the world's population used in the following graphs are shown here. The two smallest regions are the islands of Japan and the countries of the Congo basin – each containing over one hundred million people. These regions are defined by continental location, income and by the locations of the world's two largest states which contain over a billion people each. Globally these twelve regions of the earth order the population by space into social groups which suggest that there is a continuum to global social and health inequalities.

15. Life Expectancy (years): By 2002 the best off 100 million people on earth (by large area) live twice as long as the worst off. The main irregularity in the continuum is that the people of China now live a little longer, on average, than do those of South America. Within Africa there are regional inequalities which are mirrored at the opposite end of the global scale by inequalities between geographically contiguous groups of OECD nations.

16. Not Surviving until age 40 (%): By 2002 a majority of people living in central Africa do not survive until age 40. In both China and the Near East a higher proportion do than in South America, but again the continuum is clear.

17. Spending on health (\$/person/year). When compared by equal purchasing power parity dollars the spending on health care per person is higher in North America than in Western Europe and higher there again than in Japan. This is total public and private spending. Thus the country with the longest life expectancy is not that which spends most on health care, but the global inverse health care law is still stark. The spending in central Africa per person is near zero. The reverse continuum is clearer on a log scale.

18. Proportion of infants immunised against TB and measles (%). Globally around four in every five and three in every four infants are immunised against these diseases respectively, annually. More where the diseases are least common. Regions are drawn in proportion to the number of infants in each region (135 million infants a year now worldwide).

19. HIV prevalence, ages 15-49 (millions 2003). Three quarters of people with HIV live in Africa and India. To all intensive purpose, none in Japan.

20. GDP US\$ billions 2002. Three quarters of the world's income is enjoyed in North America, Western Europe and Japan. To all intensive purposes as near to none in central Africa as can be shown without a log scale.

21. Per capita annual income (PPP\$ 2000). The world income distribution appear to be essentially log normal formed by the addition of these twelve log normal distributions. It is continuous, not bimodal – although this graph relies on estimates made for individual countries. Almost no one earns (rather than receives) more than 1 million US\$ a year. One million people, almost all in Africa, live on less than 64\$ a year. Of course, with real data the richest people in the world have incomes of very much more than the combined incomes and assets of groups of ten thousand of the poorest of peoples.

22. Decline in infant mortality rate 1970 to 2002 (%).

Infant mortality rates have declined most since 1970 where they were lowest to begin with. Globally inequality in infant mortality has been growing since the 1970s.

23. Slope and Dispersion Index of Inequality – World Life Expectancy 1950-2005. Continental variations in life expectancy have been rising since the mid 1980s using the SII measure and since the early 1990s using the DII measure (Moser et al. WHO Bulletin).

Irrespective of how global inequalities in mortality are measured they are rising and rising because of events in Eastern Europe and the Near East as much as because of Africa and because improvements are still rapid in the richest regions of the world.

24. Inequalities in relative incomes worldwide 1200- 2000. When OECD estimates by Maddison for GDP and population are amalgamated for the twelve regions used here it becomes evident that average incomes in Central Africa have now fallen to a tenth of the low world average. India and the remainder of Africa live half an order of magnitude way. China, Japan, and the far East at different points in the last sixty years each broke away from the group of regions they were travelling, in relative terms, downhill with. However, globally income inequalities are now widening at an exponential rate with the acceleration beginning just as inequalities in mortality began to rise for the first recorded time. The world is dividing by health and by wealth.

25. Conclusion. This talk has drawn on new data made available in recent years locally and globally. Most results are unpublished, but some are in "People and Places" and more analysis of the changing social makeup of one country is now published in "The Human Geography of the UK" (Sage, 2005); see [www.shef.ac.uk/sasi](http://www.shef.ac.uk/sasi) for more information. Locally, in the UK rates of poverty have risen as increased affluence has been accompanied by increased inequality (perhaps not most recently). World-wide, inequalities in income and health are widening. In rich nations the future looks most bleak for younger men who do not succeed – however success is measured. In poorer nations the future is most bleak for children.

#### References

- Data for sides 14-24 is from current research. Much other work is published in \*'d refs below – for more information see [www.shef.ac.uk/sasi](http://www.shef.ac.uk/sasi)
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