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## Environmental Public Health Awaits Rediscovery

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# Environmental Public Health Awaits Rediscovery

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*Preventing environmental exposures that threaten human health remains among the best but least attended to opportunities to improve everyone's health. For more than a decade, medical care concerns, exacerbated by voracious competition among medical empires and the implacably growing number of uninsured, have often been misconstrued as constituting a complete agenda for health system reform. The authors explain the predicament from an historical perspective — how defining events moved U.S. health policy away from protecting the public against dangerous exposures toward unrealistic expectations that doctors will fix whatever goes wrong, at least for individuals with ample medical insurance. They explain how environmentally oriented public health is uniquely suited to help organized medical care with its biggest headache: how to restrain expenditures while producing health. The authors provide specific examples of what has been lost and a prescription for how the U.S. could become the first among nations to strategically link public health and increasingly organized medical care to improve population health.*

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Preventing environmental exposures that threaten human health remains among the best but least attended to opportunities to improve health. Efforts to prevent disease, disability, and death caused by environmental exposures, including those in workplaces, fall far short in the United States because the public health institutions we have charged with this responsibility are notably less effective than they could be. The effectiveness of these organizations is compromised not only for reasons specific to their operations, but by long-standing political circumstances that need no longer prove insurmountable. To make this point, we occasionally draw from our March 1999 piece in *Public Health Reports*, where we first observed that the American public has come to expect more from medicine than it can deliver and far less from public health than it can accomplish.<sup>1</sup>

In the United States we expect doctors to fix what is broken — our injuries, diseases, and their consequences — but rarely do we expect that our social institutions,

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in particular our public health authorities (health departments and environmental and worker protection agencies), will prevent exposures that cause ill health. Yet too often those at risk from hazards remain unaware of any danger until symptoms betray irreversible damage that medical care cannot repair. If the public does not yet recognize the mismatch between our expectations of medical care and the scope of tools clinicians possess, organized medical care is beginning to falter. The medical care industry is politically vulnerable today because the public and politicians demand both more modest spending and better health results. Clinical medicine alone cannot keep the public healthy, even using a full array of clinical preventive services and actively promoting healthier life styles. Environmentally oriented public health is uniquely suited to help organized medical care with its biggest headache: how to restrain expenditures while producing better health.

Clinical preventive services receive increasing attention, while public health efforts rarely generate broad political support. A few epidemics, such as smoking, gun violence, and lead exposure have produced public backing for public health interventions. In general, however, opportunities to protect the public from hazards in the environment remain the most neglected public health strategy.

We will acquaint the reader with historical developments that have led to the predicament we face today. After exploring aspects of that predicament, we suggest how organized medical care and public health together — both operationally and politically — can contribute significantly to improving health. We suggest reasons why it may now be possible to overcome obstacles posed by the dominance of medical care and by the lack of political will to launch and sustain the broad community and workplace interventions (including state and federal regulation) of environmental public health. We argue that an alliance between organized medicine and public health is crucial to exercise this under-exploited group of public health strategies.

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### Defining Events in Health History

Long before the concepts of public health or environmental health had emerged, a safer environment contributed to the largest increase in life span and population growth. After early agricultural innovations enhanced the food supply,<sup>2, 3</sup> a mid-nineteenth-century sanitary revolution in industrializing Europe brought a second major leap forward in human health. Public health reformers led this movement as they enriched epidemiology, the basic science of public health. They collected information that enabled them to associate ill health in human populations with filth in the environment, even before lab sciences allowed for identification of specific causes. Public health reformers directed removal of human wastes, provision of uncontaminated food and drinking water, and reduction of hazards where people lived and worked.<sup>4</sup> They were often guided by the seemingly *unscientific*, but more correctly *non-reductionist* concept of *filth*.

For most of this century, scientific progress has flowed from laboratory investigations conducted under simple and controlled conditions, coming as close as possible to changing one variable or condition at a time — a reductionist approach. In retrospect, scientists and historians have tended to disparage the ways in which early practitioners of public health had characterized the environment because they had not reduced the biological processes observed in populations to the basic rules of chemistry and physics. Applying reductionist methods to clinical problems rapidly

advanced medical science, but making laboratory analysis the standard for public health action may have undervalued population-oriented environmental public health interventions.

At the end of the nineteenth century, germ theory and the fruits of the bacteriologic revolution facilitated new strategies to control disease. For a short time, often called the “golden era of public health,” availability of new products developed in public health laboratories — principally in Massachusetts and New York City — stimulated collaboration between public health and medical practitioners.<sup>5</sup> Together they reduced the spread of bacterial diseases and improved health in populations. The burden of diphtheria, for example, was much diminished by this collaboration. Had the alliance endured, many health benefits might have resulted from integration of population-based public health and patient-oriented medical care. But by 1920, several developments coincided to shift priorities away from environmental science and broad, community interventions, towards greater reliance on medical encounters with individual patients.

Encouraged by germ theory, public health practitioners channeled their efforts to identify the specific microbes causing damage. They pursued the individual “carriers” of infections, relying on treatment of dangerous persons as the preferred strategy to contain the spread of disease. By 1930, the “New Public Health” signaled an historic shift in orientation for the science and practice.<sup>6</sup> The disease-specific character of the New Public Health reinforced physicians’ roles as diagnosticians and providers of increasingly effective therapies — albeit for a relatively small proportion of maladies. Simultaneously, the rapidly growing American Medical Association boosted the social status of medical practitioners and established the dominance of medicine over public health. Nonmedical public health practitioners, largely sanitary engineers responsible for water and sewage treatment, lost prestige as doctors gained it.<sup>7</sup> Medical practitioners retain their superior status today.

The shift to the New Public Health and the ascendancy of the medical profession drew public attention away from huge health disparities among various segments of society. It also relieved political pressure on government in general, and on public health agencies in particular, to alleviate such disparities by preventing exposures to hazards in the environment. By *environment* we mean the physical and social world in which we live and work, but not the population’s genetic makeup, its lifestyles, or the medical care it receives. This definition comprises exposures to toxic chemicals, infectious agents, and physical hazards. It includes, among others, the hazards of slum housing with lead paint and rats, the danger in schools where asbestos was used as insulation, and the risk of drawing water from aquifers that are contaminated by pesticides.

With the New Public Health in ascendance, even greatly enhanced understanding of environmental disease based on molecular biology, toxicology, and increasingly sophisticated epidemiology did not attract health departments back to the practice of population-based environmental health. And the political ascent of medicine drew the scientific talent, resources, and attention of all categories of health practitioners disproportionately to the treatment of individuals already suffering from illness or injury, while diminishing emphasis on protective measures for the healthy.

As early as the 1930s, but more notably since World War II, Americans have debated issues once removed from health itself — how to offer medical and hospital care to everyone and how to insure these services. Departments of health, too, offered medical services to immigrants, minorities, and the poor, featuring care of

mothers and babies, and treatment of tuberculosis and venereal disease. They did not concentrate on gathering and analyzing population data or on fashioning better environmental strategies to prevent exposures and their adverse health consequences. Even advocates for poor communities seemed to assume that medical care for the indigent would close the gap in health status associated with economic, social, and physical circumstances. Without wider recognition of the limits of medical care and sufficient public support to overcome political resistance to broad health interventions including regulation, environmental health remained a neglected public health strategy from the 1920s to the 1970s.

Then two major institutional changes reshaped the public health landscape. First, by the 1970s, most health departments increased their dependence on fee-for-service Medicaid funds to support clinical services for the poor and vulnerable, tilting even further away from environmental strategies.<sup>8</sup> Second, following the model of the Federal Environmental Protection Agency (EPA), state governments stripped their health departments of environmental health components, (although not always of the statutory authority). As the Congress had transferred the Public Health Service's air and water programs into the new EPA, state legislatures assembled new state environmental or natural resources agencies from pieces of public health departments. The new agencies, staffed heavily by engineers and lawyers, lacked health departments' broad mandates to protect the public's health. New specialized programs for mine safety and worker health created in 1969 and 1970 by new labor laws had even less consequence for public health, as they failed to stimulate adequate programs in state public health agencies and the federal health department or anywhere else.

These changes contributed to the current predicament in which environmental health is not the vital force that it should be. As our colleague David Ozonoff explained in his classic 1995 commentary, "No People, No Politics: the legacy of the environment in public health,"

The mainstream environmental movement has commonly projected a vision of the environment as "wilderness without people," whereas, for the environmental health professional, the environment has been replaced by environmental "media" of air, water, food and soil. What is missing from both concepts is *people* — the essential ingredient of public health.<sup>9</sup>

The 1988 Institute of Medicine (IOM) report, *The Future of Public Health*, observed that EPA's creation "has led to fragmented responsibility; lack of coordination, and inadequate attention to the health dimensions of environmental problems."<sup>10</sup> The IOM proposed ways that public health might emerge with greater clarity, direction, and political will. Unfortunately, the well intentioned efforts of the IOM panel did not stimulate a public health renaissance. Fourteen years later, we are no closer to reviving public health to the full effectiveness presaged by sanitary reforms and the brief period of synergy between public health and medicine at the turn of the century.

Ironically, since the 1970s, fruitful efforts by medical care providers to improve clinical preventive services and to promote healthy lifestyles may have obscured from public view the continuing failure to prevent environmental exposures, the preventable cause of disease, disability, and death that receives least attention from the health sector.<sup>11</sup> Comprehensive environmental and occupational health textbooks discuss the diseases caused by environmental exposures (including asthma, cancers, birth defects, and neurobehavioral disorders) and their incidence. Unfortunately, so

far as we know, no one has summed up all that is known to produce a meaningful estimate of the combined contribution of environmental exposures to the overall burden of ill health.

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### **The Predicament**

Our current predicament, the result of developments in science, medicine, public health, occupational and environmental health, and political affairs, was recognizable as early as the 1980s. The professionals and organizations that identified themselves with the traditions of public health remained largely ineffective or indifferent to environmental matters and to population-based health interventions as medical care grew to dominate overwhelmingly the U.S. health system.

Large disparities in the health status of Americans get little public attention compared to the costs of medical care and their effect on personal finances. With 1.4 trillion dollars expended per year in the health sector of our economy, which employs in excess of ten million people, U.S. “health reform” has focused on competing visions of how, and how much, to pay for medical care, and on the quality of clinical services rather than on improving health population-wide.<sup>12</sup>

Today, and for the past decade, medical care concerns, exacerbated by voracious competition among medical empires and the implacably growing number of uninsured, are often misconstrued as constituting a complete agenda for health system reform. Even many public health professionals devoted themselves to debates about which organizations should deliver medical care to the poor, while neglecting population and environmental perspectives. Efforts to clarify the limits of clinical care and to see health reforms in terms of what could be done to promote the health of the population remain at the periphery of the nation’s political radar screen.

In the absence of universal medical care, it is hard to gauge how much health the United States would be squandering if our society were to provide clinical care to all but continue to neglect environmental public health. Surely, a significant portion of the remaining preventable burden of ill health and premature death is appropriately allocated to environmental causes. A 1997 British report of the Office of National Statistics entitled *Health Inequalities*, reinforces this view.<sup>13</sup> The United Kingdom has a long tradition of maintaining reliable health statistics, and the National Health Service (NHS) provides comparable medical services to every segment of British society. Despite vast improvements in the quality of and the equity in allocation of medical services in Britain over the last fifty years, health disparities among sectors of society that were seen early in this century persist.

The report notes that all groups in England and Wales experienced improvements in life expectancy and a steep decline in infant mortality since 1900. It documents differences in health between sectors of society that endure in the face of universal provision of medical care. “Differentials in health can be observed across the social groups within the population, with a gap of five years in life expectancy between men grouped into five occupational classes.”<sup>14</sup> Those five years of life lost to the group occupying the lowest economic rung are most likely attributable to the aggregate contribution of social and physical environments.

Beyond the reform debates of the first Clinton administration, many problems and opportunities that might have rejuvenated environmental public health since the publication of the IOM report have not. Here are a few:

- The emerging infections strategy offered by CDC's National Center for Infectious Diseases in the early 1990s<sup>15, 16</sup> following the HIV epidemic gained public attention. Scientists like Nobel Laureate Joshua Lederberg and journalists like Laurie Garrett, author of *The Coming Plague*,<sup>17</sup> publicized potential infectious threats for which the nation was unprepared. Recent vector-borne, water-borne, and food-borne outbreaks caused by hanta virus, Cryptosporidium, and E. coli 0157 dramatize the case for detecting and controlling infections. Despite new funds and programs here and there, neither the Administration nor Congress has moved to plan, fund, and organize systematic surveillance and protection for populations exposed to the full range of environmental health threats.
- Asthma is a growing epidemic that is enormously costly in health and productivity. Even as medical institutions strain to manage increasing numbers of patients whose health is compromised by asthma, few have joined with public health authorities to implement effective strategies to prevent new cases. Environmental monitoring, by measuring air contaminants, has demonstrated that poor indoor air quality and certain antigens in particular — at home, work or school — are significant contributors to this problem. Already sensitized building occupants may need ongoing medical attention, but exposures, and thus flare-ups and new cases, can often be prevented by attention to building design, materials, renovation, and maintenance, and especially ventilation.<sup>18</sup>
- While the Department of Transportation and others systematically attack the causes of motor vehicle injuries and deaths — from road design to drugs and alcohol — neither medical care nor public health groups have developed a similar approach to the growing number of falls among the elderly, where the causes of these injuries are both medical (osteoporosis and medications) and environmental (home design and furnishings).
- The World Bank's 1993 World Development Report emphasized population health outcomes.<sup>19</sup> It has influenced policy thinking in most countries, save this one, which topped all others in spending more (as a fraction of GDP) and producing less (in "years of healthy life lost"). In 1999, the World Health Organization used a similar approach to set its global agenda.<sup>20</sup> WHO's new leaders decry the disproportionate share of the world's scarce health resources devoted to expensive, technologically complex medical procedures to treat the dying in contrast what is spent on preventive interventions. They euphemistically call these bad decisions *allocational inefficiencies*. How to avoid spending so much for so little health gain preoccupies experts worldwide, including the economists and physicians from U.S. universities who helped create the analytic tools. Our country, nonetheless, remains the outstanding example of inefficient and ineffective investment for health.

Admittedly, the environmental public health aspects of the World Bank and WHO strategies have yet to be clearly articulated. But if these analyses do come to invigo-

rate environmental public health somewhere, the change is more likely to occur outside the U.S. than within. World Bank pressure to invest in efficient interventions is unlikely to affect the United States, as our country is not seeking loans from the Bank.

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### The Prescription

Given this predicament, how can we overcome the incapacity of environmental health in the United States? How can we use both medical and public health capabilities to optimize health for all? Escalating pressures on the health care industry to produce more health at lower cost suggests an unprecedented window of political opportunity to review and repair how our nation conducts its health business. Below, we discuss essential operational requirements of a more unified health system, capable of improving health while safeguarding resources. Finally, we explore a political alliance suited to correcting those popular misconceptions with which we began. If medical institutions that recognize the predicament choose to engage in a new political strategy, it could radically alter the culture of medicine and make way for a more competent health system.

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### Operational Aspects

A health sector explicitly charged with improving health status, as David Kindig has noted,<sup>21</sup> depends on better population-based information about threats to human health and on analytic capacity to formulate and then evaluate strategies. Effective response to environmental hazards will depend on data about both exposures and diseases. Both must be aggregated and tied to population denominators.

If clinicians were rewarded for the health of the population, they might strive to provide information to guide public health interventions. Signs and symptoms or diagnoses, when aggregated to a locality or workplace, might trigger investigations to detect dangerous exposures. Knowledge of such hazards might initiate greater efforts by public health agencies to eliminate the causal exposures.

Such examples of synergy should alert physicians that public health is more than the sum of all clinical preventive services. Most clinicians, however, do not recognize in their patients what could — or should — have been prevented. Although increasingly likely to counsel patients to avoid lifestyle risk factors, clinicians overlook countless opportunities to lend their information and expertise to guide complementary action by public health authorities to curb problems at the source. Medical care organizations rarely reward collaboration with public health agencies, yet neither medical care nor public health programs can maximize their own contributions to health without new links and greater integration. We first presented the tasks below in *Public Health Reports* in March 1999.<sup>22</sup> As they remain essential to systematic improvement, here we have updated our thinking and attuned the descriptions to feature environmental aspects of public health as follows:

**Monitoring disease, injury, disability, and death** in the whole population: when, where, and in whom are they occurring? Data gathering for disease and injury surveillance is best done by clinicians who see sick and injured people. What data are most important to gather and how to do so



efficiently can be determined by public health and medical care professionals working together. Many problems are not evident until information is aggregated. Beyond birth and death registration — vital statistics long maintained by public health authorities — data aggregation, indispensable for improving health, is rarely systematic in this country. The United States is one of the few industrial nations still relying more on surveys than on medical care data to assess the health of its population. As the medical care system becomes more universal and more organized, it will also become better able to generate population-based data. (A caution: Because privacy of medical data can be sensitive, systems for aggregating data will need public involvement in their design and operation.)

**Monitoring the environment for exposures** that may cause disease, injury, disability, or death: Who is exposed to what, how much of it, when, where, and for how long? Such environmental monitoring or hazard surveillance is usually led by public health authorities. With a determined effort they could assemble better information about how the population may be exposed in living and working environments to toxic chemicals, infectious agents, and physical hazards — from carbon monoxide from space heaters to salmonella in poultry. This information would become important for protecting potentially exposed and exposed individuals, both by eliminating offending dangers and by strengthening links with medical institutions to assure proper individual clinical screening and care for those likely to have been exposed. New technologies now make it possible to gauge some exposures by studying the exposed individuals — biomonitoring. (Another caution: because many industries and some parts of government, especially military installations and the gigantic factories that made nuclear weapons, have been major creators of environmental health hazards, they may be reluctant partners. Residents and community-based organizations, on the other hand, drawn into the fray by local concerns, often prove to be enthusiastic advocates for environmental public health. The experience of the environmental justice movement illustrates both cautionary points.)

**Intervening socially and institutionally to protect the public.** Public health authorities may act to remove hazards from the environment: bacteria and viruses from drinking water or lead from paint and gasoline. Where protection is lacking, they may promote or require it by, for example, urging the addition of iodine in table salt to prevent goiter or folate in enriched flour to prevent neural tube malformations. Other public health interventions insulate people from hazards, as when ventilation is installed in dusty or fume-filled workplaces or when pollution is dispersed away from people by sending it up tall smokestacks. These social or institutional interventions often require the authority of a public health agency (including environmental and workplace regulatory agencies) in order to act before the potential victims recognize the danger or are harmed. Such interventions could stem the tide of injuries and illnesses, relieving some of the pressure on organized medical care.

**Intervening with individuals for population-wide results.** Vaccination, for example, is at once a public health strategy and a medical intervention. Entire communities can be protected when vaccines are administered to enough people to decrease the population of susceptibles and thus the spread of a disease. Similarly, effective clinical treatment of people with tuberculosis is part of a population-based strategy to control the disease, because it reduces everyone's likelihood of exposure. Not every clinical intervention is closely linked to the health of others in the population, but effective ones, including some screening programs, are capable of reducing the burden of disease and making the nation as a whole healthier. In this middle ground where public health and medicine overlap, a more rational division of labor will smooth operations and contribute to better health outcomes.

**Evaluating all interventions** designed to reduce injury, disease and disability. To see what works, population-based reviews must consider disease, injuries, disability, and death — examining records of births, deaths, disabilities, and diagnoses. As clinical medicine adopts an evidence-based approach to resource allocation for clinical care, it is logical to extend this evaluation to include social and institutional interventions.

These tasks are only a necessary first step if the U.S. is to strengthen both medical care and environmental public health. They would provide the nation a better picture of threats to health and burdens of disease and a better understanding of the benefits available from particular interventions. But none of this will happen without an almost revolutionary cultural change, after which people would no longer expect that medical care can solve every health problem.

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### **Garnering Political Will**

Public health practitioners understand that unless harm comes to large numbers (or perhaps a single celebrity), a popular call for protection is unlikely. Damaged individuals go quietly to clinicians who may not even attempt to learn the cause of the illness or to report the hazard for investigation. Such failures to detect, prevent, and control health threats lead inexorably to poor health and impressive medical expenditures. Despite the logic and a plethora of examples — from asthma to falls in the elderly — where prevention would work, public health organizations have often been unable to generate political support for environmental interventions.

Until very recently medical practitioners have profited from the rising demand for their services without any penalty for inefficiency. They could ignore public health without economic peril. Today, clinicians can no longer disregard either what their services cost the public or what outcomes they produce. To adjust practice, physicians must rely on organizations or networks that aggregate data, because the number of patients seen by one practitioner is too small to paint a meaningful picture. Managed care, the most rapidly growing segment of the medical care industry, has an advantage as it enrolls populations. Despite the fact that improving public health would relieve some of the pressure on medical care providers, we see little evidence that organized medicine has sought to increase the effectiveness of public health and its interventions in the environment.

Major employers, the primary purchasers of private health insurance, have encouraged competition in the medical marketplace by limiting what they will cover and how much they will pay. Employees often lose benefits or pay a larger share of the premium, and the system seems less and less user-friendly. Neither the federal nor state governments have picked up the slack (and welfare reform has aggravated the problem). More people are forced to manage without insurance coverage that medical practitioners consider adequate. Clinicians suffer too. As per patient or per procedure income to medical institutions is restricted, medical managers have increased their control of clinicians whose satisfaction has plummeted. Perhaps more medical professionals and institutions will acknowledge the predicament they now share with patients, insurers, employers, and tax payers — and strive for relief. The environmental contribution to compromised health status awaits a full accounting. Environmental public health awaits rediscovery.

If the public and our politicians have been lulled into expecting too much health from medical care alone, who better to start the process of correcting that misguided expectation than the leaders of medical care? Until now they have enjoyed our linguistic anomaly wherein we often fail to distinguish between *health*, meaning medical — as in health care and health insurance — and *health*, meaning well-being and lack of disease.

Nor have the determined efforts of dedicated advocates brought environmental public health to the front page of America's health debate. Environmentalists have been slow to shift their efforts from protecting the environment to emphasize protecting the people in it. Because the environmental justice movement struggles to protect already politically disenfranchised groups, it lacks clout. Physician groups, like Physicians for Social Responsibility, reached their peak of effectiveness when fighting the threat of nuclear weapons. Today they are dedicated to improving the environment for people, but have not yet developed politically effective tactics. Protecting worker health ranks high among the labor movement's list of organizing and collective bargaining objectives, but medical care providers and public health professionals have been slow to grasp the role of workplace exposures in causing disease and injuries in the population as a whole.

Obviously, times are changing. If the American Medical Association that considered syndicalism and collective bargaining anathema only a short time ago has formed a labor union within itself, other unprecedented events are possible. Imagine if health plans were to develop operational and political links with public health.

Many forums can advance the cause. The Pew Environmental Health Commission has been studying how to revitalize environmental public health.<sup>23</sup> The Institute of Medicine might reopen its deliberations on the future of public health to consider how to link environmental public health and medical care. Or Congress might investigate what opportunities exist to make both public health and medical care more effective, as many of the political pressures which brought the Clinton attempts at reform and the market driven changes since, are still potent.

The U.S. has been slow to develop a national health system. Yet we might still be among the first to consciously link and strategically ally public health with our diverse and hard pressed, but increasingly organized, medical care providers. It is among our best prospects to improve the health of the nation.✿

*These comments are from a talk given by Dr. Robbins at the opening of the Pew Environmental Health Commission, May 11, 1999.*

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**Notes**

1. Anthony Robbins and Phyllis Freeman, "Viewpoint: Alliances with Managed Care: How Organized Medical Care Can Advance Public Health," *Public Health Reports* 114 (1999):120–125.
2. Thomas McKeown, *The Role of Medicine: Dream, Mirage or Nemesis?* The Nuffield Provincial Hospitals Trust (London, 1976). On how food and nutrition have played a more major role in health improvements than have medical interventions.
3. Jared Diamond, *Guns, Germs and Steel: The Fates of Human Societies* (New York: Norton & Co, 1997). On how domesticity of crops and animals contributed to nutrition, which has played a major role in the health and longevity of human populations and in the pace of industrialization.
4. George Rosen, *A History of Public Health* (New York: MD Publications, 1958), from Chapter 6: "Industrialism and the Sanitary Reform Movement, 1830–1875."
5. Paul Starr, *The Social Transformation of American Medicine: The Rise of a Sovereign Profession and the Making of a Vast Industry* (New York: Basic Books, Inc. 1982).
6. Barbara Rosencrantz, *Public Health and the State: Changing Views in Massachusetts, 1842–1936* (Cambridge: Harvard University Press, 1972).
7. David Ozonoff, "No People, No Politics: The Legacy of the Environment in Public Health," *Current Issues in Public Health*, 1 (1995) 55:55–59.
8. Robbins and Freeman, "Viewpoint: Alliances," 120–125.
9. David Ozonoff, "No People," quotation at 55.
10. Institute of Medicine, *The Future of Public Health* (Washington: National Academy Press, 1988), 150.
11. Robert G. Evans, M. Barer, and T. Marmor, eds., *Why Are Some People Healthy and Others Not? The Determinants of the Health of Populations* (New York: Aldine de Gruyter, 1994), Chapter 8, "The Determinants of a Population's Health: What Can Be Done to Improve a Democratic Nation's Health Status?" 217–230.
12. Phyllis Freeman and Anthony Robbins, "Health Care Reform Minus Public Health: A Formula for Failure," *Journal of Public Health Policy* 15:3 (1994):261–282.
13. Francis Drever and Margaret Whitehead, eds., *Health Inequalities* (London: Government Statistical Service, 1997).
14. Drever and Whitehead, eds., *Health Inequalities*, quotation at 3.
15. CDC, *Addressing Emerging Infectious Disease Threats: A Prevention Strategy for the United States* (1994).
16. CDC, *Preventing Emerging Infectious Diseases: A Strategy for the 21st Century* (1998).
17. L. Garrett, *The Coming Plague: Newly Emerging Diseases in a World out of Balance* (New York: Penguin Books, 1994).
18. Clive M. Brown, Henry A. Anderson, and Ruth A. Etzel, "Asthma: The States' Challenge," *Public Health Reports* 112 (1997):198–205.
19. World Bank, *World Development Report 1993: Investing in Health* (Oxford: Oxford University Press, 1993).
20. World Health Organization, The World Health Report, 2000, *Health Systems: Improving Performance*. Sets forth a new framework for building health systems and evaluating their performance; rates US 37th despite great technological advantages over most countries in the world—based on inequitable distribution of health services and inequities in financing system for health services.
21. David A. Kindig, *Purchasing Population Health: Paying for Results* (Ann Arbor: University of Michigan Press, 1997).
22. Robbins and Freeman, "Viewpoint: Alliances," 120–125.
23. The Pew Environmental Health Commission, "America's Environmental Health Gap: Why the Country Needs a Nationwide Health Tracking Network," September 2000, The Pew Charitable Trusts, <http://pewenvirohealth.jhsph.edu>.

