

How Can Donors Help Build Global Public Goods in Health?

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Abstract

Aid to developing countries has largely neglected the population-wide health services that are core to communicable disease control in the developed world. These mostly non-clinical services generate “pure public goods” by reducing everyone’s exposure to disease through measures such as implementing health and sanitary regulations. They complement the clinical preventive and treatment services which are the donors’ main focus. Their neglect is manifested, for example, in a lack of coherent public health regulations in countries where donors have long been active, facilitating the spread of diseases such as avian flu. These services can be inexpensive, and dramatically reduce health inequalities.

Sri Lanka spends less than 0.2% of GDP on its well-designed population-wide services, which contribute to the country’s high levels of health equity and life expectancy despite low GDP per head and civil war. Evidence abounds on the negative externalities of weak population-wide health services. Global public health security cannot be assured without building strong national population-wide health systems to reduce the potential for communicable diseases to spread within and beyond their borders. Donors need greater clarity about what constitutes a strong public health system, and how to build them. The paper discusses gaps in donors’ approaches and first steps toward closing them.

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How can donors help build global public goods in health?

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*Focusing on clinical services while neglecting services that reduce exposure to disease
is like mopping up the floor continuously while leaving the tap running*

(paraphrased from Laurie Garrett 2001, *Betrayal of Trust: The Collapse of Global Public Health*)

1. Introduction

There is a curious and costly dissonance between the basic public health services provided in developed countries, and those that donors promote in developing countries. In the developed world, a core component of publicly-funded health services is population-wide health services that reduce people's exposure to communicable diseases, underpinned by a framework of public health regulations.¹ In developing countries, donors have prioritized clinical services over population-wide services. Donors need to pay more attention to population-wide services if they are to be more effective at improving health outcomes among the world's poorest people, and ensuring global public health security.

Health systems have three major components: (1) *population-wide services* to reduce exposure to disease through measures such as implementing health and sanitary regulations, surveillance, assessing health threats, and controlling outbreaks; (2) *clinical preventive services* for individuals, such as screening and vaccination; and (3) *clinical treatment services* to care for and treat individuals with injuries and disease. Population-wide health services are largely non-clinical in nature, and complement clinical services to prevent and treat disease. They constitute a pure public good, and form a basic part of a country's developmental infrastructure.

In developed countries, health outcomes were historically improved through intensive efforts to strengthen population-wide health services,² as described below. And continuing attention to these services keeps the incidence of communicable disease low. Low-income countries with their limited resources and high burdens of communicable diseases need to prioritize services that produce public goods (Figure 1). To this end, they need strong public health systems underpinned by modern laws and regulations, and trained staff that can monitor and improve health conditions on the ground.

Despite the need, donors have typically neglected population-wide services in their efforts to strengthen health systems. They have focused largely on improving financial or physical access to quality health care services, and on programs addressing specific diseases and maternal and child health (Stern and Markel 2004, Howard-Jones 1981). Their efforts on population-wide services have been piecemeal (e.g., improving disease surveillance and outbreak control) rather than to ensure a strong system capable not only of responding to disease outbreaks but also of addressing potential health threats *before* they lead to cases of illness. This would involve *inter alia* measures such as routine inspection of markets and slaughterhouses, and routine efforts to improve animal and poultry management to eliminate the conditions that lead to the emergence of diseases like SARS and avian flu.³ One striking manifestation of this neglect is a lack of coherent public health regulations in many countries with whom donors have been working for decades.⁴

The neglect of public health systems has slowed the progress of the health transition in large parts of the developing world. This has imposed high costs on national and global economies as discussed below, and above all on poor people who bear most of the burden of communicable diseases. National governments are, of course, ultimately responsible for the quality of their own health programs: our focus here is on the role of international actors.

Fortunately, there is renewed international awareness of the importance of population-wide health services, in the face of increasing evidence of new and re-emerging diseases for which therapies are inadequate. For example, the World Health Organization's recent thinking focuses on building up national public health systems (WHO 2007a, 2007b). However, the WHO is as yet primarily concerned with detecting and managing outbreaks of specific diseases, rather than building capacity to avert exposure to disease more generally.

Global public health security cannot be assured without building strong national population-wide health systems to reduce the potential for communicable diseases to spread within and beyond their borders. Promoting this requires a radical re-thinking of the role and priorities of international agencies, and how to structure cooperation among agencies, donors, nongovernmental organizations, and developing countries. It also requires greater clarity among partners about what constitutes a public health system, and how to help countries build them.

2. Public health systems in the developed world

In the second half of the nineteenth century, rapid industrialization and urbanization in the Western world led to repeated outbreaks of cholera, malaria, and other communicable diseases, as people crowded into cities where sanitary conditions were already highly inadequate (US 1999). Sanitary reform was the only reliable scientific tool against communicable diseases in this era. The interests of elites and the under-privileged were clearly aligned, since elites were sharply aware of the fact that unless *everyone's* exposure to disease was reduced through sanitary and other measures, they would not be able to protect themselves from diseases spreading from neglected groups or areas.⁵

Health departments were set up, and much thought given to how to establish strong systems for protecting the public's health. This is illustrated, for example, in Chapin's (1901) exposition on how to achieve municipal sanitation in the US, detailing what needs to be done, the modalities of doing it, and the effectiveness of alternative approaches to service delivery used in different jurisdictions of the country.

In Ashton and Seymour's (1988:17-18) characterization of the three phases of modern public health, this was the first "environmental" phase, in which the focus was on enacting public health laws and making the provision and monitoring of water, sewage, waste disposal systems a public concern, along with related measures such as controlling disease vectors like rats and mosquitoes. Public health workers were charged with the highly transaction-intensive task of interacting with local authorities, communities, and households to improve environmental sanitation.

Toward the late nineteenth century, the discovery of germs and the specific diseases they cause provided a much stronger scientific underpinning for public health interventions. This led to what Ashton and Seymour (1988:17-18) call the second "personal preventive" phase of public health, characterized by measures such as campaigns to improve personal hygiene and childcare practices, and vaccination programs. Public health workers' duties expanded to include these campaigns, as well as additional environmental sanitation measures indicated by the scientific advances, such as testing water supplies and milk supplies for contamination.

These combined efforts were dramatically successful at reducing mortality and morbidity, and it is estimated that most of this is due to environmental public health interventions.⁶

“By 1900...the incidence of many of these (infectious) diseases had begun to decline because of public health improvements, implementation of which continued into the 20th century. ...Local, state, and federal efforts to improve sanitation and hygiene reinforced the concept of collective “public health” action (e.g. to prevent infection by providing clean drinking water). ...state and local health departments made substantial progress in disease prevention activities, including sewage disposal, water treatment, food safety, organized solid waste disposal, and public education about hygienic practices (e.g. foodhandling and handwashing). ...Animal and pest control also contributed to disease reduction. ...Malaria, once endemic throughout the southeastern United States, was reduced to negligible levels by the late 1940s, regional mosquito-control programs played an important role in these efforts.” (US 1999, parentheses ours).

There was some triumphalism about having “forever banished from the earth the major plagues and pestilences of the past” (Winslow, 1943:380).

From the 1940s there were rapid advances in medical therapy, and the development of techniques for mass production of penicillin-based antibiotics. This ushered in what Ashton and Seymour (1988:17-18) have called the third “therapeutic” phase of public health, accompanied by a shift of focus from systemic public health interventions to more individual approaches. Today developed countries’ health services include those associated with all three phases of public health.

In the 1970s many environmental health activities were shifted from public health agencies to environmental protection agencies. For example, by 1984 in the United States only 22 of 46 state health departments were engaged in assuring solid waste management (IOM 1988:110-1, 179). However, local health departments continue to be responsible for ensuring compliance with public health laws and sanitary codes.⁷ Thus the basic sanitary activities continue in the developed world, under the oversight of the health authorities. The need for face-to-face engagement by public health workers diminished over time, as people became more familiar with the health regulations and the sanctions for non-compliance, as well as how these measures benefit their own health. Besides, the cumulative successes of environmental sanitation services dramatically reduced the prevalence of infectious disease pathogens, making small lapses in hygiene less potentially life-threatening.

Developed countries periodically upgrade their public health systems, as evidenced by the work of the Institute of Medicine in the United States⁸ and the formation of the European Union’s Centres for Disease Prevention and Control to provide some federal order to a multiplicity of diverse national public health systems. In the aftermath of the SARS outbreaks, countries such as Canada sought to upgrade their public health systems and expand federal order over their provincial systems with the Public Health Agency of Canada. Over the decades, citizens’ expectations regarding the acceptability of being exposed to communicable disease has been altered such that it has become politically difficult to provide poor public health services.

3. Can developing countries afford public health systems?

The costs of neglecting services to reduce exposure to disease are very high, so the real question is whether developing countries can afford *not* to have them. The World Bank estimates that the costs of poor sanitation amount to more than 1% of GDP in Colombia, and 1.4% in Bangladesh (World Bank 2007d). Poor management of feces is responsible for a significant fraction of child mortality, as well as a heavy toll on child health resulting from parasitic and diarrheal infections (WHO 2006, Kosek et al 2003). The WHO estimates that better sanitation and environmental

management would reduce the incidence of diarrhea by 88% and of malaria by 42% (Pruss-Ustun et al 2008). They also estimate that the economic benefits of investing in improved water and sanitation vastly outweigh the costs.

Outbreaks also impose heavy costs by disrupting business. Peru's cholera epidemic is estimated to have resulted in losses of up to \$1.5 billion (WHO 2000). Even more striking are the global costs of emerging diseases such as SARS and avian flu, which arise from poor oversight of livestock management hygiene. Although SARS led to only around 800 deaths (and thus no discernible impact on output), it resulted in economic losses estimated at around 2 percent of East Asian GDP in the second quarter of 2003 (World Bank 2005). The World Bank (2006) estimates that a severe avian flu pandemic among humans could cost the global economy around 3.1% of its GDP, or up to \$2 trillion.

It is not easy to formally evaluate the impact of better services to reduce exposure to disease, since improvement needs to take place along many dimensions that are rarely neatly organized simultaneously. The health benefits of better fecal management, for example, depend on many factors, including having toilets, good water quality monitoring, and improvements in personal health behaviors. Nevertheless, studies show that improving even some of these factors results in significant reduction in diarrhoeal and parasitic diseases (Esrey et al 1991, Fewtrell et al 2005). Easterlin's (1999, 2000) wide-ranging review of the evidence concludes that public health interventions were responsible for much of the increase in life expectancy in the developed world.

The cost of population-wide services can be very low. Das Gupta and Dalpatadu's³ ongoing study in Sri Lanka shows the wide range of population-wide services that can be provided using simple low-cost approaches in a poor developing country. Some of the services provided by their Public Health Inspectors include (1) working with and pressuring local governments and households to improve their environmental sanitation and control vector breeding, (2) assuring food safety by inspecting food establishments and teaching them how to improve their hygiene, taking food samples for testing, inspecting slaughterhouses, and prosecuting offenders, (3) working with water suppliers and communities to keep water sources safe, and taking water samples for testing, (4) providing health education, (5) supporting disease surveillance by validating reports through house visits, and following up cases to make sure they complete their treatment, (6) mapping the cases of disease in order to identify their source and eliminate them at source, and (7) organizing interventions to avert health threats in emergencies and disasters such as the tsunami.

Such intensive face-to-face interventions to improve sanitation were carried out in the developed world between the mid-nineteenth and the mid-twentieth centuries (Easterlin 1999). All this is done in Sri Lanka by staff whose minimum qualification is only high-school graduation, followed by intensive training in public health work. In combination with the medical services and the Public Health Midwives, who are responsible for maternal and child health interventions, this covers at a basic level the public health services provided in the developed world.

What does it cost? Less than 0.2% of Sri Lanka's GDP is spent on preventive and public health services — total public expenditure on health is 1.8% of GDP (World Bank 2007a),⁹ and 9 percent of this budget is spent on preventive and public health services (Institute of Policy Studies 2005). This includes the costs of program management, epidemiological and health monitoring, laboratory support, Public Health Inspectors, and the staff who provide reproductive and child

³ This is part of an ongoing collaborative study with a team at the Institute of Health Policy, Colombo.

health services. Nor is there heavy expenditure on sanitary infrastructure such as sewerage, as most of the population uses stand-alone latrines. With good public provision of sanitary and clinical health services as well as good education services, Sri Lanka has high levels of health equity and life expectancy approaching that of developed countries (World Bank 2007a, Rannan-Eliya and Sikurajapathy 2008), despite low GDP per capita and a quarter-century of civil war.

4. Donors and international organizations' work in developing countries

Donors and international organizations have neglected population-wide health services, contributing to weakening health system effectiveness in the developing world. This is evident intellectually and programmatically.

Intellectual shift from population-wide health services to health care services

Population-wide services have dropped so far from donors' and international agencies' focus, that people in these agencies who focus on them feel the need to specify that public health services are not synonymous with publicly-funded personal health care services (World Bank 2002:4, World Health Organization 2007b:2). A recent major report on diseases arising from poor sanitation virtually begs the reader to see that assuring environmental sanitation is a cost-effective way of controlling many communicable diseases (WHO 2006:14). In the developed world standard readings on public health discuss environmental management as a key component of good public health services,¹⁰ but this is largely ignored in international agencies' health strategies (WHO 2000, World Bank 2007b).

The Alma Ata Declaration of 1978 stressed a comprehensive approach to primary health care, including safe water and sanitation, and prevention and control of endemic diseases. However, WHO (2000) points out that the goals remained largely unmet due to a variety of shortfalls, including a lack of clarity about what was to be done, compounded by shortages of funding and training.

The intellectual shift away from population-wide health services has become so extreme that interventions to improve environmental sanitation have come to be classified as being "outside the health sector". Sanitation was even excluded from the original Millennium Development Goals – implying that it was unnecessary for meeting child survival goals despite the high proportion of child deaths resulting from poor sanitation (WHO 2006, Pruss Ustin et al 2008) – and introduced only subsequently (Satterthwaite 2007). By this logic, the health sector's response to diarrheal diseases is confined to treating cases or improving personal health behaviors, rather than reducing people's exposure to fecally-transmitted diseases. But a core function of public health agencies in the developed world is to monitor the quality of sanitation services, and pressure the providers to improve them.¹¹

Donor initiatives related to environmental sanitation, such as the Water and Sanitation Program, focus on expanding the proportions of people covered with adequate water and sanitation facilities (the latter typically narrowly defined in terms of latrines). These efforts are receiving increasing attention in the donor community, but institutional links to the health sector remain weak. To be more effective, the expansion of water and sanitation coverage needs to be supported by institutional mechanisms for monitoring the quality of these services and assuring that they continue to be operated such that health threats are minimized. This critical support can be provided by strengthening population-wide health systems, with staff carrying out tasks such as

checking that water is safe at point-of-use, checking on latrine maintenance, and working with communities to improve their water handling and hygiene practices.

Another example is that of vector-borne diseases, where donor approaches place little emphasis on multi-sectoral coordination for environmental management to control vector breeding. This contrasts sharply with the developed world's successful use of environmental management, first to eradicate these diseases, and now on a continuing basis to ensure that these diseases do not re-emerge.¹² For example, the Tennessee Valley Authority, which eradicated malaria and other mosquito-borne diseases in a large tract of the United States in the 1930s, continues to collaborate with the health department in environmental management and monitoring of mosquito breeding (United States, Tennessee Valley Authority). In the developing world, similar efforts were made in some areas especially during the colonial period,¹³ but they are largely forgotten today.

Programmatic shift away from focus on population-wide health services

Programmatic interventions by donors and international organizations have neglected population-wide health services, focusing largely on expanding access to health care services, maternal and child health, and specific diseases such as malaria (Stern and Markel 2004, Howard-Jones 1981). These programs tend to rely heavily on the use of the magic bullets of modern medical technology, rather than on strengthening systems for delivering population-wide health services. This approach has been spectacularly successful for some diseases, notably diseases for which highly effective vaccines are available, such as smallpox. It has had less success in addressing other diseases such as malaria, whose control depends also on more complex management of the disease environment.¹⁴

Single-focus programs can be useful, but must be balanced with building and maintaining the overall capacity of preventive health systems. These programs can strengthen specific parts of a health system, but they can also unravel health systems and expertise. In the case of malaria, Lindsay et al (2004:24) conclude:

“The DDT era failed to eradicate malaria, but has almost eradicated public health scientists with an interest in environmental management...(for malaria control)”
(parentheses ours).

They can also unravel existing public health systems by putting pressure for concentrating resources on the single program of interest. This has been the case in India, where grassroots health workers have since the mid-1950s been asked to focus on priority programs to the detriment of other important but routine public health activities (Das Gupta 2005). In Tanzania, district plans prioritize the diseases covered by donor-supported programs such as leprosy and malaria, while neglecting diseases such as filaria and schistosomiasis which were perceived by health workers and communities to be serious problems (Mubyazi et al 2004). In turn, finding it difficult to run programs in settings with dysfunctional health systems, international agencies sometimes further weaken those systems by setting up alternative delivery mechanisms (Travis et al 2004, WHO 2007b).

PAHO: An agency which offers useful lessons

The Pan-American Health Organization (PAHO) offers some useful lessons in how an international agency can develop long-term partnerships with member countries to strengthen their public health systems.¹⁵ As early as 1924, the countries of the Americas signed the Pan American Sanitary Code, and later updated it. Like the revised International Health Regulations, this Code establishes a legal requirement for notifying other countries of disease outbreaks. But it

goes much further than this, establishing a legal framework that lays the basis for technical cooperation between the Pan American Sanitary Bureau and its member countries to reduce disease burdens within each country.

Technical collaboration between PAHO and member states seeks to systematically strengthen all aspects of their public health systems, including their population-wide services. For example, their current program of collaboration with Belize includes *inter alia* training Environmental Health Officers, updating public health legislation, and strengthening water quality monitoring, solid waste management, vector control, and food safety (PAHO 2007). With PAHO's encouragement, most of its member states have used the tools developed by the U.S. Centers for Disease Control and Prevention to identify what needs to be improved in their public health systems (PAHO 2002).

5. Beginnings of a donor turnaround

Global threats from emerging and drug-resistant diseases, as well as fear of bio-terrorism, have led to a revival of interest in building and maintaining strong public health systems. Developed countries have worked on strengthening their own systems, and increasingly understand that helping control communicable diseases in other countries will improve their own health security (Gostin 2008:17). International organizations have also begun to focus on public health system capacities. WHO's revised International Health Regulations, for example, address public health emergencies of international concern, and stress health system capacities. Unfortunately, WHO's focus is principally on the *capacity to detect and respond to outbreaks of disease of international concern* (WHO 2007a: xv). Such a strategy is inherently inefficient, because if health systems are poorly prepared for implementing health regulations and other measures to reduce exposure to disease, there will be repeated outbreaks to control.

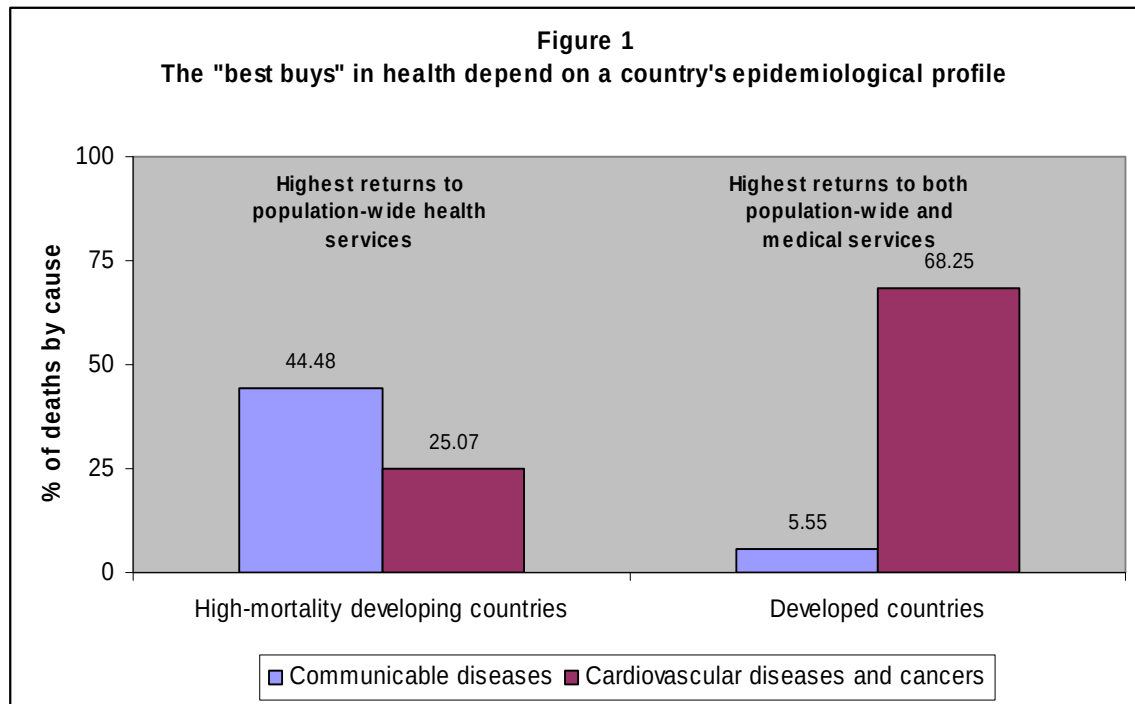
In a follow-up document, the World Health Organization (2007b) states its intention to better discharge its core function to strengthen health systems — going beyond efforts to strengthen outbreak surveillance and response to include systems for predicting and preventing exposure to health hazards. It elaborates the institution's framework for strengthening health systems. However, key gaps remain. For example, the role of a regulatory framework is buried amongst many other priorities in the subsection on governance, and does not mention public health regulations amongst the regulatory issues to be addressed (2007b:24).

6. What needs to be done?

There is growing awareness of the inability of global elites to insulate themselves from the externalities of poor public health systems in distant lands. This offers the opportunity to focus international cooperation on strengthening national population-wide health systems. The new efforts of the World Health Organization represent an important beginning on this front. However, they are as yet incomplete. Meaningful public health security for nations and the world requires building national public capacity to anticipate, avert, and control all major communicable disease threats — not merely to detect and control outbreaks — *whether or not* they have as yet developed into issues of international concern, as the WHO's current formulation suggests. Concerted attention and resources for such capacity building offers new opportunities for international collaboration to create public goods in health.

To this end, we offer a few suggestions. First, there is a need for compiling information on the basic institutional and regulatory underpinnings of population-wide services, to inform countries' and donors' efforts to improve these services. Analyzing the approaches used in countries such as Sri Lanka can illustrate the strengths and weaknesses of alternative approaches to system design. Secondly, international collaboration needs to be channeled towards building and maintaining national public health systems, with a focus on long-term collaboration to build public goods in health (Travis et al 2004). This can draw lessons from PAHO's success in doing this for many decades, despite its member countries' often difficult political and economic circumstances. Thirdly, global health cooperation needs to be better designed. Gostin (2007, 2008) has proposed a Framework Convention on Global Health which would help coordinate the fragmented activities of international organizations, states, NGOs, and civil society; and create incentives for more effective international health assistance.

To assure meaningful global health security, donors and international agencies need to radically change their approach to working with developing countries, with the new goal of strengthening their population-wide health systems. This is critical for enhancing the effectiveness of ongoing initiatives to improve health systems, water and sanitation, and health security. As Stern and Markel (2004) note: "Public health is an investment that works best when purchased in advance rather than paid out as each crisis arises."



Source: World Health Organization: Estimates of numbers of deaths by sex, cause and WHO mortality sub-region for 2002
www.who.int/healthinfo/bodgbd2002revised/en/index.html

References

- Ashton, John, and Howard Seymour. 1988. *The New Public Health*. Philadelphia: Open University Press
- Barnett, Darryl B., Joe E. Beck, Worley Johnson, and Steven Konkel. 2003. "Environmental Health in Public Health", ch 23 in F.Douglas Scutchfield and C. William Keck (eds.) *Principles of Public Health Practice*, Clifton Park NY: Delmar Learning (second edition).
- Chapin, Charles V. 1901. *Municipal Sanitation in the United States*, Providence RI: The Providence Press.
- Cueto, Marcos. 2007. *The Value of Health: a History of the PanAmerican Health Organization*, Washington DC: Pan American Health Organization.
- Das Gupta, Monica, and Manju Rani. 2004. "India's public health system - how well does it function at the National level?" Washington DC: The World Bank, Policy Research Working Paper 3447 (forthcoming in *Health Policy*).
- Das Gupta, Monica. 2005. "Public Health in India: an overview", Washington DC: The World Bank, Policy Research Working Paper 3787. A shorter version of this was published in Kaushik Basu (ed.) *Oxford Companion to Economics in India*, Oxford University Press, 2007.
- Donaldson, L.J. 2001. "125 Years of Public Health in the UK", *Journal of the Royal Society for the Promotion of Health* 121(3):146-151.
- Duffy, John. 1990. *The Sanitarians: a history of American public health*, Urbana and Chicago: University of Illinois Press.
- Easterlin, Richard.A. 1999. "How Beneficient is the Market? A Look at the Modern History of Mortality", *European Review of Economic History* 3:3:257-294.
- Easterlin, Richard.A. 2000. "The Worldwide Standard of Living since 1800", *The Journal of Economic Perspectives* 14(1):7-26.
- Esrey, S.A., J.B.Potash, L Roberts, and C Shiff. 1991. Effects of improved water supply and sanitation on ascariasis, diarrhea, dracunculiasis, hookworm infection, schistosomiasis, and trachoma, *Bulletin of the World Health Organization* 69(5):609-621
- Fewtrell, Lorna, Rachel B.Kaufmann, David Kay, Wayne Enanoria, Laurence Haller, and John M Colford. 2005. "Water, Sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis", *Lancet Infectious Diseases* 5:42-52
- Fidler, David. 2004. *SARS, Governance, and the Globalization of Disease*, London: Palgrave Macmillan
- Flemming Konradsen, Wim van der Hoek, Felix P. Amerasinghe, Clifford Muter⁶ and Eline Boelee. 2004. Engineering and malaria control: learning from the past 100 years, *Acta Tropica* 89(2): 99-108
- Gostin, Lawrence. O. 2004. International Infectious Disease Law: revision of the World Health Organization's International Health Regulations, *Journal of the American Medical Association* 291(21):2623-7
- Gostin, Lawrence. O. 2007. "Meeting the survival needs of the world's least healthy people: a proposed model for global health governance", *Journal of the American Medical Association* 298(2): 225-228
- Gostin, Lawrence O. 2008. "Meeting Basic Survival Needs of the World's Least Healthy People Toward a Framework Convention on Global Health", *Georgetown Law Journal*, Vol. 96(2): 331-392 (available at <http://ssrn.com/abstract=1014082>).

- Howard-Jones, Norman. 1981. "The World Health Organization in Historical Perspective", *Perspectives in Biology and Medicine*, Spring: 467-482
- Institute of Policy Studies. 2005. *Sri Lanka National Health Accounts 2000 – 2002*, Colombo: Institute of Policy Studies, Health Economics Policy Series
- IOM (Institute of Medicine). 1988. *The Future of Public Health*. Washington, D.C.: National Academy Press.
- Kosek M, Bern C, Guerrant RL. 2003. The magnitude of the global burden of diarrhoeal disease from studies published 1992-2000. *Bulletin of the World Health Organization* 81:3 p. 197-204.
- McKeown, T. 1976. *The role of medicine – Dream, Mirage or Nemesis*. Nuffield, London
- Lindsay, Steve, Matthew Kirby, Enis Baris, and Robert Bos. 2004. *Environmental Management for Malaria Control in the East Asia and Pacific (EAP) Region*, Washington DC: The World Bank, Health Nutrition and Population Discussion Paper.
- Mubyazi, Godfrey, Mathias Kamugisha, Adiel Mushi, and Erik Blas. 2004. Implications of decentralization for the control of tropical diseases in Tanzania: a case study of four districts, *International Journal of Health Planning and Management* 19: S167-185.
- Pan American Sanitary Code http://www.paho.org/English/D/OD_308_ch1-3.pdf
- PAHO (PanAmerican Health Organization). 1992. *Pro Salute Novi Mundi: a history of the PanAmerican Health Organization*, Washington DC: PanAmerican Health Organization
- PAHO (PanAmerican Health Organization). 1998. *Technical Cooperation among Countries: PanAmericanism in the Twenty-First Century*, Washington DC: 25th Pan American Sanitary Conference
- PAHO (PanAmerican Health Organization). 2002. *Public health in the Americas: conceptual renewal, performance assessment and bases for action*. Washington DC: Pan American Health Organization (<http://www.americas.health-sector-reform.org/english/publichealth-americas.htm>)
- PAHO (PanAmerican Health Organization). 2007. Belize Country Office, PAHO's Technical Cooperation on Trends affecting Health <http://www.blz.paho.org/program01.htm>
- Rosen, George. 1993. *A History of Public Health*, Baltimore: The Johns Hopkins University Press.
- Satterthwaite, David. 2007. "In pursuit of a healthy urban environment in low- and middle-income nations", ch 4 in Peter J. Marcotullio and Gordon McGranahan (eds.) *Scaling Urban Environmental Challenges: from local to global and back*, London: Earthscan Publications.
- Stern, Alexandra Minna, and Howard Markel. 2004. "International Efforts to Control Infectious Diseases, 1851 to the Present", *Journal of the American Medical Association*, 292(12):1474-9
- Travis, Phyllida, Sara Bennett, Andy Haines, Tikki Pang, Zulfiqar Bhutta, Adnan A. Hyder, Nancy R. Pielemeier, Anne Mills, and Timothy Evans. 2004. "Overcoming health-systems constraints to achieve the Millenium Development Goals", *Lancet* 364: 900-906.
- United States, Tennessee Valley Authority n.d. *Vector Control*
http://www.tva.gov/environment/reports/ros_eis/4-12_vector_control.pdf
- United States Public Health Functions Steering Committee. 1994. *Public Health in America*, <http://www.health.gov/phfunctions/public.htm>
- United States Centers for Disease Control. 1999. Control of Infectious Diseases, 1900-1999, *Journal of the American Medical Association* 282(11): 1029-1032
- United States Department of Health and Human Services. 2000. "Health Infrastructure", ch 23 in *Healthy People 2010 Vol II*. 2nd ed. Washington, DC: U.S. Government Printing Office.
<http://www.healthypeople.gov/document/HTML/Volume2/23PHI.htm>

- Utzinger, Jürg, Yesim Tozan, and Burton H. Singer. 2001. Efficacy and cost-effectiveness of environmental management for malaria control, *Tropical Medicine & International Health* 6 (9): 677–687.
- Winslow, Charles-Edward Amory. 1943. *The Conquest of Epidemic Disease*. Princeton: Princeton University Press
- World Bank. 2002. *Public Health and World Bank Operations*, Washington DC: The World Bank, Human Development Network, Health, Nutrition, and Population Series
<http://siteresources.worldbank.org/HEALTHNUTRITIONANDPOPULATION/Resources/Peer-Reviewed-Publications/PHOperations.pdf>
- World Bank. 2005. East Asia Update – Countering Global Shocks, Washington DC: The World Bank, East Asia and Pacific Region
<http://siteresources.worldbank.org/INTEAPHALFYEARLYUPDATE/Resources/EAP-Brief-avian-flu.pdf>
- World Bank (Brahmbhatt, Milan). 2006. Economic Impacts of Avian Influenza Propagation, Speech at the First International Conference on Avian Influenza in Humans, Institut Pasteur – Paris, France
<http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:20978927~menuPK:34472~pagePK:34370~piPK:34424~theSitePK:4607,00.html>
- World Bank 2007a. Sri Lanka Poverty Assessment: Engendering Growth with Equity, Washington DC: The World Bank
- World Bank. 2007b. *Healthy Development: the World Bank Strategy for Health, Nutrition, and Population Results*, Washington DC: The World Bank
- World Bank 2007c. *Health Reform in Rural China: where next?* Washington DC: The World Bank
- WHO (World Health Organization). 1978. *Role, Functions, and Training Requirements of Environmental Health Officers (Sanitarians) in Europe*, Copenhagen: WHO Regional Office for Europe.
- WHO (World Health Organization). 2000. *World Health Report 2000: Health Systems—Improving Performance*. Geneva: World Health Organization
- WHO (World Health Organization) (Prüss-Üstün, A. and C. Corvalán eds). 2006. *Preventing disease through healthy environments: Towards an estimate of the environmental burden of disease* Geneva: World Health Organization
- WHO (World Health Organization). 2007a. *The World Health Report 2007: A Safer Future: Global Public Health Security in the 21st Century*. Geneva: World Health Organization
- WHO (World Health Organization). 2007b. *Everybody's Business: Strengthening Health Systems to Improve Health Outcomes, WHO's Framework for Action*. Geneva: World Health Organization

Endnotes

- ¹ See, for example, Barnett et al 2003, Donaldson 2001, and WHO 1978.
- ² See for example Easterlin 1999 and 2000, United States Centers for Disease Control 1999, and Ashton and Seymour 1988. Until the therapeutic advances of the mid-twentieth century, these were the most effective way for elites to protect themselves from diseases spreading from neglected groups or areas. See for example, Donaldson 2001, Duffy 1990, and Rosen 1993.
- ³ Fidler 2004 discusses the implications of the SARS epidemic for the global governance of disease.
- ⁴ See for example, World Bank 2007c, Das Gupta and Rani 2004.
- ⁵ See for example, Donaldson 2001, Duffy 1990, and Rosen 1993.
- ⁶ See for example McKeown 1976, Ashton and Seymour 1988, Easterlin 1999, and US 1999.
- ⁷ See, for example, Barnett et al 2003, Donaldson 2001, and WHO 1978.
- ⁸ See for example Institute of Medicine, 1988, United States Public Health Functions Steering Committee 1994, United States Department of Health and Human Services. 2000.
- ⁹ Sri Lanka spends a total of 3.7% of GDP (\$32 per capita), including private as well as public spending.
- ¹⁰ See, for example, Institute of Medicine 1988, Barnett et al 2003, and Ashton and Seymour 1988.
- ¹¹ See, for example, Barnett et al 2003, Donaldson 2001, and WHO 1978.
- ¹² For example, malaria was eradicated from a vast tract of the United States through a collaboration between the Public Health Service and Tennessee Valley Authority to (<http://www.cdc.gov/malaria/history/index.htm#tva>), and by draining marshes in a large tract in Italy <http://www.britannica.com/eb/article-9060807/Pontine-Marshes>
- ¹³ See for example, Lindsay et al. 2004:Annex 2; Flemming et al. 2004; and Utzinger et al.2001 for successful programs in Asia and Africa.
- ¹⁴ Lindsay et al. 2004, Flemming et al 2004, Utzinger et al 2001, WHO 2006, Pruss-Ustin et al 2008.
- ¹⁵ See for example Pan American Sanitary Code, PAHO 1992, 1998, and Cueto 2007.