Chapter 4

The Determinants of Welfare

Introduction

The view of poverty that has become most widespread in development economics and international politics is one based around income. The UN's Millennium Development Goals, for example, would 'halve poverty' through reducing the number of people living on one dollar a day or less by fifty percent.

At the same time, it is widely agreed that there are dimensions of welfare that cannot be easily aggregated with consumption of market goods. The Millennium Goals themselves contain a list of other targets regarding attributes that people would be poorer, in a broader sense, without.

Our definition of welfare from the previous chapter is the satisfaction of animal needs—food, drink, shelter and other things that contribute to 'bodily flourishing.' The presence or absence of such satisfaction is surely better measured by levels of health in the population than income.

What is a matter of some debate is the extent to which there is congruence between income and non-income measures of welfare. On the one hand, some have suggested that 'wealthier

is healthier' (Pritchett and Summers, 1993).[1] As a result, econo-
mists frequently conflate income and welfare. For example,
Robert Lucas (1988) asked: 'Is there some action a government
could take that would lead the Indian economy to grow like
Indonesia's or Egypt's? If so, what exactly? If not, what is it
about 'the nature of India' that makes it so? The consequences
for human welfare involved in questions like this are simply
staggering …' On the other hand, there is a growing consensus
that the relationship between income and broader measures of
welfare is not as strong as it might appear at first examination.

It is true that richer people have been healthier people
through most of history in most places. Fathers able to provide
the largest dowries for their daughters in fifteenth-century
Florence had less than half of the mortality rates of poorer
fathers (Coniff, 2002). In the first half of the Nineteenth Cen-
tury in the UK, child mortality rates amongst the British peer-
age were 109 per 1,000 live births compared to a national
average closer to 156 per 1,000 live births for the country as a
whole (Hill, 1995). Today, high income countries see average
life expectancies 20 years longer than low income countries
and child mortality rates of 0.7 percent compared to 12.3 per-
cent (World Bank, 2005). Given this, it is unsurprising that a
range of regression analyses have found income a significant
correlate with health and education outcomes across countries
at a given time.[2]

Nonetheless, there is plentiful evidence that income is a
poor proxy for health. Table One compares the United King-
dom in the early nineteenth century to Vietnam in 2000. They
had approximately the same income per head, a level approxi-
mately one tenth of current UK GDP per capita. In the early
nineteenth century, the UK was considerably more unequal
than modern-day Britain or modern-day Vietnam, with the
richest ten percent of the country accounting for nearly half of

---

[1]   Although it is worth noting that even Pritchett and Summers conclude
       that 'income changes explain less about mortality changes than econo-
       mists might have supposed.'
[2]   Including World Bank, 2004b, Hanmer and White, 1999, Thorbecke and
       Charumilind, 2002, Filmer and Pritchett, 1997, Wang, 2002, Leipziger et
       al., 2003.

national income. As befits the first industrial nation, it was also highly urbanized, with nearly two fifths of the population living in towns and cities—this is almost twice the level of modern Vietnam. One could argue either way on the relative state of democracy between Vietnam today and Britain in the early 1800s—in one country only ten percent of the people had a vote, in the other everyone can vote, but only for approved candidates. There are two sets of striking differences, however. One is the extent of technology—Vietnam has access to telephony, electricity production and aircraft, the UK in the early nineteenth century did not. The second set of differences involves welfare outcomes. Life expectancy at birth in Vietnam today is 69 years as opposed to 41 years in the UK in the 1800s.

Indicator	UK, Early 19th Century	Vietnam, 2000
Income per Capita ($)	1,700	1,860
Share of Income to top 10 Percent of Population (%)	49	29.9
Life Expectancy (years)	41	69
Infant Mortality (per 1,000)	160	37
Literacy (% population)	69	95
Electricity Production (billion kwh)	0	22
Urbanization (% population)	39	20
Army (% population)	1.2	0.6
International Telephone Traffic, (minutes/subscriber)	0	22
Voters (% Eligible, Choice)	10 (Multi-party)	100 (Party Approved)
International Aircraft Passengers (million passengers/year)	0	3.0
Source: C. Kenny (2005a)		

Table One. Comparing The UK and Vietnam at Similar Income Levels

Infant mortality is less than one quarter of the level of the UK two hundred years ago. The child mortality level for the very richest in the UK in the early nineteenth century is three times the average level for modern day Vietnam.[3]

The amount of welfare a given income can 'buy' has apparently risen considerably since the 1800s, no doubt in large part to the massive technological change we have seen in the last two hundred years. Along with no access to electricity, British subjects in 1815 knew nothing of the germ theory of disease and little of refrigeration. The most advanced sewer systems they were likely to have known were those found in Roman ruins from 1,500 years earlier. It may also reflect differences in access to education—Vietnam's literacy rate today is considerably above the rate for the UK at the start of the 1900s.

This chapter discusses the relationship between income and welfare in detail, and looks at the role of other causes of the global improvement in welfare that we have witnessed over the past 100 years. It opens with a discussion of the historical path of changes in welfare and potential determinants before looking at more recent evidence as well as a theory of determinants. The chapter also briefly discusses the changing nature of mortality from violence. It concludes that the strength of institutional structures is key to harness the state for positive health outcomes as well as to control the risk of state-sponsored violence.

Welfare, Civilization and Globalization

For most of world history, global average life expectancies have hovered a little over 20 years. Health indicators began to make dramatic progress in the West in the second half of the Nineteenth Century and globally during the twentieth century. Global average life expectancy was 24 years in 1000 AD, 31 years in 1900 and reached 66 years in 1999. At the same time, the human population of the planet has increased from four

[3]   More broadly, within countries at a given time, child mortalities amongst the richest quintile are considerably higher than would be expected given their income and the cross-country relationship between average national incomes and average infant mortalities (C. Kenny, 2005b).

million 10,000 years ago (Simon, 1995), passing one billion in the nineteenth century and reaching over six billion today.

While populations and levels of health have recently expanded, so have incomes. In 1820, perhaps 84 percent of the world's population of one billion people lived on an income of below one dollar a day. By 1910, this had declined to two thirds of a population of 1.7 billion. In 1992, less than one quarter of a population of 5.5 billion lived in what by then was defined as 'absolute poverty' (Bourguignon and Morrisson, 2002). Despite this apparent correlation between health and income indicators, however, the historical link between economic advance and advances in welfare has not always been straightforward.

Life expectancy at birth for our stone-age ancestors was around 25 years (Cutler et al., 2006). It appears that early hunter-gatherer societies had reliable, and frequently abundant, food supplies. Indeed, crop domestication may actually have started not as a way to improve diets for the majority but to generate delicacies for the privileged. The first domesticated crops were chili peppers (a Mayan status symbol to this day), wheat (first used for beer) and the bottle gourd (used as a serving vessel for feasts) (Conniff, 2002). The move from hunter-gathering to farming may have favoured the elite who oversaw the earth moving required to create large fields and the construction of storage facilities, but the diets and health of those working the fields appear to have declined, while hours of work increased.

Looking at nine foraging and shifting-cultivation societies extant today, we find that they produce an average of nearly twice the kilocalories per hour than did an English farmworker in 1800. Partially as a result they work only 60 percent of the hours (Clark, 2005). Furthermore, the comparatively restricted sources of nutrition provided by early agriculture not only increased the risk of famine when the staple failed (such as in Ireland in the nineteenth century) but also fostered the spread of deficiency diseases such as pellagra, marasmus, kwashiorkor and scurvy. The widespread introduction of monoculture cash-cropping in colonial systems

similarly led to a decline in the nutritional status of the colonized (Porter, 1999).

The rapid increase in disease prevalence was another result of civilization. Of prehistoric society, Porter (1999) writes that 'infections like smallpox, measles and flu must have been virtually unknown, since the micro-organisms that cause contagious diseases require high population densities to provide reservoirs of susceptibles. And because of the need to search for food, these small bands did not stay put long enough to pollute water sources or accumulate the filth that attracts disease-spreading insects. Above all, isolated hunter-foragers did not tend cattle and other tamed animals which … proved perennial and often catastrophic sources of illness, for infectious disease riddled beasts long before spreading to humans.' Infections that humankind received from animals included poxes, tuberculosis, colds, the flu, measles, salmonella, polio, cholera, typhoid, hepatitis and whooping cough. Diseases such as malaria, elephantiasis, river-blindness, schistosomiasis and bilharzia spread only thanks to settlement required by agriculture.[4] In parts of North America that adopted farming in the twelfth century AD, Jared Diamond (1987) reports a fourfold increase in iron-deficiency anemia, a threefold rise in bone-lesions from infectious diseases, a 50 percent rise in enamel defects indicative of malnutrition and a seven year drop in life expectancy.

Average heights are a good measure of the material living conditions of humans because disease and poor diet in childhood both lead to reduced adult stature. Average heights were on the decline for much of the last two thousand years. They were greater prior to 1 AD than they were for eighteenth-century Britain. When the people of Tahiti (who lived a stone-age existence) were 'discovered' in 1767, they were taller than the British sailors who discovered them. Their average heights were indeed greater than those of British citizens 100 years later, at a time most of the way through the Industrial Revolution (Clark, 2005). Modern Greeks and Turks are still shorter

---

[4]   Until the nineteenth century, towns remained so unsanitary that their populations never replaced themselves by reproduction, multiplying only thanks to the influx of rural surpluses (Porter, 1999).

than the hunter- gatherers who lived in the same area at the end of the last ice-age.

The health risks of civilization were exacerbated by globalization and the growing interaction between previously isolated communities. The danger faced by Europeans in Africa before modern medicine is well-illustrated by a letter from Mungo Park, a Scottish explorer, who led an expedition up the Niger River in 1805. In a letter from 'on board of H.M. Schooner Joliba at anchor off Sansanding' on the Niger on November 17th to Earl Camden, he wrote

> Your Lordship will recollect that I always spoke of the rainy season with horror, as being extremely fatal to Europeans; and our journey from the Gambia to the Niger will furnish a melancholy proof of it … We had no contest whatever with the natives, nor was any one of us killed by wild animals or any other accidents; and yet I am sorry to say that of forty-four Europeans who left the Gambia in perfect health, five only are at present alive … but I assure you I am far from desponding … I have changed a large canoe into a tolerably good schooner, on board of which I this day hoisted the British flag, and shall set sail to the East with the fixed resolution to discover the termination of the Niger or perish in the attempt.

Perish he did, along with the others left with him.[5]

As much as African diseases were of immense risk to Europeans, the diseases which European explorers, conquerors, missionaries, colonists and slavers brought with them killed many more. Ninety percent of the Mexican Indian population was wiped out by 'the white man and his fellow-traveling pathogens' as Landes (1998) puts it. The native population of Hawaii also fell 90 percent after its discovery by James Cook, Tahiti by over 75 percent and New Zealand by over 60 percent.[6] In North America, as European diseases (including smallpox, chickenpox, measles, mumps and scarlet fever) killed off Amerindian populations, the burgeoning slave trade

---

[5] Source: the last letter written in Park's hand from *The Journal of a Mission to The Interior of Africa*.

[6] In Africa, colonization spread sleeping sickness, especially in the Belgian Congo, where over half a million people died of the disease 1896–1906 (Porter, 1999).

brought an additional set of maladies from Africa— the first outbreaks of yellow fever occurred in Boston in 1693. This is to say nothing of the toll to the slaves themselves. There was a 50 percent mortality rate amongst the 20 million slaves who were forced to take the Middle Passage. For those who survived the journey, life expectancy at landing was less than seven years in 1682 (Fernandez-Armesto, 2001).

Back in Northern Europe, average heights fell from 173 cm in the 800–1000 AD period to 166 cm in the seventeenth and eighteenth centuries, not recovering until as late as the mid-twentieth century—in part due to urbanization and the importation of new diseases. It may be that syphilis was a gift of the new world to the old. Typhus spread to Europe from the East at about the same time. Continued urbanization and globalization had a particularly significant impact on the age of disease victims. 'Infections which at one time ravaged isolated susceptible populations in catastrophic waves now became endemic within densely crowded urban environments with high levels of demographic immunity' writes Porter (1999). 'Diseases which at one time were responsible for high levels of mortality among adults in secluded communities were reduced to attacking new susceptibles: that is, infants and children.'

Even as the spread of technology has improved health outcomes, economic integration continues to be a force for the globalization of disease. The influenza pandemic circled the world in 1918, killing over 25 million people in six months. Tuberculosis is in resurgence, cases increased by 12 percent in the US from 1985–91, 30 percent in Europe and 300 percent in parts of Africa, piggybacking on the new global pandemic of AIDS. Diphtheria has returned to the former Soviet Union, and cholera to the Americas, from where it had been absent since 1895.

Welfare and the Industrial Revolution

The welfare costs of urbanization in a globalizing world absent sanitation and public health are well illustrated by the British Industrial Revolution. In the century after 1750, Britain's population increased threefold (Porter, 1999). The

agricultural revolution combined with rapid improvements in transport (including canal and rail systems) allowed for particularly rapid growth in city sizes. Between 1800 and 1850, the population of London grew from one to 2.7 million (Friedman, 2005). But this symptom of rapid economic advance was a cause of declining health.

In 1798, Malthus wrote in his *Essay on Population* that:

> The increasing wealth of the nation has little or no tendency to better the conditions of the working poor. They have not, I believe, a greater command of the necessaries and conveniences of life, and a much greater proportion of them than at the period of the revolution [1688] is employed in manufactures and crowded together in close and unwholesome rooms.

This situation only deteriorated as the Industrial Revolution advanced. Life expectancies in the urban areas of England and Wales dropped from 35 to 30 years between the 1820s and 1840s. It is not hard to figure out why. Urbanization put unsustainable pressure on traditional modes of waste disposal while grouping people so close together that disease outbreaks would inevitably spread: 'Cesspools turned into manure swamps and seeped into local water supplies and wells. Dry middens and their consequent dungheaps turned into mountains infested with flies and vermin … disease victims died and their corpses remained rotting among families in single-roomed accommodations for days, as the family scraped together pennies to bury them …' (Porter, 1999). Easterlin (2004) quotes contemporaries describing 'town dairies … dens and cellars in which cows were kept for the greater part of the year, standing knee-deep in filth … tailors making soldiers' clothing having their children, from whom scabs were falling, wrapped in the garments' and a dunghill that 'contains a hundred cubic yards of inpure filth' on which flies would settle and then pass into houses: 'Every article of food and drink must be covered, otherwise, if left exposed for a minute, the flies immediately attack it, and it is rendered unfit for use, from the strong taste of the dunghill left by the flies.'[7]

---

[7]   Not all were so horrified by the situation. Thomas Macaulay wrote confidently in his *History of England* that 'It is now the fashion to place the

The spread of child labour in new industries had a particularly dramatic impact on health. The average age of boys starting work at the coal mine in the 1840s was a little over eight and a half. Long hours underground meant that they had almost no exposure to sunlight. As a result, rickets was widespread, and the average stature of twelve year old children in the coal mines was nearly three and a half inches shorter than boys working on farms (Kirby, 1995).

Rickets, along with smallpox and tuberculosis were three 'old' diseases that spread most dramatically in expanding industrial towns. The new disease of cholera joined them when it hit London for the first time in 1832, killing 7,000. These diseases attacked an increasing number of malnourished, brought on by growing pauperism (Fogel, 1995). Poor relief records from the village of Compton and the town of Shefford in Bedfordshire, for example, show a doubling of paupers in Compton and a full quadrupling in Shefford between 1794 and 1830 (Williams, 2005). Partially as a result of this growing underclass, Fogel (2004) argues that from the beginning of the Industrial Revolution to the end of the Nineteenth Century, the gap in life expectancies between rich and poor expanded from around seven to seventeen years (declining again to four years today). Overall, between 1800 and 1900 statures remained unchanged, and between 1820 and 1870, life expectancies rose only by a couple of years—all while average incomes approximately doubled (Table Two).[8]

Golden Age of England in times when... men died faster in the purest country air than they now die in the most pestilential lanes of our towns, and when men died faster in the lanes of our towns than they now die on the coast of Guinea' (quoted in Friedman, 2005). Macaulay's optimism was based on erroneous comparisons of death rates.

[8]   Famines had long been a very minor source of mortality in the UK. In the period 1540–1750 in the UK, famines accounted for less than 0.6 percent of total mortality (Fogel, 1995).

Date	Income (1990 US$)	Stature (cm)	Life Expec-tancy	Calorie Intake	Literacy (%)
1700	1250			2095	
1725					
1738			34.6		
1750		165		2168	
1756			37.3		47.5
1776			38.2		49.5
1800		167	35.9	2237	56.5
1811			37.6		51.5
1820	1707		39.2		54.0
1830			40.8		58.0
1840			40.3		59.2
1850		166	39.6	2362	61.9
1866			40.3		74.2
1870	3191		41.3		76.9
1900		167	48.3		
1913	4921				
1931			60.1		100
1934				3042	
1950	6907	175	69.0		
1970			72.1	3316	
1973	12022				
1990				3282	
1998	18714				
1999			77		100
Source: C. Kenny (2006)					

Table Two. UK Historical Indicators of Welfare

It was only with the development of significant government interventions covering working hours, water, sanitation and hygiene that UK health indicators including stature and life expectancy began to improve—life expectancies climbing seven years from 1870 to 1900 and then a further twelve years from 1900 to 1931. As a result, broadly similar increases in income were accompanied by remarkably different rates of improvement in health in the early and later periods of the process of industrialization. Annual income growth was approximately 1.3 percent over 1820–70, while annual life expectancy growth was 0.1 percent. Between 1870 and 1950, annual income growth slowed to 0.9 percent while life expectancy growth reached 0.6 percent per year—a sixfold increase in the rate of improvement from the earlier period. The central role that technological advance and public action has for health improvements is one that remains to the present day.

Technology, Public Action and Health in History

As we have seen, the Dutch Republic in the seventeenth century was the richest country in the history of the World, and a country in which even the poor appear to have been well-fed. Indeed, the Republic may have been the first 'Supersize Me' nation. Visitors to the Republic frequently commented on the peoples' girth and height—'big-boned and gross-bodied' according to one commentator disgusted by their continual cramming. By 1590, there were 180 breweries operating in Amsterdam alone. Fifty years later, there were also more than fifty sugar refineries. Smoking was widespread enough that the town of Gouda employed 15–16,000 people, or half the workforce, making pipes (Schama, 1997). But despite the highest incomes in history, life expectancies remained around the European average, in the low 30s (Maddison, 2001) and perhaps a third of children died in infancy.

The main reason for such poor health was that the medical community didn't know what it was doing. Take views of the efficacy of tobacco as a medicine extant at the time: it was though to cure toothaches, worms, ague, scurvy, gout, stones and chronic insomnia. It was also supposed to reduce labour

pains and protected against the plague. The Dutch Republic in the seventeenth century did see advances in anatomy, the discovery of the circulation of nutrients in the blood and microorganisms in water and the first blood transfusion. But the limits of efficacious application of these discoveries is suggested by the fact that the blood transfusion used sheep's blood in an attempt to cure a man of insanity. Miraculously, it didn't immediately kill him (Gribbin, 2002, Jardine, 1999).

The history of medical knowledge and public health interventions up until the mid nineteenth century is a history of a few effective practices in a sea of misinformed, frequently harmful, quackery. Amongst the more effective measures introduced was quarantine. In fourteenth century plague outbreaks, Poland closed its borders with relative success, while Milan walled up houses containing plague victims and their families. During fifteenth-century plague epidemics, Venice and Majorca isolated travelers and goods for forty days (thus the word 'quarantine'). Other cities used household isolation of infected individuals, some banned festivals and public gatherings.[9] Medieval towns including Dublin, Basel and Bruges attempted to limit pollution of the water by preventing citizens from throwing dead animals, refuse or tanning dyes into streams. Milan even had ordinances regarding the building of cesspools and drains (Porter, 1999).

At the same time, Tuchman (1978) recounts a number of methods to overcome plague in the fourteenth century which ranged from the wicked—pogroms against Jews—to the merely pointless—dancing to drums and trumpets to keep jolly. Cures included burning aromatic substances, bleeding and purging, lancing and cauterization, and pills and potions of stag's horn, myrrh, saffron, gold, pearls and emeralds. Until the late nineteenth century, Europeans fought off disease with practices including leaving water in the sun to draw up 'noysome vapors,' eating chili to 'disolve windes,' drinking plentiful alcohol and eating sugar and chocolate (Kupperman, 1984).

[9]   Thomas More was the first to issue orders regarding isolation of plague victims in Oxford in 1518 which, according to Porter (1999) means that he can be credited as the father of English public health policy amongst his other achievements.

Mathew Baille, author of *Morbid Anatomy of Some of the Most Important Parts of the Human Body* (1793) noted that 'I know better perhaps than another man, from my knowledge of anatomy, how to discover disease, but when I have done so, I don't know better how to cure it.' Porter (1999) notes that 'the one early striking instance of the conquest of disease—the introduction of the first smallpox inoculation (in the early eighteenth century) and then of vaccination (at the end of the century)—came not through "science" but through embracing popular medical folklore.'

An example of the ineffectiveness of the medical community was the considerable efficacy of hospitals in terms of killing their patients. In the United States, Canada, and Britain today there are about four hospital beds for every 1,000 people. In Africa there is one bed for every 1,000 people. In 1591, Rome had a ratio of more than 30 beds for each 1,000 people. In France in 1700, there were about five beds per thousand people (estimated from Porter, 1999 and Maddison, 2001). The problem was not a lack of beds, then, but what happened to those in them. When it came to surgery, well into the nineteenth century hospital mortality was as much as three to five times higher than in private houses (Porter, 1999).

In the first half of the nineteenth century, some useful cures and drugs were invented and adopted, including morphine, codeine, quinine and ephedrine. Compulsory vaccination for smallpox was introduced in Britain in 1853. Antiseptic techniques in surgery spread in the second half of the century. At the same time, research by a number of colonial medical surgeons at the end of the Nineteenth Century began to uncover the role of vectors (such as mosquitoes and ticks) in spreading diseases including elephantiasis and malaria, opening up the possibility of disease control through vector eradication. In the period 1880–1900, causal agents for typhoid, leprosy, malaria, tuberculosis, glanders, cholera, streptococcus, diphtheria, tetanus, pneumococcus, malta fever, gas gangrene, plague and dysentery were all discovered and in the period 1890–1930 vaccines for diphtheria, cholera, pertussis, tuberculosis,

tetanus, yellow fever and typhoid fever were developed (Easterlin, 2004).

Of even greater significance than the discovery of new vaccinations was the spread of sanitation. Edwin Chadwick was a key figure in the design of the new British Poor Laws (passed in 1834) as Secretary to the Poor Law Commission. He believed that the old system of poverty relief had been too generous, encouraging waste and idleness, and leading to rising demands for relief. However, he reconsidered his theory in the light of ever-increasing pauperism even after the passage of his punitive poor law amendments (discussed in a later chapter). He concluded that much poverty was due to disease rather than fecklessness. Chadwick's *Report on the Sanitary Condition of the Labouring Population of Great Britain* (1842) detailed the link between poverty, disease and sanitary infrastructure. He suggested that 'The primary and most important measures, and at the same time the most practicable…are drainage, the removal of all refuse from habitations, streets and roads, and the improvement of the supplies of water.' As a result of the report, the first British Public Health Act was passed in 1848. This forced local authorities with high mortality rates to adopt a set of institutions designed to improve sanitary conditions by dealing with issues including water supply and sanitation.

A second mid-century health reformer in the UK was Dr. John Snow, whose investigations into the London cholera epidemics of 1849 and 1854 led him to conclude that contaminated water was the cause of the disease's spread. In an 1855 report to the Commons Select Committee he advocated massive improvements in sewage and drainage to counter the threat. This call provided the catalyst for a number of significant improvements in sanitary infrastructure in cities across Britain, including London's new water and sewage system, completed in 1875, which drew water from the Lea Valley and the upper reaches of the Thames (Porter, 1999).

Only with the sanitation and health reforms of the later nineteenth century did the UK rural-urban health gap decline. Deaths from infectious diseases, concentrated in the dense

breeding grounds of urban areas, fell from accounting for 60 percent of all deaths in 1848 to six percent in 1951 (Easterlin, 2004 and Cutler et al., 2006).[10]

Modern-Day Convergence in Welfare and the Role of Income

Until the dawn of the twentieth century, it appears that technological and institutional advance rather than income growth were behind changing patterns of health in the face of globalization and urbanization. A similar story holds true for more recent history, reflected in patterns of divergence and convergence in income and welfare measures. For measures of income, debate rages over the extent of convergence across countries. Answers depend in part on one's data, one's chosen measure of convergence and the weighting one applies. It remains fair to say that the consensus finding is for long-term divergence and weak convergence or stagnation in more recent periods since the Second World War (Pritchett, 1997, Quah, 1993). For almost any other measure of welfare that we possess, the image is of strong divergence in the nineteenth and early twentieth centuries followed by strong convergence since then.

Table Three displays data on India's performance on various measures of development as expressed as a percentage of UK scores on these measures. The picture for income is of falling behind followed by stagnation. In 1500, Indian incomes were 72 percent of UK incomes. Over the next 450 years they fell to nine percent, and they were still at nine percent in 1999. Compare that to calorie intake, which fell from 79 percent to 59 percent of UK values from 1700 to 1934 before recovering to 68 percent by 1990. Life expectancy, at approximate parity with the UK in the fourteenth century, fell to 44 percent in 1931 but recovered to 82 percent by 1999. In short, other welfare mea-

---

[10]   Similarly, in 1900 in the US, waterborne diseases accounted for nearly one quarter of infectious disease deaths in major cities. The health cost of city living was such that, in 1880, infant mortality was 140 percent higher in cities than in rural areas. The introduction of water filtration and chlorination systems over the next 35 years accounted for three quarters of the decline in infant mortality and nearly half of the overall reduction in mortality (Culter and Miller, 2004).

sures have never been as divergent as income is today, and have been converging for at least the last fifty years or so.

At the global level, for life expectancy convergence began at some point between 1913 and 1950. The 1950-99 period saw average global life expectancy increasing by nineteen years while measures of variation in performance dramatically declined (the standard deviation has nearly halved, for example). Data for infant survival suggest a similar pattern of convergence beginning at some point prior to the Second World War (C. Kenny, 2005). Related to this, adequate nutrition has been spreading worldwide, with the percentage of the World's population where per capita food supplies are below 2,200 calories per day falling from 56 percent in the mid 1960s to below 10 percent by the 1990s (Johnson, 2000).

Year	Income	Calorie Intake	Life Expectancy	Literacy
1363			99	
1500	72			
1543			71	
1700	39	79		
1738			69	
1800		74		
1813			59	
1820	25			
1913	13		46	9
1931			44	
1934		59		
1950	9		56	19
1970		61		
1990		68		
1999	9		82	57
Source: C. Kenny (2005b)				

Table Three. Historical Welfare Indicators: India as a Percentage of the UK

As these figures suggest, cross-country relationships between income and health are significant but subject to considerable variation. In 1992, Mozambique's GNP per capita (unadjusted for purchasing power parity) was $80. China's was $470 and the United States' was $24,740. Infant mortalities per one thousand live births were 146, 31 and nine, respectively. Moving 1.6 percent of the distance between Mozambique and the US in terms of income got you 84 percent of the distance in terms of infant mortality (C. Kenny, 1999). More broadly, Diener and Diener's (1995) index of basic needs, which includes factors such as access to clean water and infant mortality, is significantly related to income only up to a GNP per capita of about $4,000.[11]

This evidence of considerable recent convergence in welfare measures absent income convergence reflects a weak and complex underlying relationship between income and health, one that is not simply a result of declining health returns to income. Sen (1992) has noted that men in Harlem, New York have a lower chance of reaching the age of 40 than do Bangladeshi men. The United States as a whole spends twice the OECD average on healthcare—13 percent. It is four times richer than Malaysia on a per capita basis, and yet its infant mortality rate is the same. Cities in the state of Kerala, India (average income per capita of $300, life expectancy of 72) are another well-known case—they have a lower infant mortality rate than do African-Americans living in Washington, DC (UNDP, 2005).[12]

Across time, income-health relationships can be even weaker. Deaton and Paxson (2003) looked at age-specific mortality in the UK and US since 1950 and conclude that neither average income nor changes in income distribution can explain the observed trends, which must have been driven by technology instead. Developing countries also see a weak rela-

[11] Within countries, in Bolivia in 1998, the average under five survival rate was 96.43 percent, but the poorest ten percent of households had a better survival rate than the top thirty percent of households (Klasen, 2005).
[12] In part these statistics reflect that more that three percent of US households were 'food insecure' in 2002, to the extent that every day people in more than 500,000 US households were hungry because they cannot afford more food (Nord et al., 2003).

tionship between economic advance and health improvements. Life expectancy in Japan increased from 40 years in 1900 to a little below 80 years in 1990. In India, life expectancy over that period increased from 23 years to about 60 years. In absolute terms, the increase has been about the same, then –and in percentage terms India is significantly ahead. The same is not true of income. India's income per capita approximately doubled over that period while Japan's average GNP per capita increased 1,500 percent (Maddison, 1995).

Post-War Sub-Saharan Africa tells a similar story. Over the last four decades of the twentieth century, GDP per capita in Sub-Saharan Africa climbed by less than $100—from $477 to $561. It fell from about five to about two percent of the average GDP per capita of a high-income country over that period. Under-five mortality fell from 254 to 161 per 1,000 live births, suggesting considerable convergence in child survival rates with wealthy countries. Similar results pertain to infant mortality, overall life expectancy and primary enrollment (C. Kenny, 2005). Again, almost all of China's post-war reduction in infant mortality happened prior to the acceleration in economic growth after 1980—and the period since then has seen relatively little progress (Cutler et al., 2006).[13]

If we look at a group of 27 countries for which we have life expectancy and income data over the period 1913–99, it is clear that even over the long term there is little link between changes in the two variables. In both 1913 and 1999, those countries with higher incomes saw longer life expectancies. Indeed, looking at income in 1999, one could predict 1999 life expectancy with an 89 percent accuracy. But, at the same time, the speed of income *growth* between 1913 and 1999 is completely unconnected with increases in life expectancy over that period. On average, amongst those 27 countries, income increased from $3,000 to $15,000, while average life expectancy increased from 47 to 76 years. But faster growing countries saw slightly (statistically insignificant) *smaller* increases in health.

---

[13] Once the passage of time has been accounted for, rates of economic growth are insignificant in explaining reduced mortality rates across China in the 1980s and 1990s (Banister and Zhang, 2005).

Similar results also hold for a larger sample of countries over the shorter period 1975–2000, as well as for a sample of poorer countries (those with a GDP per capita below $3,000 in 1975) over that period and for measures of female and male adult mortality in developing countries in the recent past.[14] Indeed, even countries that saw considerably negative income growth saw positive health outcomes. For example, Angola saw income per capita fall by 34 percent from 1950–90, while life expectancy increased by 50 percent over the same period (See Table Four).

Country	Percentage Change in Income	Percentage Change in Life Expectancy
Angola	–34	50
Cuba	–18	28
Nicaragua	–15	51
Mozambique	–14	28
Bolivia	– 7	44
Source: Kenny (2005b)		

Table Four. Economic Performance and Health Performance 1950–90, Selected Countries

Why is there a weak link between income and health? In part it is because too much income might be bad for health outcomes. Until the 1820s, it was commonly assumed that increased riches would lower levels of health through 'diseases of civilization' such as obesity, gout and venereal disease (Szreter, 1997). Indeed, it may be the case today that, above a certain minimum level of income, 'diseases of the rich' are as significant problem as 'diseases of the poor.' In the United

[14] As an example, and ignoring issues of causality and weak statistical significance, for Brazil between 1965-96, three percentage points of change in female adult mortality was due to income growth compared to a nine percent change due to the passage of time (capturing global technological change). C. Kenny (2005a) discusses data weaknesses. In sum, the data are indeed weak, but there appears little reason to believe that these weaknesses account for the limited correlational strength of the relationship between income and health. See in addition Hill et al., 1998. Korenromp et al., 2004.

States, heart attacks increase when unemployment falls, with a one percentage fall in unemployment countrywide estimated to raise heart attack mortality by 2,500 deaths (Ruhm, 2006).[15] Recessions in wealthy countries appear to improve health because people with less money and more time are more likely to exercise and less likely to drink and smoke (Cutler et. al., 2006). Even in developing countries, more people die each year from high blood pressure, high cholesterol, obesity, physical inactivity, tobacco, alcohol and illicit drug consumption than die of malnutrition, indoor smoke from solid fuels, unsafe water, or poor sanitation and hygiene (WHO, 2002).

Furthermore, even very poor people do not appear to use their consumption resources to maximize health or education outcomes. Within two years of electrification, rural households in surveyed areas of Indonesia where incomes per capita were around $2/day saw television ownership reach 30 percent. Within seven years of electrification, ownership rates reached 60 percent, despite the fact that a television cost four or five times the monthly income of poorer households in the survey sample. (Compare this to refrigerators, which were owned by fewer than five percent of surveyed electrified households). Households with a television were watching it on average four to five hours per day. When asked to rank their priorities in life, electrified households put food, shelter, clothing, health and education all above recreation (Madon, 2003). Given that 70 percent of them were watching television four to five hours a day, we might have to assume they had done all they felt they could to meet these other priorities.

This is not to cast aspersions on the poor in developing countries. It is only to emphasize that rich and poor people in both developed and developing countries use income in ways that do little good or positively harm their health all of the time. Not least, they purchase large quantities of alcohol and cigarettes. Worldwide, income is rarely spent in a way that maximizes welfare.

---

[15] This stands in marked contrast to the relationship between employment and contentment presented in a later chapter.

Potential conflicts between economic and health interests also have a long history. We have seen that the concentration of people required for both farming and industrialization had a significantly negative impact on health. Attempts to quarantine the city of Pistoia in Italy to control the plague in 1630 were defeated by wine traders keen to continue their business (Deaton, 2004). Schistosomiasis was worsened in Egypt by the construction of the Aswan Dam. More recently, small-scale irrigation dams in Ethiopia have been found to improve agricultural yield and farm profits at the same time as they have considerably increase the burden of disease (Ersado, 2005). Economic and public health interests can directly conflict.

Factors that provide potential negative links between income and welfare cannot help to explain considerable global improvement in health outcomes, however. For this, we have to look first to technological advance. Samuel Preston (1975) studied data regarding life expectancy and income across countries and argued that global technological change was three to nine times more important than changes in income in explaining growth in life expectancy. Since then, a number of different researchers using different techniques have come to similar conclusions.[16]

Between 1870 and 1999, the income per capita associated with a given life expectancy has fallen tenfold. Countries with a GDP per capita of $300 today are achieving similar welfare outcomes to those achieved by countries with an income per capita of $3,000 in 1870 (See Table Five).[17]

---

[16]   Not least Easterly, 1999, McGuire, 2001, Szretzer, 1997, Deaton, 2004, Easterlin 1995, 1998.

[17]   Given that, it appears likely that more than half the World's countries today containing over four billion people (or about 69 percent of the global population) have seen more advance in life expectancy from non-income factors than from economic growth over the 1870–1998 period (C. Kenny, 2005a).

GDP per Capita (US Dollars)	Predicted Life Expectancy in Given Year		
	1870	1950	1999
300	23	33	46
3,000	44	59	64
30,000	65	85	83
Source: Kenny (2005b). GDP per capita is in constant dollars using purchasing power parity.			

Table Five. Income and Life Expectancy Over Time

The Role of Technology and Governments in Welfare

Overall, our general measures of income growth appear to be missing considerable changes in the basket of goods available to, and consumed by, the poor thanks to technological change. The average American industrial worker in 1889 had nearly twice the purchasing power of a rural Indian in 1983. And yet a day's worth of calories (2,300) cost around ten percent of the American's wage, compared to less than five percent in rural India in 1983. While the average Indian in 1983 consumed nearly 2,100 calories, the average American in 1888 consumed 1,646 calories (Logan, 2005). The income required to sustain an adequate diet has declined to the point that weight problems have become epidemic even in fairly poor countries. Egypt has a GDP per capita approximately 15 percent of the US level, but more than three quarters of women over 30 are overweight—a similar percentage to the US (Bhattacharya, 2005).

More broadly, GDP measures our ability to produce and consume goods in general. It is a poor measure of the choice of goods available, and this choice appears to be a key factor in determining welfare outcomes. However rich a citizen of the UK was in the early 1800s, they could not buy a vaccine against measles. Today, Vietnam, at a similar level of average incomes to the UK in the early 1800s, sees vaccination rates of around 97 percent. Thanks to the invention and rollout of cheap vaccina-

tion technologies, even very poor countries can use scarce health expenditures far more effectively than could countries 200 years ago to reduce death rates from a number of diseases. As a result, over the recent past, there has been considerable global convergence in the percentage of children immunized for diphtheria polio, tetanus and measles, for example (Comin et al., 2006). Similarly, knowledge about the transmission of disease and engineering advances have given the incentive and the means for even very poor cities to roll out access to clean water and sanitation.

What non-income factors related to technology and institutions play a role in determining health outcomes? Numerous studies have thrown variables into cross-country and within-country regression analyses, some looking across a single time and some looking at changes across time. Few results are 'robust' to all different samples and all different techniques, but some of the stronger correlates include not only expected ones such as immunization levels, but also more interesting factors such as female education, gender and income inequalities, access to potable water and sanitation, institutional quality and geographic factors.[18] Time—a proxy for the general influence of global technological change —appears to be a particularly strong determinant.[19]

It is worth noting that, beyond measures of immunization, direct measures of health inputs such as the number of doctors, nurses or hospital beds per capita or public health expenditures per capita do not appear to be robustly related to health outcomes in developing countries.[20] This is not to say that public health measures are unimportant—they are far more

[18] Such results have been found in World Bank, 2003, Hamner and White, 1999, Younger, 2001, Wang, 2002, Hanmer et al., 2003, Ranis and Stewart, 2001, Filmer and Pritchett, 1997, Waldmann, 1992, Leipziger et al. 2003, Shi, 2000, Hertz et al. 1994, Moore et. al., 1999 and Lena and London, 1993.

[19] See, for example, C. Kenny, 2005a, 2005b, Easterly, 1999, Clemens et al., 2004.

[20] See Ranis and Stewart, 2001, Filmer, Hamner and Pritchett, 2000, Younger, 2001, Leipziger et al., 2003, Hertz et al., 1994. Although see Wagstaff, 2001 and Baldacci et al., 2004. The role of health care in explaining health outcomes appears to be limited even in advanced economies. The introduction of Medicare had no effect on the mortality of US elderly, while

important in the developing than the developed world.[21] Instead, it is that the most effective measures require minimal amounts of money and numbers of doctors to implement.

Laxminarayan et al. (2006) rate the three most cost effective interventions in Sub-Saharan Africa as a whole to reduce mortality and morbidity as first, childhood immunization, second, interventions to reduce traffic accidents and third the extension of access to bednets, spraying and preventive anti-malarial treatment during pregnancy. At the low end, such interventions would cost as little as $1–2 per (disability-adjusted) life year saved. Not only do these numbers suggest how inexpensive effective interventions can be, but also that interventions do not need to involve hospitals or doctors.

Looking at child and maternal health, nearly three quarters of under-five deaths in the developing world are caused by diseases for which practical, low-cost interventions exist such as immunization, oral rehydration therapy use (for overcoming diarrhea) and antibiotics (Hill et al., 1998). That 63 percent of children are immunized is a likely factor behind rapidly declining under-five mortality in Mozambique, for example (IMF and World Bank, 2005).[22] Using cross-country analysis, McGuire (2005) repeats the finding that health care expenditure (as well as geographic access to health services and per capita availability of doctors, nurses and hospital beds) is not associated with lower under-five mortality. But he finds that reduced mortality is correlated with the quality of maternal and infant health programs and the share of births attended by trained personnel. McGuire concludes that 'the main challenge in many developing countries may be less to raise overall public health spending, or even the share of public health spending devoted to basic services, than to assure that a very small absolute amount of revenue is spent effectively…' Oral

the introduction of the National Health Service had no impact on class differences in health in the UK (Cutler et al. 2006).

[21] For example, in Sub-Saharan Africa, 42 percent of total health burdens are due to infectious and parasitic diseases, compared to 2.8 percent in Western Europe (Bloom and Sachs, 1998).

[22] Indeed, Lewis (2006) finds that once one accounts for the quality of governance and education, GDP per capita is an insignificant determinant of measles immunization coverage.

rehydration, promotion of breastfeeding,immunization —these very cheap interventions are very effective.

Malaysia and Sri Lanka have both made competent, professional midwives available in rural areas as well as ensuring access to drugs and equipment. Maternal deaths per 100,000 live births have dropped from 2,136 in 1930 to 24 in 1996 in Sri Lanka and from 1,085 in 1933 to 19 in 1997 in Malaysia (the 2000 estimate for the US is 17 per 100,000). Once again, these improvements were achieved with extremely limited resources. Expenditure on maternal and child health services in the two countries remains below 0.4 percent of GDP (World Bank, 2006).

Overall, a recent survey found that the cost of a basic package of primary health services in rural areas ranged from US$2.82 per head per year in Cambodia to US$6.25 per head per year in Guatemala. In all cases studied, the amounts represent less than one percent of gross national income (Loevinsohn and Harding, 2005). Similarly, Easterlin (2004) argues that, since the 1950s, 'the cost requirements of major improvement in life expectancy have probably been no more than 2 percent of GDP, even in the poorest countries.' Some very effective interventions are even revenue-creating for health systems. Controlling tobacco use through taxation is rated by Jamison and his colleagues (2006) as perhaps the most important intervention for reducing noncommunicable disease in developing countries.

The Role of Institutions

Concerted public action has been central to improved prospects for global health in countries rich and poor. For example, the global community has eradicated endemic smallpox from 140 countries since 1920, a complex coordination effort which overcame multiple market failures. The results of this public action are clear worldwide. In particular, they can be seen in the pattern of urban-rural health differences. In nineteenth century Europe, prior to public health interventions, urban life expectancy was considerably below rural life expectancy. In early Twentieth Century developing countries with similar

incomes per capita, that picture has been reversed—with urban populations living longer (C. Kenny, 2005). This central importance of public health and sanitation measures in improving welfare outcomes suggests a vital role for government institutions in determining levels of health (a later chapter will discuss the nature of institutions).

The state has become a far more powerful agent over time for both good and ill. The British government's revenues as a share of GDP rose from perhaps two percent of national income under Elizabeth I in the late sixteenth Century to four percent 100 years later. By 1788, they had reached 12 percent, and closed the Twentieth Century at around 45 percent of GDP (Ferguson, 2001). Today, the size of government bears little relationship to incomes per capita. Indeed, if anything, poorer countries have governments that consume a larger percentage of GDP on average than richer countries (Alesina and Wacziarg, 1998, Annett, 2001). This suggests that governments in poorer countries at the start of the twenty-first century are far larger than were European governments at a time when European countries had similar incomes per capita.

How effective the state is at using this growing power has become an ever more vital determinant of health outcomes. Amartya Sen (1999) has noted that:

> … even the poorest democratic countries that have faced terrible droughts or floods or other natural disasters (such as India in 1973, or Zimbabwe and Botswana in the early 1980s) have been able to feed their people without experiencing a famine…. Famines are easy to prevent if there is a serious effort to do so, and a democratic government, facing elections and criticisms from opposition parties and independent newspapers, cannot help but make such an effort. Not surprisingly, while India continued to have famines under British rule right up to independence… they disappeared suddenly with the establishment of a multiparty democracy and a free press.

As a result, welfare appears closely related to measures of dignity. A second case highlighted by Dreze and Sen (1999) in a discussion of Kerala in India is that of gender equality. The state of Kerala is considerably more equal in terms of female to male literacy ratios than the rest of India, and has higher levels

of literacy overall. Dreze and Sen suggest this has played an important role in achieving very high welfare measures in the state. At the cross-country level, similar findings regarding the importance of gender equality to welfare have been found in numerous other studies.[23] Furthermore, the extent of sanitation, clean water and immunization is significantly higher in countries that have been stable democracies and, reflecting this, life expectancy is considerably longer in such countries (Besley and Kadamatsu, 2006).

There is some evidence that general health expenditures do improve health outcomes at the cross-country level in the presence of strong institutions measured by good governance and low corruption.[24] Improving the quality of expenditure through improved institutions and reduced corruption is surely as important as improving the quantity of expenditure when absentee rates for health providers in developing countries appear to average around 35–40 percent (with levels significantly higher in rural clinics), when the average leakage rate for drugs supposedly destined to public health care facilities in Uganda was estimated at 73 percent in the late 1990s, or when the ratio of highest to lowest price paid for saline solution and cotton across public hospitals in Bolivia was 15 to one and 36 to one respectively (Lewis, 2006).[25]

In both the case of education and health, it is clear that progress is a long-term project with an upper bound in terms of the speed of improvement (Clemens, 2004, Clemens et al., 2005). In part this will reflect the fact that institutional development takes a long time. A later start in commencing progress towards improved health and education will have acted as a considerable cause of current differences in performance in these areas.

---

[23] See Hanmer and White, 1999, Ranis and Stewart, 2001, Filmer and Pritchett, 1997, Leipziger et al., 2003.

[24] See Baldacci et al., 2004 and Lewis, 2006.

[25] A further example: surveys of public sector doctors in Delhi found rampant over-prescribing and mis-prescribing perhaps in part related to the fact that they did less than a third of what they knew to be important in terms of diagnosis and took about fifteen percent of the required time to fully diagnose complaints (Das and Hammer, 2005).

The skewed institutional models generated as a result of differing colonial histories are blamed by many development economists as a driving force behind income differences between countries, as we will see in a later chapter.[26] It is clear that they can also help to explain long term differences in health and education outcomes. Disease-rich environments will have a direct impact on health, but they may also have determined the strength or weakness of initial government institutional structures that could improve health outcomes over the long term.

Support for the thesis that long term factors perhaps connected with colonial history and institutions play a role in determining today's health outcomes is that we can predict 70 percent of today's variation in male life expectancy across countries using data on the mortality rates of early colonists, and data from the 1960s on the extent of ethnic fragmentation within a country (based on the number and extent of different languages within national borders) (C. Kenny, 2005a).

To conclude the discussion of non-violent morbidity, welfare is largely a matter of public health in developing countries, and public health takes strong institutions to overcome related market failures. The strength of such institutions may in part reflect different histories stretching back as far as the colonial period. It is worth emphasizing, however, that evidence of global welfare convergence suggests that developing countries are performing far better in the delivery of public goods related to welfare than did now-developed countries when they had similar levels of income. This is in part due to improved technology and in, part, perhaps, to the growing strength of government institutions. Some minimum level of income is surely required to promote welfare, but that level is minimal, and the scope for improved welfare outcomes even in the poorest countries is immense.

---

[26] See Easterly and Levine, 2003, Acemoglu et al., 2001, Engerman and Sokoloff, 2005.

Violence

Hobbes may have had a point regarding the state of nature. For a number of stone-age communities in the twentieth century, figures suggest that male deaths were caused by warfare varied between just under 10 percent (for the Gebusi of Papua New Guinea) to nearly sixty percent (amongst the Jivaro of the Peruvian rain forest) (Pinker, 2002). Having said that, the extent of harm caused by warfare worldwide appears to be on the resurgence over the long term, thanks in large part to technological advance. Once again, the best defense against a growing level of death from warfare may be institutional change rather than income growth.

Whilst technological and institutional changes have been powerful forces behind improved health, they have also driven immense increases in the power of the state for violence. In the 1470s, during the British Wars of the Roses, UK-based armies made up about 0.6 percent of the population. By 1810, during the Napoleonic Wars, this had risen to five percent (Ferguson, 2001). By World War One, Britain had nine percent of its population under arms (calculated from Maddison, 2001 and Ferguson, 2003).

Not only were more people directly involved in the effort to kill one another, but the means to kill became considerably more effective. Overall, Ferguson (2001) looks at the modern history of war and concludes on the basis of annual casualty figures that between the seventeenth and the twentieth Century, the capacity of war to kill (in terms of deaths per year) rose by a factor of roughly 800. The annual death rate in the Thirty Years War was a mere 69,000 compared to 9.5 million in the Second World War. The percentage of people dying in wars grew from a little under one percent of the global population in the nineteenth century to over four percent in the Twentieth (Kenny, 2006). In the decades since the Second World War, global battlefield deaths rose from 0.5 to 1.2 per 1,000 of the world's population between the 1950s to the 1970s, falling back to 0.4 per 1,000 during 1990–7. It should also be noted that battlefield

deaths account for a fairly small percentage of overall war deaths in many twentieth-century conflicts.[27]

There have also been more occasions to utilize increasingly effective killing machines. Brecke (2001) estimates that the number of conflicts including civil wars averaged somewhere around 50 per decade in the period 1400–1700, dropping closer to 30 conflicts per decade in the 1700s before rising to around 80 per decade in the post-1800 period. A measure of the number of wars ongoing annually for the post-World War Two period suggests that the period after 1961 saw a dramatic rise in conflicts around the globe, from around 20 that year to over 50 by 1994, dropping back to below 30 by 2002 (Human Security Centre, 2005).

This drop in the number of wars after 1994 coincides with the end of the Cold War rather than a period of dramatic global economic growth, one piece of evidence against a strong link between income growth and peace. Over the period 1975-91, wealthy countries were less often the target of invasion, as were democracies (Hermann and Kegley, 1996). But data on the extent of involvement in warfare suggests that neither income nor democracy are guarantors against war. The three countries that have been involved in the most armed conflicts since 1946 are the UK (21), France (19) and the US (16). The most conflict-prone countries (measured by the number of conflicts multiplied by their length) were Burma, India, Ethiopia, the Philippines and Israel (Human Security Centre, 2005).

It is true that poorer countries have hosted more that their fair share of the world's recent civil wars, and that wealthier countries have fought fewer wars with each other (Hegre and Sambanis, 2005). Civil wars do break out more often in poor countries (Collier and Hoeffler, 2004). But income growth does not appear to reduce the appetite for such acts over the long term.[28]

---

[27] Battlefield deaths accounted for less than two percent up to 29 percent of total deaths in a range of post-war African conflicts. Data from Lacina and Gleditsch, 2005.

[28] Even in the short term, the finding that civil wars occur more in countries which seen recent periods of low growth appears not to be robust (see also Easterly, 1999).

Again, the role of institutions including the presence of stable democracies (both at home and in the neighborhood) appears to be more significant in determining long term trends in the frequency of conflict (Hegre and Sambanis, 2005). In particular, democracy appears to be far more robustly linked with reduced severity of civil wars in terms of battle deaths than is economic development (Lacina, 2006). Similarly, terrorists appear to be richer and better educated than the average population from which they are drawn, and they come from countries that lack civil liberties rather than those which are comparatively poor (Krueger and Maleckova, 2003, Abadie, 2006).

The state as an engine for domestic oppression has also significantly grown in efficiency. In Sixteenth Century Britain, Queen Mary killed 300 people over a reign of five years to earn the title 'bloody'. Three hundred deaths were the matter of a few hours work for Mao during the Cultural Revolution or Stalin during the Purges. Once again, the direct role of income as compared to institutions in explaining such outbreaks appears limited.

Leviathans which use their power to control rather than extend violence have been responsible for considerable reductions in non state-sponsored violence. Homicide rates began to decline in the UK as early as the Fifteenth Century, dropping from 23 per 100,000 people per year in the 1200–1400 period to seven in the Sixteenth Century. They continued this decline until the second half of the Eighteenth Century, when levels reached as low as one per 100,000 people (lower than rates today). The Industrial Revolution was accompanied by a rise in violent crime, no doubt connected with social dislocation, so that rates doubled from the late Eighteenth Century to the first half of the Nineteenth. After that point they started declining again, until the 1970s.

Regarding the rest of Europe, dramatic declines commenced in the Low Countries by the end of the sixteenth century, in Scandinavia and Germany by the first half of the seventeenth century and in Italy by the end of that century. In other words, declines considerably predated modern economic growth, and periods of stronger growth since then

have frequently been associated with rising homicide rates (Eisner, 2003).

Eisner (2003) suggests that the rise of the nation state may have played some role in the dramatic declines in homicide. Judges and sovereigns became increasingly involved in 'social disciplining,' including ordinances regarding feasts, child rearing, clothing, alcohol consumption and church attendance. At the same time, authorities began to regulate lethal interpersonal violence far more closely and concepts such as 'honorable manslaughter' fell out of favour. Nonetheless, growing efforts at state control alone cannot explain the decline in homicides given that police forces in Italian cities reached a considerable size (making up as many as one out of every 145 residents) at a time when homicides remained high. The role of a growing sense of community—of a *nation* state—which gave the state legitimacy to act to control public violence was an important element of the transition to lower homicide rates.

Using a global sample over more recent periods, manslaughter has actually risen faster in countries that have grown more rapidly over recent periods (Easterly, 1999). There is little evidence that the extent of hate crimes is linked in either direction to economic conditions (or levels of education, sadly) (Krueger and Maleckova, 2003). Across countries, survey evidence suggests that the percentage of people attacked or threatened with violence over the last five years ranged between twelve and twenty percent in the US, France, Canada, South Africa, Russia and Brazil, while the figures in Japan and India were only one percent (Human Security Centre, 2005). Indeed, differences in rates of violent crime between (rather than within) countries over long periods account for most of the global variation in violent crime.[29] This suggests that factors such as income or income growth must play a comparatively minor role in determining crime levels, although growth rates do appear to have some short-term impact. There

[29]   Taking a sample of 44 countries over the period 1950–2000, 87 percent of the variation in homicide was accounted for by cross-country differences rather than differences over time within countries (LaFree and Tseloni, 2006).

is some evidence that inequality might be linked with greater rates of violent crime, although it is disputed. Levels of social capital may also play a role (Lederman et al., 2002 and Neumayer, 2004).

There are significant gender differences in the nature of crime. In early eighteenth-century Stockholm, women accounted for nearly half of all murder offenses. One major factor behind this appears to be that, for fear of eternal punishment in hell for suicide, desperate women would kill their children rather than themselves and then, after professing repentance for their crime, suffer the death penalty imposed on them by the judiciary. This extremely unusual calculus led to an extremely unusual outcome — women became almost as responsible for public violence as men, whereas through most of history they have accounted for 20 percent, or frequently far less, of total violent crime (Eisner, 2003).

Over time female victim homicides have decline considerably more slowly than male homicides. Related to this, violence within the family has become a growing issue, so that within-family homicides now account for around forty percent of the total (Eisner, 2003). More broadly, domestic violence against women appears to be the most common form of violent act worldwide. Rates across countries vary dramatically — with between three and 52 percent of women reporting physical violence by an intimate partner in the previous year (Watts and Zimmerman, 2002).

Violence against females frequently starts early. In the latest Indian census, there were only 93 women for every 100 men, suggesting that between 22 and 37 million girls and women are 'missing' due to sex-selective abortion, infanticide or fatal neglect. Amartya Sen (2000) cites results from India which suggest that the female labor force participation rate and female literacy both reduce the gap between male and female child mortality rates. Conversely, higher income levels (amongst other factors) can even increase the gender bias in child survival, while doing little if anything to reduce overall levels of child mortality. Furthermore, it is worth noting that the country with the highest male/female sex ratio at birth is South Korea, where 117 boys are born for each 100 girls. For

third children, the ratio is 185 boys for each 100 girls, suggesting considerable early termination of female fetuses (Watts and Zimmerman, 2002).

Rates of violence against females do not appear to be closely correlated with average levels of income or income growth at later stages, either. A WHO survey (2005) of 24,000 women in ten countries found that one half of the women had been subject to physical or sexual violence. Women in Butajira province in Ethiopia had the lowest rate of non-partner violence, but one of the highest rates of partner violence, suggesting that complex causal mechanisms may be at work. Furthermore, despite high rates of domestic violence amongst women in this, one of the poorest countries of the World, it appears that the link between domestic violence and income across countries is weak. The region of Cusco, in Peru (a considerably richer country) saw even higher rates of domestic violence. Heise, Ellsberg and Gottmoeller (2002) argue that there are small-scale societies such as the Wape of Papua New Guinea where domestic violence is virtually unknown. They suggest that violence against women is a social phenomenon more common in societies where gender roles are rigidly defined and enforced and where cultural norms tolerate violence.

Conclusion

Income can be used to promote welfare. Some level of income is required to consume enough calories and nutrients to live. Income is required to buy vaccines and procure the services of a skilled midwife. Far greater income is required to purchase a heart bypass operation or other advanced surgery. At the same time, the amount of income required to purchase the most cost- effective technologies that have driven the morbidity revolution is very small. And greater production and consumption can at times be a force for declining welfare.

As a result, the debate is no longer between those who see income as of central importance in the battle to improve global health outcomes and those who see income as one significant factor amongst many. The debate is between those who see income as one significant factor amongst many and those who

see it as marginal or insignificant beyond some comparatively low level (see Jamison, 2006 and Jamison et al., 2001). For the great majority of countries, it is likely that the causal link from welfare improvements to economic growth is considerably stronger than the causal link from economic growth to improvements in welfare.[30]

Furthermore, it is worth emphasizing that while GDP per capita growth is not significantly correlated to a number of welfare outcomes, it is significantly related to a number of bad things—not least the expanded output of pollutants (including waste paper, carbon dioxide, sulfur dioxide and nitrogen oxides) (Easterly, 1999).[31] Pollution can have an immediate impact on welfare outcomes in terms of lead poisoning from petrol or lung damage from particulates. Environmental destruction which denudes species and habitats might be considered an assault on dignity. And whilst the status of the global environment is not a theme of this book, the threat which greater income growth in already wealthy countries poses to sustainable global welfare may be a real and significant one.

Rather than income, technology and the growing power of the state appear to have been the driving forces for improved welfare across countries. And evidence of rapid global convergence in welfare suggests they have been very powerful forces. At the same time, as the section on violence makes clear, if the beneficial leviathan turns malign, its power for harm has been similarly amplified. Institutional structures that control the state's potential for destruction have become ever more important, and these structures appear to be related to civil and political rights.

---

[30] See Easterlin, 2004, Wagstaff, 2005 and Lorentz et. al. 2005. Wiel's estimate of the health-to-growth relationship estimates that differences in health performance can account for between 10 and 23 percent of the global variation in GDP per worker.

[31] Mishan (1967) notes that 'bringing the Jerusalem of economic growth to England's green and pleasant land has so far conspicuously reduced both the greenness and the pleasantness.'