Gaps between the rich and the poor

The widening differences in wealth, life expectancy, public health infrastructure and perception of threats, and the consequences for global security

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Our world was shaken on 11 September 2001 as we watched hijacked aeroplanes crash into the World Trade Center, the Pentagon and a grassy field in Pennsylvania. In ways far too numerous to count, we are still experiencing the ripples—social, political, religious and economic—from the events of that day. Even now, more than a year after these tragedies, we can barely imagine where these terrorist attacks will lead the world. Certainly, their historic impact was compounded less than a month later by the death of photo editor Robert K. Stevens, a victim of an anthrax-poisoned letter.

Since then, it seems that life in the USA has been turned upside-down. Subjects once considered the purview of paranoids, quacks and troublesome scientists are now the foci of orange alerts, billions of dollars in government security spending, intense public fear and a newfound interest in public health. The USA has become a fearful nation. And that fear is driving billions of dollars into spending on bioterrorism research, improvements in public health infrastructure, preparedness for epidemics and the study of microbes.

The microbes are hitchhikers on human frailty, prejudice, inequity and filth

Although scientists have long warned about emerging infectious diseases, it was only recently—in the second administration of President Bill Clinton—that microbes received serious attention from the federal government. The Clinton administration classified emerging diseases and the AIDS pandemic as national security concerns, giving mandates for their scrutiny by agencies as far from basic science as the Central Intelligence Agency (CIA), the National Security Administration, the Federal Bureau of Investigation and the State Department. By the late 1990s, the CIA in particular had developed a vigorous division for analysing global disease trends (Working Group on

Emerging and Reemerging Infectious Diseases, 1995). But all this was abandoned when George W. Bush acceded to the Presidency in 2001. His national security advisors, particularly Condoleezza Rice, rejected the notion of non-nation-state definitions of national security, such as international drug and weapons trafficking, resource scarcities and emerging diseases. The blossoming divisions devoted to such issues at the CIA and other government agencies were shut down. This happened despite a strongly worded CIA report that was handed to Bush shortly after his inauguration (National Intelligence Council, 2002a), which warned of impending global instability due to pandemics and bioterrorist threats. The Bush administration altered its assessment of such risks shortly after the attacks on the World Trade Center and the Pentagon, and today bioterrorism and threats to public health rank among the US government's top priorities.

If we look closely at these threats, nearly all of the factors responsible for promoting the emergence of microbes in new ecologies, such as that of Africa's West Nile Virus in the concrete jungle of New York City, or the re-emergence of microbes in ecologies from which they had long been vanquished, are of man's creation (United States General Accounting Office, 2000). We aid and abet the microbes. We create our own risks. Yes, the microbes have the advantage of evolutionary speed, but we offer them ample selection pressure, mobility, new vectors and fantastic conditions for replication and zoonosis. In the most extreme cases, we use microbes to further political or terrorist causes. The microbes are hitchhikers on human frailty, prejudice, inequity and filth.

Fifteen-year-old Zimbabwean boys face a 74% chance of dying of AIDS before their 30th birthdays

The travels of Christopher Columbus, Captain Cook and the seventeenth-century slave traders carried microbes to human beings whose immune systems had neither innate nor acquired resistance to measles, influenza, syphilis, smallpox, yellow fever and a host of other killers. The result was unparalleled carnage (Watts, 1997). Surely, that can never happen again. Theoretically, globalization will, in the long run, spread microbes to so many ecologies that our species will develop a sort of uniform level of immunity, rendering a level playing field for all healthy *Homo sapiens*, regardless of where they live or travel. But we are still many generations away from this scenario. Furthermore, a uniformity of human acquired immunity might also be interpreted as a uniform susceptibility. Microbes are able to develop new methods of bypassing our immune responses, either through novel approaches to infection or through the direct assault, or even manipulation, of our own immune systems. The HIV pandemic might simply be the first of a new set of microbial threats that effectively exploit human frailties—in this case, sexual promiscuity, non-sterile syringe use and contaminated blood transfusions—to infect our species.

Since 1996, when highly active anti-retroviral therapy (HAART) was widely introduced in the developed world, death rates due to AIDS have plummeted in the USA, Canada, Western Europe, Japan and other wealthy areas. Whereas this boon has markedly affected the lives of these HIV-positive individuals, it has not registered as so much as a statistical blip in the overall, global pandemic (Weiss, 2001; United Nations AIDS Programme (UNAIDS), 2002a). This is, of course, because HAART is unaffordable and unavailable to most people who are suffering from AIDS at present. Today, the HIV pandemic is out of control in sub-Saharan Africa, with some regions of the continent suffering adult infection rates as high as 45% (UNAIDS, 2002b). If uncurbed, the pandemic will grow to

Table 1 | Global life expectancies

Rank	Country	Years
1	Japan	74.5
24	USA	70
40	Costa Rica	66.7
70	Ukraine	63
81	China	62.3
91	Russia	61.3
134	India	53.2
160	South Africa	39.8
161	Kenya	39.3
163	Nigeria	38.3
176	Tanzania	36
180	Mozambique	34.4
184	Zimbabwe	32.9
186	Uganda	32.7
187	Botswana	32.3
188	Zambia	32.3
191	Sierra Leone	30.3

Source: *The World Health Report 2001*,
<http://www.who.int/whr/en>

astounding proportions. Karen Stanecki from the US Census Bureau predicts that by 2020, at least 6,427,000 Africans will die every year from AIDS if no effective vaccine becomes available. Bearing in mind that there are, at present, only 360 million Africans, this will constitute an extraordinary annual toll.

On 3 October 2002, the Zimbabwe National AIDS Council adjusted its estimate of the national HIV prevalence across all age groups. The prevalence was already a sorry 25% in 2000, but became a breathtaking 34% for 2002. Fifteen-year-old Zimbabwean boys face a 74% chance of dying of AIDS before their 30th birthdays. A survey in South Africa found that 72% of the nation's households are now headed by women, and 31% of all heads of households are HIV positive. Government surveys of pregnant women in Botswana last year found that 81% of them were unmarried, and 44% were HIV positive. By the end of this decade, 70% of HIV-positive individuals will be female, according to UNAIDS forecasts, meaning that millions of children will be left motherless (UNAIDS, 2002b). Who will raise all those babies?

Total HIV infection rates are rising most rapidly in the east and south of the continent, whereas they have remained remarkably stable in central Africa and have only recently started to increase in

the west. The gender bias might be softened in the west of the continent because of a long tradition there of female entrepreneurship and the power that comes with money (Human Rights Watch, 2003). Researchers from the Institute of Tropical Medicine in Antwerp have compared HIV trends in women from West Africa—from Cotonou in Benin and Yaounde in Cameroon—with those from the east—Kisumu in Kenya and Ndola in Zambia. Whereas infection rates have remained below 5% in all female age groups in the west, they have approached 60% in Zambian women and 48% in Kenya (Buve *et al.*, 2001).

The most disturbing new trend was discerned by Glynn and colleagues, working in Kenya and Zambia (Glynn *et al.*, 2001), who found that girls who had fewer lifetime incidents of sexual intercourse and had lost their virginity within the previous 12 months were more likely to be infected than their more experienced counterparts. At first glance, this seems counterintuitive. Why should younger, sexually naive girls have the higher infection rates? The terrible answer lies in the fact that violent sex against women has increased markedly in the region, mainly because of the belief that sex with a virgin removes a man's HIV infection (PlusNews, 2002; Burkhalter, 2002). A recent survey in Capetown (Jewkes *et al.*, 2002) found that 60% of teenaged girls said they had been victims of rape. And UNICEF reports that increasing numbers of school girls in the region are experiencing their first sexual encounters at the hands of their male teachers (Human Rights Watch, 2002). A study in

Tanzania and Uganda shows that HIV-positive women are 7–10 times more likely to have been the victim of rape (Quigley *et al.*, 2000). Clearly, HIV is a virus that is spreading fastest in societies with the most severe imbalances of power between the genders: not in political power, but in the power of the bed. The key to reversing this trend is in a woman's right to say who she has sex with, when she has sex and under what circumstances. HIV is spreading where women cannot possibly insist that their partners use condoms. It is cruel, indeed, to cry "safe sex" or "sexual abstinence" in the face of widespread rape and coercive sex.

In some of the countries hardest hit by HIV, life expectancies are plummeting to levels last seen before the Second World War (Table 1; Fig. 1) and child survival rates are also reversing (UNAIDS, 2002b; Walker *et al.*, 2002). These terrible numbers represent a complete negation of decades of investment—billions of dollars, marks, francs and pounds—in these nations. They also represent a grave threat to their stability. In national security circles in Washington, at the World Bank and the International Monetary Fund, so-called 'chimney effect' charts (Lamptey, 2002) are bringing economists and security analysts to the AIDS table (Fig. 2). On the x axis, separated into genders, are population numbers, and on the y axis is age. One colour depicts a demographic projection for an African country's population distribution in 2020 in the absence of HIV. Overlaid in a darker colour is the continent's projection with HIV. The HIV epidemic is producing a demographic

Fig. 1 | Decreasing life expectancy caused by the HIV/AIDS epidemic

Fig. 2 | The 'chimney' effect.

'chimney' so that by 2020 the most severely affected countries will have roughly the same numbers of elderly people as would have been the case in the absence of HIV. But the middle-aged, productive labour force, professionals, leaders and parents will be diminished to a narrow band. And below them will be a massive population of young adults and adolescents—unsupervised, orphaned, and increasingly without values or education.

In the Lake Victoria area, where this epidemic is in its fourth human generation, the chimney effect is already a reality. It is illustrated by an 83-year-old woman I met in the village of Kyebe, Uganda, who took me on a tour of her small plot of banana trees. Throughout the grove were mounds of stone, under which were buried her husband, 10 out of 12 of her children and 10 out of 33 of her grandchildren. And with only bananas to sell, she is raising the remaining 23. Her plight is hardly a rarity. Indeed, from house to house in Kyebe and neighbouring villages the horrors of the chimney effect can be seen. In many parts of sub-Saharan Africa, AIDS is called 'Grandmothers' disease' in reference to the millions of youngsters now being reared by destitute, grief-stricken, elderly women.

With more than 14 million children orphaned by this plague so far (UNAIDS, 2002b), we are witnessing a genuine collapse of cultures. For example, I visited an orphanage in Tanzania that exclusively raises infants under two years of age, most of them orphaned by the AIDS pandemic. When the toddlers reach the age of two the orphanage turns them over to little girls from the same clans to raise them thereafter. Most of these girls are themselves AIDS orphans. As resourceful as they are, they cannot comprehend immunizations, and do not have the strength to carry their little charges dozens of kilometres to clinics for vaccination. The re-emergence of measles, polio and other childhood diseases is inevitable in the region. More importantly, these girls cannot tell their charges who their ancestors were, what is the history of their people, and what spiritual and cultural values they ought to believe. And so, before our very eyes, precious elements of African culture are disappearing. HIV is hastening what anthropologist Wade Davis of the National Geographic Society, USA, called "ethnospheric extinction".

...fearfulness is not a good prism through which to view microbial threats

The economic impact of this pandemic might hit sooner than expected. According to James Morris, head of the World Food Programme, the famine of southern Africa that now threatens the lives of 16 million people is more about AIDS than about drought and politics. "HIV/AIDS is a fundamental, underlying cause of vulnerability in the region", Morris said (Wurst, 2002). Alex De Waal and Alan Whiteside argue that HIV has created a new form of famine, the like of which has never faced humanity before (De Waal, 2002; Barnett & Whiteside, 2002). From my own observations, fields all over Africa are now fallow because of the lack of a workforce. Agriculture is women's work and, with rape a constant danger, fewer women are willing to work alone in the fields. In Zimbabwe I encountered a gang of roving rapists who marauded the fields in search of virgin girls.

In late September, the National Intelligence Council (NIC) of the CIA released an important report on 'the Next Wave of AIDS' (National Intelligence Council, 2002b)—the epidemics that are only now emerging, and could well define the future of this scourge. The report focused on China, India, Nigeria, Ethiopia and Russia, which in 2002 had a total of 14–23 million people infected with HIV. The NIC report estimates that by 2010 there will be 50–75 million individuals in these countries with HIV.

In India, about 4 million people are believed to be infected, and the bulk of all transmission is due to the same primary factor that underlies the African epidemic: gender. India's vast sex industry is fuelling the epidemic, although intravenous drug use is a component, and the country has an unsafe blood industry. The NIC report predicts that there will be up to 25 million HIV-infected Indians in 2010, with a national seroprevalence of 3–4%. China's epidemic is extremely complicated, because human beings there are affording HIV many different options for transmission. These include heterosexual and homosexual intercourse, hospital-acquired transmission through blood and non-sterile needles, a booming narcotics abuse problem and an extraordinary imbalance of genders owing to the one-child policy and parental preference for male offspring. These boys are now of age, cannot find brides, and are fuelling a booming brothel

industry. The NIC report forecasts that China will have up to 15 million infected citizens in 2010, with an adult prevalence approaching 2%.

Nigeria, Africa's most populous nation, will also have 15 million HIV-positive citizens and an adult prevalence of up to 26% in 2010. This will affect the stability of the region because Nigerian troops are the major peacekeepers in western Africa. HIV has recently reached the critical 5% nationwide prevalence mark, and infection rates in 15–30-year-olds in urban areas now exceed 15%, according to the nation's AIDS control board (National Intelligence Council, 2002b). Given that Nigeria has the largest standing army on the continent and is the world's sixth biggest oil producer, this rising tide of infection has prompted serious concerns about national security in Washington. Over on the Horn of Africa, Ethiopia now has an adult prevalence of about 18%, and this is forecast to reach 27% by 2010.

And then there is Russia. Although the NIC report focuses on this country, my investigations have revealed that the entire former Soviet Union, particularly the Baltics, Ukraine and Belarus, are following the same trend (Garrett, 2000). Here, the epidemic would be comparatively easy to stop because it is not sexual—not yet. Today, more than 90% of all new infections are acquired through the injection of narcotics, and victims are predominately young adults (Grisin & Wallander, 2002). The vector is clear: only politics stands in the way of slowing the disaster through the provision of sterile syringes. Russia already has the highest adult prevalence in the northern hemisphere, of about 2.5%. By 2010, both the Russian Ministry and the NIC Report estimate that 8 million Russians, or 11–12% of all adults, will be infected (Feshbach, 2002).

The loss of an educated, productive adult labour force is a catastrophe wherever it occurs. Russia, in particular, is experiencing a marked reversal in population size, predicted to fall below 1917 levels within a generation (Feshbach, 2002). As a result, the country's primary industries are witnessing acute labour shortages, and this will reach critical proportions within a decade. The added burden of HIV, which is predominately afflicting young adult males, could well cripple any prospects for economic growth in this nation. Of greater concern in national security circles

are the differentially high losses in the upper tiers of the militaries of China, Russia and India—all of them nations with nuclear weapons (Eberstadt, 2002; Xinhua News Agency, 2002; Makiese, 2002).

The HIV pandemic has caused an upsurge in other diseases as well, most notably tuberculosis (TB). TB is out of control, now claiming more people's lives than at any time in the history of our species (World Health Organization, 2001). The distressing rise in multidrug-resistant forms of the TB microbe is forcing doctors to resort to early twentieth-century treatments, such as complete lung removal. In addition, the world's blood supply remains largely untested for HIV and hepatitis B and C. As more of the global population is rendered immunodeficient, we might see far more obscure organisms entering the blood supply, having opportunistically infected blood donors who are HIV positive, the elderly, or patients after organ transplantation or during cancer chemotherapy. At least 18 deaths from West Nile Virus in the USA in 2002 were due to blood transmission. What will be next?

And AIDS itself is already sapping the resources of health care systems throughout the developing world. In Malawi's capital, for example, patients are now 'warehoused' three to a bed. Health care workers are themselves dying of the disease. As we prepare to create mass distribution systems for dispensing anti-HIV drugs in poor countries, competition is rising. Botswana, for example, has accused South Africa of poaching its nurses and doctors, leaving the tiny country with no health providers. South Africa's nurses are, in turn, being recruited to the UK and the USA, where hospitals are experiencing acute shortages in nursing personnel. Ethiopia already has a rural doctor-to-patient ratio of 1:50,000; how much worse can this get before hospital-acquired disease, rampant drug resistance and unnoticed epidemics become the norm in hospital settings that are grossly understaffed and packed with dying, immunodeficient patients?

History will look back with wonder—and judgement. It might ask how it could be that this great HIV plague swept over the world, almost unnoticed by the dominant cultures, the wealthy and powerful, while more exotic and unremarkable outbreaks

garnered vast resources and mobilized the public imagination. History will undoubtedly recall that nearly everybody in the medical and scientific communities pooh-poohed reports in 1981 and 1982 of unusual pneumonia and skin cancers in gay men in the USA and Europe. Those handfuls of cases have now become 65 million cumulative HIV-positive individuals.

We fear infectious diseases of all kinds and we have rational reasons for this. But fearfulness is not a good prism through which to view microbial threats. Humans have a tendency to nonchalantly play down the significance and ability of microbes when we feel secure—even smug—in the superiority of our species. Conversely, when threatened, humans tend to exaggerate microbial threats, so that an Ebola virus outbreak in remote Kikwit, Zaire, is perceived as a direct danger to the global populace. However, we have entered new territory: anthrax; bioterrorism; HIV—this is our twenty-first century. And it is the new age of globalization for microbes. As the events of the autumn of 2001 illustrate, human beings are willing to exact unimaginable tolls from one another. And they are willing to use microbes as weapons. But perhaps history will record that the more important, vital basis for human fearfulness in the early twenty-first century was signalled by the arrival of HIV and its opportunistic companions.

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