Cutler, Deaton, and Lleras-Muney, “The Determinants of Mortality”

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- in the 20th century in high income countries growth in real incomes was accompanied by a historically unprecedented decline in mortality rates
- life expectancy at birth grew by nearly 30 years
- value of reductions in mortality risk can be estimated using compensating differentials in labor markets
- Nordhaus (2002): the economic value of increases in longevity about as large as the value of measured growth in nonhealth goods and services
- Murphy and Topel (2005): between 1970 and 2000, the annual value of increased longevity was about half of the conventionally measured national income
- rapid convergence of older adult mortality rates since 1970 in rich countries
- outside of the rich countries: life expectancy much lower and average health is strongly correlated with income
- after WWII: life expectancy gaps falling, poor countries enjoyed rapid increases in life expectancy, in some cases more than a year gained over a year
- reversal because of HIV/AIDS epidemic and Eastern European, particularly Russian transition
- within countries, there is also a positive relationship between income and other socioeconomic measures and life expectancy (e.g., in the US 25% difference in life expectancy between top 5% and bottom 5% of income distribution, 5.4 years difference between blacks and whites, in England 8.4 years gap between manual workers and professionals)
Determinants of the Historical Decline in Mortality

• life expectancy of hunter-gatherers was perhaps 25 years

• little progress over time, even in 1700 in England life expectancy was 37 years

• start of decline in mortality in 18th century, similar transitions with some timing differences in England, France, and the US

• UK: 37 years in 1700, 41 years in 1820, 50 years in 1910, 77 years today

• bulk of the historical reduction in mortality occurred at younger ages, reduction in mortality from infectious diseases

• improved nutrition
  
  – proponents:
    
    * McKeown (1976): argument through residual analysis
    * Fogel (1997, 2004): uses measures of agricultural output and diary surveys to argue that there was enormous increase in calorie intake

  – opponents:
    
    * Wrigley and Schofield (1981): early increases in life expectancy in England are just fluctuations
    * Steckel (2004): based on skeletal remains, people were taller (and presumably better nourished) in early medieval times
    * Easterlin (2004): beginning of modern growth is far more dispersed across countries than the onset of the modern mortality decline
    * Livi-Bacci (1991): mortality was not lower in well-fed populations (e.g., United States), English aristocrats had no life expectancy advantage over the rest of the population, despite presumably better nutrition
    * Dasgupta and Ray (1990): children who suffer repeated episodes of diarrhea may be able to digest less than 80% of what they consume - two-way interactions between disease and nutrition

• public health
  
  – Preston (1975, 1980, 1996): at a given level of income, people live substantially longer today than they did in the past
  
  – Cutler and Miller (2005): water purification alone can explain half of the mortality reduction in the United States in the first third of the 20th century
- macro public health: big public works projects
  - filtering and chlorinating water supplies
  - building sanitation systems
  - draining swamps
  - pasteurizing milk
  - mass vaccination campaigns
- micro public health: changes made by individuals encouraged by the public sector
  - boiling bottles and milk
  - protecting food from insects
  - washing hands
  - ventilating rooms
  - keeping children’s vaccinations up to date
- public health had existed before but gained ground with the acceptance of the germ theory of disease in the 1880s and 1890s

• urbanization: initially, larger and more crowded cities with unsanitary conditions led to greater spread of disease

• vaccination
  - prior to 20th century: little effective medical treatment for infectious disease
  - during the 20th century the role of medical advances increased in importance
  - vaccinations were the first important medical interventions
  - variolation introduced to Europe from Turkey and to America by African slaves in the early 18th century
  - wide-scale vaccination depended on the germ theory of diseases and started in the late 19th century
  - the morbidity consequences of these diseases was high, but in rich countries even prior to the introduction of these vaccines mortality was low, except for tuberculosis
  - indirect effects of vaccinations can still be important

• medical treatments
  - the development of new therapeutics for people with disease was quantitatively important in the mortality reduction
• decline in infectious disease mortality in the first half of the 20th century
• cardiovascular disease mortality reductions after 1960 (medical care + reduced smoking)
• additional 19% of the increase in life expectancy attributable to reduced infant mortality
• Cutler (2004): importance of improved neonatal medical care for low birthweight infants
• reduced mortality from motor vehicle accidents, pneumonia/influenza, slight decrease in cancer mortality

• long-term reach of early life factors

• Barker (1990): “fetal origins” (or “womb with a view”) hypothesis suggests that conditions of nutritional deficiency will compromise functions operative late in the life-cycle beyond normal age of reproduction to maximize chances of reproduction
• as a consequence, better nutrition decades ago could be having its effect only today
• empirical evidence: strong correlation between health in adulthood and birthweight (several natural experiments)
• most likely the current reductions in cardiovascular mortality are coming from other sources

Determinants of Mortality in Poor Countries

• life expectancy much lower and mortality much higher than in rich countries
• important differences in who dies and from what:
  • in poor countries 30% of deaths among children (vs <1% in rich countries)
  • in poor countries most deaths are from infectious diseases (vs from cancer and cardiovascular diseases in rich countries)

• enormous improvements in life expectancy over the last half century in today’s poor countries
  • India and China: more than 30 year increase since 1950
  • Africa: 13 years between 1950 and 1980 before decline due to HIV/AIDS

• causes:
- improvements in water supply
- cleansing the environment of disease vectors
- use of antibiotics
- widespread immunization

- population explosion because previous Western inventions introduced rapidly and previously mostly children died; fertility followed mortality decline slowly
- there is more to be done in terms of healthcare even though cheap medical treatments exist for the diseases that are prevalent in poor countries
- there could be more vaccine development and easier-to-use therapies for these diseases
- diseases are a result of several risk factors; the quantitative magnitude of the importance of these factors is unknown
  - unsafe sex
  - unsafe drinking water
  - malnutrition
  - indoor smoke from burning solid fuels

- health delivery often low quality (both private and public)
  - Chaudhury et al. (2005): third or more of the medical staff doesn’t show up for work
  - Das and Hammer (2004): public doctors more qualified but more likely to be absent and to have insufficient time or medicines to provide effective treatment; private providers are often ill-qualified and face competitive pressures to overtreat
  - a lot of countries simply spend too little on healthcare

- international health programs:
  - many of the most successful health programs (e.g., smallpox and polio campaigns) were “vertical” campaigns run by WHO or UNICEF
  - critics say that international programs have done little to improve domestic healthcare systems
  - programs might have run out of steam recently
  - Bloom et al. (2005): programs may have successfully targeted the easiest-to-reach segments of the population
  - Ahmad et al. (2000): worldwide slowdown in the rate of reduction of infant mortality in the 1990s relative to the 1980s
• importance of broader social factors

  – Preston (1980): half of the gain in life expectancy in developing countries from 1930s to the late 1960s is attributable to combined effects of changes in income, literacy, and the supply of calories; the rest of the gain attributable to public health measures

  – importance of education, particularly women’s education confirmed in many studies

• role of economic growth in health improvements in poor countries is controversial

  – more income can lead to better nutrition and public health infrastructure

  – Pritchett and Summers (1996): “Wealthier is Healthier”, income is more important than any other factor in health improvements

  – cross-country data shows almost no relationship between changes in life expectancy and economic growth for the 1960 to 2000 period

  – for India and China, there is a negative correlation between economic growth and infant and child mortality reductions over time

  – nutrition and housing may have limited effects without macro public health measures

  – Acemoglu and Johnson (2005): improvements in health technology and associated reduction in child mortality reduce GDP per capita in the short run

Determinants of Mortality within Countries

• large literature shows that people with low income/wealth/education/social status die younger

• Rogers et al. (2000) summarizes U.S. research findings

• several possible reasons for the socioeconomic gradient: medical care, resources, health-related behaviors, social structures and stress

• medical care:

  – standards of care can be different depending on the population treated at a hospital (e.g., Bach et al., 2004; Skinner et al., 2005)

  – but Whitehall study shows that even before the involvement of the healthcare system there are major differences

  – Finkelstein and McKnight (2005), Deaton and Paxson (2004): 1965 introduction of Medicare had no clear effects on mortality
• resources:
  - resources might matter because of non-health care things it can buy
  - but in many rich countries, access to cheap food is actually a risk factor for poor health (e.g., Cutler et al., 2003)

• health-related behaviors:
  - more educated people are less likely to smoke
  - Marmot (1994): health gradients by socioeconomic status persist even when smoking, drinking, and other factors are taken into account
  - in the U.S., whites are more likely than blacks to have ever smoked (Rogers et al., 2000)
  - we also need to explain the reasons for the behavioral differences
  - Grossman (1972): economic theory of health behavior differences

• social structures and stress:
  - Whitehall study shows health differences by civil service rank, suggestive evidence of the role of psychosocial stress
  - Sapolsky (1993): work on baboons, showing health differences by rank
  - a possible limitation for this work is that socioeconomic status encompasses a lot of variables, so we are not understanding their separate effects
  - another problem is that the relationship between health and socioeconomic status goes both ways: ill-health is a leading reason for retirement (Smith, 1999, 2005) and dropping out of the labor force (Case and Denton, 2003)
  - conditional on education, changes in income do not predict changes in health and lagged income does not predict future incidence of ill health (Smith, 2003; Adams et al., 2003)
  - role of education in general human capital
  - also evidence of reverse relationship between health and education: Case et al. (2005) poor health can leads to lower educational achievement; Miguel and Kremer (2004) and Bleakley (2002) on deworming