GRANT MAKERS IN HEALTH

PROGRESS AND PERIL

Examining Antibiotic Resistance and Systemic Contaminants

ISSUE BRIEF NO. 7

BASED ON A GRANTMAKERS IN HEALTH ISSUE DIALOGUE

WASHINGTON, DC

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Foreword

As part of its ongoing mission to inform and support trustees and staff of health foundations and corporate giving programs, Grantmakers In Health (GIH), in conjunction with the Health and Environmental Funders Network (HEFN), held a day-long Issue Dialogue on two important environmental health issues: antibiotic resistance and systemic contaminants. Experts and advocates from many organizations came together to discuss concerns and opportunities, as well as current and potential roles for health philanthropy.

This Issue Brief brings together key points from the day's discussion with factual information on environmental health drawn from a background paper prepared for the participants. Saba Brelvi of GIH's staff wrote the paper and planned the program in collaboration with colleagues from HEFN, especially Kathy Sessions and Michael Lerner. Contributions to the final report came from Paula Darte as well as from Anne Schwartz and Leslie Whitlinger of GIH's staff.

Special thanks are due to those who participated in the Issue Dialogue, especially moderator Philip Lee, Senior Scholar, Institute for Health Policy Studies, University of California at San Francisco; and presenters Tamar Barlum, Director, Antibiotic Resistance Project, Center for Science in the Public Interest; Gary Cohen, Coordinator, Health Care Without Harm; Karen Florini, Senior Attorney, Environmental Defense (formerly the Environmental Defense Fund); Stuart Levy, President, Alliance for the Prudent Use of Antibiotics; Richard Jackson, Director, National Center for Environmental Health, Centers for Disease Control and Prevention; J.P. Myers, Director, W. Alton Jones Foundation; and Mark Walters, Director, Environment Program, The Nathan Cummings Foundation.

GIH gratefully acknowledges the funders who made this session possible, in particular The California Wellness Foundation and The Jenifer Altman Foundation. Additional support was provided by the Jessie B. Cox Charitable Trust, The Nathan Cummings Foundation, the W. Alton Jones Foundation, and the Mitchell Kapor Foundation.

About GIH

Grantmakers In Health (GIH) is a nonprofit, educational organization dedicated to helping foundations and corporate giving programs improve the nation's health. Its mission is to foster communication and collaboration among grantmakers and others, and to help strengthen the grantmaking community's knowledge, skills, and effectiveness. Formally launched in 1982, GIH is known today as the professional home for health grantmakers, and a resource for grantmakers and others seeking expertise and information on the field of health philanthropy.

GIH generates and disseminates information about health issues and grantmaking strategies that work in health by offering issue-focused forums, workshops, and large annual meetings; publications; continuing education and training; technical assistance; consultation on programmatic and operational issues; and by conducting studies of health philanthropy. Additionally, the organization brokers professional relationships and connects health grantmakers with each other as well as with others whose work has important implications for health. It also develops targeted programs and activities, and provides customized services on request to individual funders. Core programs include:

- **Resource Center on Health Philanthropy.** The Resource Center monitors the activities of health grantmakers and synthesizes lessons learned from their work. At its heart are staff with backgrounds in philanthropy and health whose expertise can help grantmakers get the information they need and an electronic database that assists them in this effort.

- **The Support Center for Health Foundations.** Established in 1997 to respond to the needs of the growing number of foundations formed from conversions of nonprofit hospitals and health plans, the Support Center now provides hands-on training, strategic guidance, and customized programs on foundation operations to organizations at any stage of development.

- **Building Bridges with Policymakers.** GIH helps grantmakers understand the importance of policy to their work and the roles they can play in informing and shaping public policy. It also works to enhance policymakers' understanding of health philanthropy and identifies opportunities for collaboration between philanthropy and government.

GIH is a 501(c)(3) organization, receiving core and program support from more than 175 funders annually.

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Introduction

The last hundred years have witnessed great technological and medical advancements. Dramatic industrial progress has led to new manufacturing processes and consumer goods. The medical frontier continues to expand at an exponential rate, with new knowledge and promising discoveries about the determinants of disease, and effective methods for their prevention and cure.

Casting a shadow over this progress, however, is a serious and unintended consequence. Insufficient safeguards in manufacturing and agriculture, an increase in waste by-products and the lack of suitable disposal methods, the dearth of rigorous research and surveillance, and the overuse and misuse of antibiotics have all contributed to a rise in health problems with man-made roots.

Diseases that were once considered conquerable are reappearing with a vengeance, and in forms that resist an entire arsenal of antibiotics. The rise in incidences of asthma and various cancers have been traced to exposure to certain environmental contaminants. Small amounts of man-made chemicals and pesticides are detectable in nearly everyone today, with evidence mounting that even low levels of chronic exposure adversely affect the immune, reproductive, and neurological systems.

In the process of solving one problem, advances in medicine and technology have often created another. While we know something about the health effects of acute and massive exposure to some industrial by-products, little is known about low-level or sustained exposure. Eighty years after the advent of penicillin and other so-called miracle drugs, we are now paying a heavy price for their careless or casual administration.

On October 3, 2000, Grantmakers In Health (GIH) convened an Issue Dialogue to explore these issues and discuss opportunities for health and environmental funders. Participants referred to this intersection of environment and health as disease prevention and health promotion on a grand scale. If the environment – the air, water, and food supply – is making large populations sick or compromising their ability to heal, then the environment must be of interest to all engaged in improving health.

There are a number of dimensions to the issues of environmental health that make them particularly challenging. First, many parties have strong economic interests in industrial progress, even when evidence exists regarding adverse health effects. Too often, legislation to address these effects is the result of compromise. Unfortunately, those most at risk of environmental health hazards – including toxic dumps and placement of industrial incinerators – are the least likely to wield economic or political clout in legislative or regulatory negotiations. Second, while crises frequently receive public and political attention, long-term, low-level community health hazards are overlooked, even when the health of entire communities is put at risk. Finally, relatively small increases in knowledge about potential health impacts of environmental change often raise questions that are troubling to the general public. This makes it important for health and environmental specialists to be clear when warning about potential risks.

This publication draws on presentations made during the Dialogue as well as a background paper prepared for the meeting. It begins with an examination of the increase in antibiotic resistance, likely factors that have contributed to this increase, and action by the public sector to limit this quickly-spreading phenomenon. Following this, the report provides an introduction to systemic contaminants, illustrating both

While crises frequently receive public and political attention, long-term, low-level community health hazards are overlooked, even when the health of entire communities is put at risk.

Antibiotics are not drugs that are just given to a patient and then disappear into thin air. They stick around. They end up in the water and in plants. They are found in homes and in hospitals. They are there in low doses, just right for cultivating resistant bacteria.

STUART LEVY, ALLIANCE FOR THE PRUDENT USE OF ANTIBIOTICS, 2000

their complexities and intervention strategies through four case studies of well-known contaminants: dioxin, lead, endocrine-disrupting chemicals, and pesticides. Grantmaker activities – current and suggested – to address these issues are presented following each section. Finally, the report outlines opportunities and possible strategies for future grantmaker activities that cut across both of these broad issues.

Antibiotic Resistance

The issue of antibiotic resistance presents an interesting paradox. Until 1928, when Alexander Fleming discovered penicillin, there was little effective ammunition against many of the diseases that ravaged populations. In the years that followed, the development and use of antibiotic drugs, including streptomycin and tetracycline, flourished. These medicines were effective against a wide variety of organisms responsible for diseases, including tuberculosis, pneumonia, syphilis, and meningitis. Bacterial infections leading to mortality dropped significantly.

Now, almost 80 years later, there is a rising tide of infectious diseases, due in part to the ability of bacteria to mutate as a defense against existing medicines. The inability – on a global level – to use antibiotics wisely has, ironically, put people around the world in peril from the very diseases antibiotics were developed to eliminate.

What Is Antibiotic Resistance?

Antibiotics are substances which kill or inhibit the growth of bacteria. When bacteria are exposed to antibiotics, those that are most sensitive to that particular antibiotic will be eliminated; bacteria that are more resistant to the drug can remain and proliferate. These remaining bacteria pass along resistance to future generations of bacteria, and eventually, the original drug becomes ineffective. In addition, a number of natural processes enable different types of bacteria to exchange genetic material, passing resistance between organisms.[1]

The resistance of bacteria to antibiotics is not a new phenomenon. Within a few years after the

[1]Bacteria can share genetic material through a number of processes. Plasmids, loops of DNA that can carry resistant genes, can be transferred from one to another; viruses can take genetic material from one bacterium to another; or resistant genes can be released into the environment when bacteria die and can be picked up by other bacteria (Levy 1998).

introduction of penicillin, strains of staphylococcus bacteria resistant to the drug emerged. Soon after streptomycin's use to combat tuberculosis, tuberculosis bacteria began to develop resistance as well. Rapid development of newer drugs during the 1950s and 1960s, however, limited fears of overwhelming problems due to antibiotic resistance (New Jersey Medical Center National Tuberculosis Center 1996).

But today's situation is different. Resistance to many antibiotics can be passed among and between different types of bacterial organisms, and health care providers in the United States and around the world are facing a shortage of effective drugs. Increasingly, multidrug-resistant organisms are surfacing in hospitals, in the environment, and even in people who have never taken antibiotics. With only a handful of antibiotics left to use against diseases like tuberculosis, the realization that even those antibiotics are not effective against virulent forms of disease is alarming. We are on the verge of having no effective antibiotics in our arsenal against diseases that not too long ago were the leading cause of death among adults in the United States. In many developing countries where economic hardship frequently translates into widespread misuse of antibiotics – watered-down drugs, incomplete courses of antibiotics – the situation is even more pressing.

Impacts of Antibiotic Resistance

The growing prevalence of antibiotic resistance poses serious threats to human health. *Streptococcus pneumoniae* bacteria, which account for significant morbidity, have developed resistance to antibiotics. Annually, these bacteria cause 7 million cases of otitis media (middle ear infections); 2,600 cases of meningitis; 63,000 bacteremia cases; and between 100,000 and 135,000 hospitalizations for pneumonia (NCID 2000a). Recurrent otitis media can result in hearing impairment and learning disabilities; meningitis can cause neurological impairment. Worldwide, pneumonia is the number one cause of mortality, resulting in 3.5 million deaths annually (WHO 2000). Until 1974, virtually all these bacteria were susceptible to penicillin. It is now estimated that between 10 percent and 40 percent of them are drug-resistant (NCID 2000a).

Staphylococcus aureus, which can cause both minor and fatal skin infections, is increasingly resistant to antibiotics as well. Currently, only 5 percent of staph bacteria are still susceptible to penicillin, and they are fast becoming immune to successive treatments (NCID 1999). Most staph are still susceptible to penicillin-like substances, but some new strains of staph are no longer susceptible to even vancomycin, an antibiotic that has been considered one of the last resorts for treating staph infections.

Gonorrhea – a sexually-transmitted disease (STD) that can lead to pelvic inflammatory disease and infertility, and can increase susceptibility to HIV and other STDs – is caused by the bacteria *Neisseria gonorrhoeae.* In 1997, almost 325,000 cases of gonorrhea were reported in the United States (NCID 2000b). Resistance to penicillin by *N. gonorrhoeae* is common, so other antibiotics are usually prescribed to cure infection. Multidrug-resistant strains have been detected in approximately 60 percent of gonorrhea cases worldwide. In parts of Southeast Asia, however, up to 98 percent of gonorrhea cases are multidrug-resistant (WHO 2000).

Mycobacterium tuberculosis, which causes the lung disease tuberculosis (TB), has also developed resistance to antibiotics. TB was once the leading cause of death in the United States; in the 1940s, with the introduction of streptomycin to combat TB, many scientists thought the disease had been conquered (National Center for HIV, STD and TB Prevention 1994).

In parts of Southeast Asia, up to 98 percent of gonorrhea cases are multidrug-resistant.

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As resistance to streptomycin surfaced, other drugs were developed, and through combinations of anti-TB drugs, most TB was successfully controlled.

Those who thought that TB was successfully addressed were proven wrong, however, as tuberculosis reemerged, and with it, multidrug-resistant strains of the bacteria. In the 1980s, the incidence of tuberculosis began to rise: in 1999, more than 17,000 cases of TB were reported in the United States (National Center for HIV, STD and TB Prevention 2000); worldwide, there are thought to be at least 16 million cases. Globally, between 1 percent and 2 percent of TB cases are known to be caused by multidrug-resistant bacteria; given poor surveillance of TB, the numbers are likely much higher (WHO 2000). While resistance to medication is not the sole cause of the increased incidence of TB, it makes control of the disease much more difficult.[2]

As international travel and commerce increase, drug-resistant strains of infectious diseases are no longer confined to national or regional borders, but pose a threat to those in nations where these diseases are not endemic. Typhoid fever is a good example of this. Caused by the *salmonella typhi* bacterium, typhoid fever afflicts more than 12 million people annually, resulting in 600,000 deaths. Of the 400 cases each year in the United States, 70 percent are acquired by international travel. The bacteria that causes typhoid is developing an increased resistance to the available antibiotics, including commonly prescribed fluoroquinolones (NCID 2000c).

Individual and Societal Costs

In addition to human costs, antibiotic resistance has economic implications. These costs include health care services, the antibiotic agents themselves, and lost work days when individuals suffer recurrent bouts of disease. Moreover, substantial funding is required to conduct thorough surveillance of drug-resistant disease. Treatment for standard tuberculosis, for example, averages $20 per case; treatment for multidrug-resistant tuberculosis – which requires longer courses of a combination of therapies, along with expensive directly observed therapy – averages $2,000 (WHO 2000). In 1995, the Office of Technology Assessment determined that the additional hospital costs associated with drug-resistant bacteria acquired in hospitals alone amounted to $1.3 billion (Avorn and Solomon 2000).

The Recent Increase in Resistance

Experts implicate a number of parties in allowing antibiotic resistance to flourish. Health professionals, consumers, farmers, veterinarians, the governments of industrialized nations – all have contributed to this trend. In the United States, there are two main sources of antibiotic resistance: medical overuse and misuse, and agricultural overuse. When examined from a global perspective, less industrialized nations' underuse and misuse of antibiotics has contributed to the epidemic as well.

Use in the Health Care System

Antibiotic use is pervasive in the U.S. health care system. Currently, antibiotics account for 12 percent of ambulatory care prescriptions, and 15 percent of the nearly $100 billion in annual medical expenditures in the United States (Avorn and Solomon 2000). Recent research by Bergus and colleagues indicated that by the age

[2]The increased incidence of TB in the early 1990s is thought to be the result of several factors, including an increased prevalence of HIV, increased rates of homelessness and incarceration, and decreased capacity of public health programs to effectively identify and treat TB cases (The National Academies 2000).

of 3 months, 37 percent of children have received one or more antimicrobial agents; by 6 months, the percentage has increased to 70 percent (Abramson and Givner 1999).

Inappropriate use of antibiotics in health care creates the conditions that give rise to resistance. Annually, about 18 million courses of antibiotics are prescribed for the common cold, an illness for which antibiotics are usually ineffective. In one study, antibiotics were given to 60 percent of patients who presented with upper respiratory infection, while only 6 percent of cases warranted use of these drugs. Abramson and Givner speculate that if medications were used more prudently against infections such as otitis media, sinusitis, bronchitis, and pharyngitis, 26 million fewer prescriptions would be given annually in the United States (Abramson and Givner 1999).

A number of reasons for medical overuse and misuse have been cited. Patients clearly desire a tangible product of their encounter with physicians, even if their symptoms indicate that fluids and bed rest are the best treatment options. Patient pressure has ranked first in studies examining physician overprescription of antibiotics. Consumers often have incorrect assumptions about the effectiveness of antibiotics, especially in cases of viral illness. Direct-to-consumer marketing has also provided patients with greater awareness of available medications, and may create a demand for new drugs, even if they are not advised (Avorn and Solomon 2000).

Other situations are contributing to overuse as well. Some schools and day care centers require evidence of antibiotic use for children who have been sick if those children return before they are completely cured. Increasingly, children are being prescribed antibiotics for illnesses they otherwise could fend off unaided. In this way, children are unwittingly cultivating resistant strains of bacterial infections that affect the entire population (Barlum 2000).

On the practitioner side, still other motivations exist. These include a desire to avoid disappointing patients, even when antibiotics are unnecessary; an inability to devote sufficient time to staying fully informed about indications for medications and therapies; and a lack of understanding of antibiotic limitations. Studies also cite providers' fears of poor outcomes if medication is not prescribed; and pressure upon providers to limit use of diagnostic and laboratory tests, which are sometimes necessary to distinguish between viral and bacterial infections (Avorn and Solomon 2000).

Antibiotic Use Abroad

A different dimension of the medical misuse of antibiotics can be seen in less industrialized nations. These nations – where poverty, poor health status, and lack of access to care are pervasive – face unique challenges in overcoming the growth of antibiotic resistance. In addition to misinformation among the general public about proper antibiotic use and the overuse of wide spectrum antibiotics – issues also faced by industrialized nations – several factors contribute to resistance in these countries:

- populations that cannot afford full courses of antibiotics, and instead are prescribed weaker strength, shorter course antibiotics that promote growth of resistant bacteria;
- health care systems in which many people who dispense medication are not adequately trained;
- poor diagnostic facilities, which leave practitioners to prescribe based on symptoms alone; and
- counterfeit drugs, with small amounts of active ingredients (WHO 2000).

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Agricultural Use

Currently, only half the antibiotics produced in this country are slated for human consumption. The balance are used in agriculture, to treat sick animals and to prevent disease. In addition, subtherapeutic doses of antibiotics are provided to animals as growth enhancers. A large number of the antibiotics used in agriculture are considered medically important – that is, they are used to treat humans or are closely related to antibiotics used to treat humans. Medically important antibiotics currently used in agriculture include penicillin, tetracyclines, erythromycin, and fluoroquinolones (GAO 1999).

Bacteria in animals can develop resistance to these antibiotics. Humans who acquire these bacteria – through direct contact or contaminated food or water – can then develop resistant infections. *Salmonella, Campylobacter,* and *E. coli* have all demonstrated resistance to antibiotics; when humans come in contact with these bacteria, standard antibiotics may be useless. Moreover, these bacteria continue to develop resistance to new antibiotics.

The link between agricultural overuse and resistance in human pathogens is becoming clearer, largely through scientific data and new techniques like DNA fingerprinting. In many countries – for example, members of the European Union – the use of several antibiotics for animal agriculture has already been banned. And recently, the Food and Drug Administration (FDA) has been working to ban certain antibiotics for use in poultry farming. While some U.S. producers are pushing back against these bans, others are withdrawing their antibiotics from agriculture use.

One example of this is the proposed FDA ban on certain fluoroquinolones used in poultry farming, due to an increase in fluoroquinolone-resistant *Camplyobacter* in humans. Upon the FDA's announcement of the proposal in October 2000, Abbott Laboratories, one of two man-

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One of the first studies to demonstrate the human health effects of agricultural misuse of antibiotics was conducted in Massachusetts in the mid-1970s. On a small chicken farm, 150 chickens – that had never previously received antibiotics – were given feed laced with antibiotics, and another 150 were given feed with no antibiotics.

Although no farmworkers were prescribed antibiotics, within six months, more than 30 percent of them tested positive for tetracycline-resistant *E. Coli,* as compared to just 7 percent of other residents of the neighborhood. This was clear evidence that the antibiotic use was affecting more than just the chickens.

It was also found that if chickens were kept on tetracycline, the bacteria in their systems developed resistance not just to tetracycline, but to multiple other antibiotics – ampicillin, streptomycin, and sulfonamides, antibiotics to which the chickens were not exposed. Using tetracycline-laced feed alone led to multidrug-resistant bacteria.

Agricultural use of antibiotics has an important impact on local human populations. Animal waste put into the water or the ground contains low levels of antibiotics. Rather than dissipating, these antibiotics remain in the environment, including groundwater, at levels that can select resistant bacteria. Consumption of the water can result in resistant bacteria being passed to animals and individuals. In addition, resistance can spread to other bacteria, rendering other drugs ineffective as well (Levy et al. 1976).

CHILEAN SALMON AQUACULTURE AND THE IMPORTANCE OF MEDIA ATTENTION

For the last two years, the Homeland Foundation, in collaboration with the Weeden Foundation, has supported research on the economic and biological impacts of the salmon aquaculture industry in Chile. This research, a joint collaboration between the foundations and nongovernmental organizations (NGOs) in Chile, culminated in a report issued by two NGOs, Fundacion Terram and Terra Australis. Released in August 2000, the report examined a number of factors related to salmon aquaculture, and called attention to the extremely high rates of antibiotic use in the industry. It also provided a comparison to the salmon aquaculture industry in Norway, a leading producer of farm-raised salmon, indicating that the use of antibiotics in Chile's industry was 75 times higher than in Norway.

The Chilean media provided coverage of the report, highlighting the disparity in antibiotic use between the two nations. In addition, the two NGOs conducted a series of press conferences around Chile, educating journalists, policymakers, and elected officials about the antibiotic situation and its implications. This indirectly served to educate the general public, who previously was unaware of the implications of the salmon aquaculture industry on the biological, ecological, health, and economic landscape of the country. While no definitive progress has been made on reducing antibiotic overuse in the industry to date, the report and its subsequent media attention have put industry officials in the spotlight, and increased public awareness and understanding of this health threat (Bedolfe 2000).

ufacturers of the drugs, voluntarily agreed to comply with the FDA request, withdrawing its product from the market. Bayer Corp., the second manufacturer, has contested the proposal and has requested a hearing on the matter.

There are many international success stories regarding reduction of antibiotic use in agriculture. These successes make it possible to persuade other agricultural interests that they can function – and even prosper – with new practices. The Norwegian aquaculture industry has cut antibiotic use in their salmon facilities by at least half – in many cases, by even more. The Norwegian industry's outcome data show that fish can be raised in these settings without overusing antibiotics.

Household Use

Other products contribute to the growth of resistant bacteria as well. Antibacterials – disinfectants and antiseptics – are increasingly being promoted for use not only in hospitals but in households for standard cleaning purposes. Like antibiotics, antibacterials can alter the makeup of bacteria, leading to resistance. Disinfectants and antiseptics kill susceptible bacteria and allow resistant microbes to flourish with no competition. These resistant strains can then become agents of disease. In the same way that bacteria share genetic information and develop resistance to antibiotics, they share information about antibacterials and develop resistance to them as well.

Substances like triclosan are being mixed into soaps, lotions, and dishwashing detergents marketed to general consumers. Many consumer goods, from toys and high chairs to mattress pads and cutting boards, are also treated with these antibacterials. Advertising for these goods promotes their presence without making any specific health claims, and are thus exempt from regulation (Levy 2000).

Sir William Osler once noted, "The desire to ingest medicines is one of the principal features which distinguish man from the animals."

Recent Government Activity

At the federal level, efforts are under way to address antibiotic resistance. In 1999, a task force on antimicrobial resistance was created, cochaired by the Centers for Disease Control and Prevention (CDC), FDA, and National Institutes of Health. Other members include the Agency for Healthcare Research and Quality; the Departments of Agriculture, Defense, and Veterans Affairs; the Environmental Protection Agency (EPA); the Health Care Financing Administration; and the Health Resources and Services Administration. In January 2001, HHS unveiled its report, entitled *A Public Health Action Plan to Combat Antimicrobial Resistance.* The plan provides a blueprint for specific coordinated federal actions to address antimicrobial resistance, highlighting both the domestic and international dimensions of the problem. Four strategies are identified to combat resistance. They are:

- surveillance activities, including the development of a national surveillance plan and the monitoring of patterns of antimicrobial drug use and resistance in agricultural settings;
- prevention and control programs, including prudent use policies, improved diagnostic testing, and use of vaccines to prevent infection transmission;
- further research on antibiotic resistance; and
- development of new antimicrobial drugs (Interagency Task Force on Antimicrobial Resistance 2000).

In March 2001, a national panel of experts convened by the CDC issued new treatment guidelines for adults with colds and upper respiratory infections. Entitled *Principles for Appropriate Antibiotic Use,* these guidelines target the overprescription of antibiotics for common viral illnesses which will not respond to antibiotic treatment. A number of physician groups contributed to the development of these new principles. This CDC action fulfills a priority in the *Public Health Action Plan,* providing interventions and programs to assist providers in using antibiotics prudently.

Banning Agricultural Overuse

The World Health Organization (WHO) issued a report on antibiotic resistance in 2000. The report highlights a number of strategies for addressing the issue, including better education for providers and consumers, improved containment of drug resistance in hospitals, increased research, creation of strong alliances and partnerships, availability of essential drugs for those in need, and elimination of medically necessary antibiotics in agriculture (WHO 2000).

Although the European Union banned the use of medically important antibiotics as growth promoters two years ago, the United States continues to permit prophylactic and subtherapeutic antibiotic use. A government ban of this kind has garnered interest of advocates and some legislators. Legislation to institute such a ban was introduced in Congress in 1999, but further progress has not been made.

Grantmaker Activities

Funders with diverse missions and programs can become involved in funding activities and research pertaining to antibiotic resistance. Foundations that fund public health can develop media campaigns to inform both specific audiences and the general public regarding the hazards of antibiotic overuse. Environmental Defense, with support from The Nathan Cummings Foundation and The Joyce Foundation, has formed a broad-based coalition focused on curtailing the overuse of antibiotics in agriculture. The multisector coalition includes more than 30 organizations including faith-based groups as well as representatives from health care and consumer advocacy, environmental justice, labor, sustainable agriculture, and animal welfare organizations. The campaign will take many avenues of engagement, including extensive opinion leader and public education, as well as public policy efforts aimed at the Administration and Congress to pressure the FDA to exercise its existing authority on these issues. The campaign also will work with the users of antibiotics – farmers and feed distributors – to encourage them to change their practices.

Other strategies for grantmaker involvement in antibiotic resistance exist as well. Foundations that work with health care organizations and institutions can support efforts to give providers the tools and resources to ensure appropriate prescription of antibiotics. For example, funding can support provider training, computer and online surveillance, and instruction regarding prescription habits and protocols, as well as patient education. In addition, foundations can use their influence as community members and stockholders of antibiotic manufacturers to encourage prudent sales and distribution of antibiotics.

In 1995, the Office of Technology Assessment determined that the additional hospital costs associated with drug-resistant bacteria acquired in hospitals alone amounted to $1.3 billion.

Systemic Contaminants

Like antibiotic resistance, the issue of systemic contaminants illustrates that technological solutions and scientific advancements come with an implicit – and often unknown – price. To improve automotive performance, lead was added to gasoline. To improve food production, new pesticides were developed. Brand new plastics and other materials were designed to increase convenience. But lead caused neurological impairment, pesticides poisoned, and the burning of plastics released dioxin, a carcinogen. The nation and the world now grapple with how to effectively reduce the impact of these systemic contaminants on human health.

Systemic contaminants are a large group of toxic substances that can have both acute and long-term effects on human systems. These pollutants – each of which can individually affect our respiratory, immune, neurological, or reproductive systems – are becoming ubiquitous. While knowledge exists regarding the effects of acute exposure to individual toxicants, little is known about cumulative, low-level exposure to the growing number of pollutants and how these interact within the human body. Even less is known about the dangers these pollutants pose to vulnerable populations such as children, pregnant women, and the elderly. Furthermore, we are only just beginning to understand the consequences of the additive and synergistic effects of these contaminants.

Systemic contaminants are difficult to collectively categorize or describe, making it difficult to develop and implement effective strategies to limit their effects. Research or policy could focus on any number of common denominators for substances – chemical makeup, physiological effects, or pathways of exposure – but it is likely that any of these methods will omit some contaminants. Attempting to categorize pesticides, one of the more well-known systemic contaminants, illuminates this difficulty. Pesticides can be regulated based on their chemical structures, routes of exposure, or physiological effects. But different pesticides have different chemical characteristics, some are ingested while others are absorbed through the skin, and some affect endocrine systems while others impact respiratory systems.

Intervention methods for limiting systemic contaminants differ a good deal from one to another. The following case studies of some well-known contaminants – dioxin, lead, endocrine disruptors, and pesticides – illustrate their diverse nature, potential threats, and strategies for elimination.

Dioxin

A product of industrial processes, dioxins are actually a class of chemically-related substances; the most toxic is 2,3,7,8-TCDD (often referred to simply as dioxin). It is created through heating chlorine in the presence of organic compounds or burning materials that contain chlorine. Very small amounts occur naturally, but the vast majority of dioxin in the environment is man-made. Medical and industrial incineration and paper-pulp production are large sources of dioxin. Dioxin breaks down slowly in the environment and is usually taken up by plants and animals which, in turn, pass dioxin along to humans. Up to 95 percent of exposure in humans is through dietary intake of animal fats, where the pollutant accumulates (National Center for Environmental Assessment, EPA 2000).

Both acute and chronic conditions are attributable to dioxin exposure. Dioxin has been identified by both WHO and the U.S. Department of Health and Human Services (HHS) as a human carcinogen; the EPA cites several studies

that indicate that workers exposed over a long period of time have increased cancer risks (National Center for Environmental Assessment, EPA 2000). Animal studies have also confirmed dioxin's role in causing cancer.

In addition, a number of animal studies indicate that dioxin exposure – even low exposure over a long period of time – can result in developmental and reproductive damage including immune suppression, liver damage, and endocrine disruption. Animals exposed during pregnancy gave birth to offspring with skeletal and kidney defects, weakened immune systems, and behavior changes. Dioxin exposure has also led to animal miscarriages (ATSDR 1999). In large amounts, dioxin exposure causes chloracne, a skin condition characterized by severe skin lesions.

Dioxin exposure has been documented around the world; almost all humans have detectable levels of the chemical in their bodies. Those at higher risk for exposure and adverse effects include workers in dioxin-producing industries such as paper or pulp mills, and people who live in neighborhoods near hazardous waste sites or incinerators (ATSDR 1999). Although few studies have examined the increased risks faced by children, it is assumed that, like many other environmental pollutants, dioxin poses a higher risk for children because of their rapid growth. One of the most well-known dioxin exposures occurred during the Vietnam War, when Agent Orange contaminated with dioxin was used by United States forces as an herbicide. Although evidence is mixed, there have been reports of increased rates of birth defects among the children born to those exposed to Agent Orange (GBPSR 1996).

While dioxin levels in the environment are decreasing, dioxin continues to be a health concern. This is because dioxin residues remain in the environment for many years after the dioxin is emitted. These so-called reservoir sources from past releases can continue to pose a health threat. In addition, dioxin bioaccumulates in the food chain; that is, it can concentrate as it moves up the chain such that animals and humans will have much higher concentrations of dioxin than plants, water, or soil (National Center for Environmental Assessment, EPA 2000).

Attention to the problem of dioxin focuses largely on limiting the production of dioxin: once produced, it is difficult to keep from entering animal and human systems. The Clean Air Act and its amendments authorized the EPA to promulgate regulations to limit emissions of dioxin. In 1995, the EPA issued stricter regulations for emissions from municipal waste combustors; two years later, it issued stricter guidelines for emissions from medical waste incinerators. According to the EPA, enforcement of these regulations should result in a 95 percent reduction in dioxin emissions from these two source categories (EPA 2000b). In addition, the EPA has promulgated guidelines for paper and pulp effluent concentrations, as authorized by the Clean Water Act and its amendments.

The EPA has also recently released a draft report of its dioxin reassessment project, a multiyear collaborative effort involving a number of federal agencies and representatives from the private sector. Through this report, the EPA aims to conduct a scientific reassessment of the health risks of dioxin exposure, in light of recent scientific advances regarding dioxin toxicity (EPA 2000b). Among other findings, the report indicates the classification of dioxin as a human carcinogen, rather than a "probable carcinogen," its previous classification.

Dioxin exposure has been documented around the world; almost all humans have detectable levels of the carcinogen in their bodies.

Low levels of lead exposure have been linked to decreased intelligence, impairment of hearing and brain development, and decreased growth.

Lead

Lead is another well-known systemic contaminant, with no biological usefulness or normal function in the human body. This toxic metal is now found throughout the environment, and in everyone worldwide. A major source of lead used to be gasoline; however, lead began to be phased out of gasoline in the 1970s. Today, lead-based paint (and its derivatives, including dust from leaded paint, contaminated soil, and paint chips) is the most common source of lead exposure in this country (CDC 1997).

At various levels, lead is known to have harmful effects on almost every human system. Very low levels of lead exposure have been proven to cause significant harm: even at levels below the allowed 10 micrograms, lead is correlated with low birth weight, growth retardation, and poor brain development. Low levels of lead exposure have been linked to decreased intelligence, impairment of hearing and brain development, and decreased growth (NCEH 2000). Lead levels in bone, which indicate lifetime exposure, have also been correlated with delinquent and aggressive behavior in adolescent boys (GBPSR 1996). Significant lead exposure can cause spontaneous abortions and male infertility. At high levels, lead is extremely toxic, and exposure can result in coma, seizures, and death.

Lead accumulates in the human body. Once it enters – whether through air, food, water, or soil – the lead is distributed throughout various organs. Some is secreted, and the rest eventually accumulates in bone.[3] The amount of lead in the body can be detected through blood or urine testing, or fluorescence of the bone. Maximum lead levels have been established for children by the federal government. Ten micrograms per deciliter is the current acceptable blood/lead level established by the EPA and the CDC. Average blood lead levels in the 1990s were 2.7 micrograms per deciliter, down from 15.0 in the late 1970s (NCEH 1997).

Medical treatment can reduce high blood lead levels, but for blood lead levels less than 25 micrograms per deciliter, separation from the source of lead exposure is the most effective intervention. Chelation therapy involves administering medicines that bind (chelate) lead, and is indicated for treatment of high blood lead levels, usually 45 or more micrograms per deciliter. For levels between 25 and 44, no research has shown any effectiveness of chelation therapy in decreasing the adverse effects of lead on children's intelligence. For children with blood lead levels between 20 and 24, case management to address nutritional status is recommended, along with interventions to decrease further lead exposure (CDC 2000).

As with many environmental health threats, some subpopulations bear a disproportionate share of the disease burden due to lead exposure. Young children whose bodies can more easily absorb the lead are at increased risk for developing adverse health effects. This risk is heightened for low-income and minority children, due largely to the fact that these groups are much more likely to live in older homes where lead-based paint is still a threat. In addition, they are less likely to see a health care practitioner who could detect elevated blood levels and begin treatment. Approximately one-fifth of African-American children who live in older houses have blood lead levels above the accepted exposure (CDC 1997).

Although lead exposure is still taking its toll on some segments of the U.S. population, the federal government's regulation of lead is seen as one of public health's triumphs. Beginning in the 1920s, lead was added to gasoline to boost

[3]This accumulation is especially dangerous during pregnancy, when there is a higher rate of bone turnover by the mother. Release of stored lead can cause fetal exposure, even if mothers are no longer exposed to sources of lead.

octane levels; by the 1970s, close to 200,000 tons of lead per year were being used in gasoline (EPA 1996). The 1970 Clean Air Act established new standards for lead in gasoline, and authorized the EPA to promulgate and enforce regulations regarding leaded gasoline. In large part, this was a response to the growing realization that lead was a toxic chemical. In addition, though, the Act also legislated stricter emission standards. The use of catalytic converters to reduce emissions increased, and these converters required unleaded gasoline. Amendments to the Clean Air Act in 1990 served as the final step in eliminating lead from gasoline used by highway vehicles; the phase-out was completed in 1996.

Efforts by the federal government to eliminate lead exposure continue. In 1991, the U.S. Department of Housing and Urban Development (HUD) created the Office of Lead Hazard Control, aimed at increasing the provision of housing that is both lead-safe and affordable. The Office operates a number of programs, including a grant program to states and local governments to design and implement effective and affordable strategies for eliminating lead in homes, new regulations and policies to increase consumer awareness, technical assistance, research, and evaluation of current efforts to inspect and abate lead hazards.

Endocrine Disruptors

Endocrine disruptors are chemicals that, at extremely small doses, can have drastic effects on the regular functioning of endocrine systems. These effects have been documented both in animals and humans, although research on health effects has lagged behind industry's production and use. Also called environmental estrogens or hormone disruptors, these substances are ubiquitous in our environment. Most have anthropogenic (man-made) sources, although there are naturally occurring endocrine disruptors, known as phytoestrogens, as well.

Lead, dioxin, and many pesticides are known endocrine disruptors. Phthalates, abundant man-made chemicals in the environment, are another example of endocrine disruptors. Diethyl phthalate is used to make plastics more flexible and is found in toys, food packaging, cosmetics, and auto parts. The substance can be easily released from the products in which it is found, as it is not a part of the polymer chains that make up the plastic (ATSDR 1996). Phthalates are easily absorbed through the skin, and exposure can also occur through soil and water. Like many endocrine disruptors, phthalates tend to accumulate in the body, although some excretion does occur.

While some endocrine disruptors are acutely toxic, many of the potential adverse health effects are the result of lower levels of exposure over a long period of time. Endocrine disruptors can threaten the normal functioning of the endocrine system through a number of mechanisms, including the mimicking or blocking of hormones, leading to sometimes dramatic changes in cellular activity. These chemicals can also stimulate or inhibit the endocrine system itself, which can result in the overproduction or underproduction of hormones (EPA 2000a). These can lead to decreased sperm counts, increases in reproductive cancers, and endometriosis. Health effects of endocrine disruption have been widely documented in animals and, to a lesser extent, in humans. Research has indicated recent increases in reproductive and genital abnormalities, endocrine-related cancers, and dropping sperm counts, although some disagreement still exists on the link between endocrine disruptors and these changes (Eubanks 1997).

One illustration of the potentially devastating effects of endocrine disruption comes from the field of medicine, a field that has strict safety standards. Diethylstilbesterol (DES), a man-made estrogen, was widely used to prevent

While some endocrine disruptors are acutely toxic, many of the potential adverse health effects are the result of lower levels of exposure over a long period of time.

EXAMINING THE BODY BURDEN

While data exist regarding the levels of systemic contaminants in the environment, little research has been conducted on the presence of contaminants in people's bodies at a population level. This kind of information is extremely important, as it will enable researchers, practitioners, and policymakers to more fully assess and respond to the growing burden of chemicals in human bodies.

To this end, the CDC has released the first edition of *The National Report on Human Exposure to Environmental Chemicals.* One of the premises behind the project is that the public has the right to know what contaminants are in their bodies, and whether levels are increasing or decreasing. This report, which will be updated annually, provides ongoing assessments of human exposure to various contaminants. By utilizing biomonitoring, a technique to measure chemical exposures through blood and urine testing, the CDC will gain insight into exposures of various populations to these chemicals, trends in exposures over time, and whether interventions to reduce exposures are actually working. The first report includes information on 27 chemicals, including cotinine (the metabolite of nicotine), metals (including lead), organophosphate pesticide metabolites, and phthalate metabolites. The data used in this report are collected as part of the federal National Health and Nutrition Examination Survey. Eventually, the project hopes to test up to 100 chemicals and to report on exposure levels for specific populations, including children, women of childbearing age, or minority groups.

Even when these data are available, however, effectively educating the public about the presence of contaminants in their bodies can be challenging. While being made aware of the issues in a personal way can prompt concern and action, this awareness can also create fear. Dialogue participants agreed that as various campaigns or educational efforts proceed, caution needs to be taken regarding how information about the so-called body burden is presented. The following strategies were identified as important dimensions of public education.

- The public needs tools to understand the causes of contamination or exposure and remedies for what they can do to heal themselves and their environment.
- Campaigns can regularly demonstrate progress, illustrating that there is hope in changing detrimental situations. Reasonable targets for reduction and elimination can be set over time and achieving those targets can be noted and celebrated.
- Past success stories, for example the efforts that resulted in reduction of lead exposure, can be pointed to as significant wins in areas that once seemed overwhelming.

spontaneous abortion in the 1950s, 1960s, and early 1970s; an estimated 5 to 10 million women took DES during this period. Girls born to mothers who took DES began developing vaginal cancers, previously seen almost exclusively in more mature women. Later research indicated that female children of DES mothers also suffer high rates of reproductive abnormalities, reduced fertility, and poor pregnancy outcomes, including low-birthweight infants, miscarriages, and ectopic pregnancies. Male children exhibit genital abnormalities and abnormal semen. In addition, women who took DES have had significantly higher risk of developing breast cancer than their counterparts who were not exposed to DES. Even now, there is still question as to whether the grandchildren of exposed mothers (many of

whom are not yet of reproductive age) will exhibit similar symptoms (GBPSR 1996). Today, DES is prescribed only as palliative therapy for certain cases of metastatic breast and prostate cancer, and is contraindicated during pregnancy.

The potential danger related to the synergistic nature of endocrine disruptors' effects warrants further exploration. Recent research indicates that combining several weakly estrogenic chemicals resulted in estrogenic activity 150 to 1,600 times greater than for any of the individual toxins (Eubanks 1997). While testing many combinations of endocrine disruptors may be a costly and time-consuming task, it is these combinations to which we are exposed daily in the environment.

Only recently has government activity regarding endocrine disruptors as a discrete class of chemicals emerged. The Food Quality Protection Act of 1996, which altered the way pesticides (many of which have endocrine-disrupting properties) are regulated by the federal government, mandated the creation of an endocrine disruptors screening program. By focusing on enhancing detection and characterization of endocrine-disrupting chemicals, the program will further EPA's efforts to identify these pollutants and develop regulations accordingly. The Clean Water Act and its amendments also authorized EPA to screen for disruptors found in drinking water supplies nationwide.

Pesticides

Pesticides differ from the other environmental contaminants presented here in one important way: they are intentionally toxic substances, used specifically for their ability to destroy organisms. The EPA defines a pesticide as "any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating pests" (EPA 1999b). Pests can include insects, rodents, weeds, fungi, bacteria, and viruses.

Pesticides are regulated and classified according to their specific and intentional uses as insecticides, fungicides, and herbicides. Currently, there are more than 20,000 pesticides registered for use by the EPA (EPA 1999a). Pesticides are usually synthetic chemical substances, although some are derived from naturally occurring compounds (GBPSR 1996).

Pesticide exposure, like that of other pollutants, can come from a variety of sources. Pesticides are found in food, air, water, and soil, and exposure can therefore occur through ingestion, inhalation, or skin contact. These substances are used in homes, schools, public places, lawns, and gardens; they can be found in household air and carpet dust. Pesticides are widely used in agriculture. Estimates indicate that approximately 10 million people work in farming; close to half of this population is directly exposed to pesticides. In addition to direct pesticide contact by agricultural workers, agricultural use can result in pesticide drift, run-off into groundwater, and exposure of children whose parents and family members are occupationally exposed (GBPSR 1996).

Exposure to pesticides can cause both acute toxicity and chronic adverse health effects. In 1996, an estimated 80,000 children were exposed to pesticides; of these, 20,000 exhibited signs of pesticide poisoning. In addition, 40,000 adults suffered symptoms of pesticide poisoning. These data, supplied by the American Poison Control Center, are thought to represent only 30 percent of medical cases related to pesticides (NEETF 2000).

Some pesticides share properties with previously discussed pollutants. For example, sometimes pesticides are disruptors of endocrine systems. Animal studies have implicated pesticides in a number of poor health outcomes, including damage to the nervous, immune, reproductive, and endocrine systems. They

Recent research indicates that combining several weakly estrogenic chemicals resulted in estrogenic activity 150 to 1,600 times greater than for any of the individual toxins. While testing many combinations of endocrine disruptors may be a costly and time-consuming task, it is these combinations to which we are exposed daily in the environment.

have also demonstrated impairment of neurodevelopment and normal growth in animals. In humans, epidemiological studies of chronic exposure have linked pesticides with spontaneous abortions, reduced sperm counts, and toxic effects on chromosomes (GBPSR 1996).

The federal government's role in regulating pesticides has evolved as concern and awareness of the risks of pesticide use have grown. Several key pieces of legislation form the basis of the government's role in addressing the use and risks of pesticides. For many years, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) served as the foundation for government activities, authorizing the EPA to register and regulate all pesticides in use. In addition, the Federal Food, Drug, and Cosmetic Act (FFDCA) authorized EPA and the FDA to establish maximum residue levels for pesticides in food and animal feed. The Food Quality Protection Act (FQPA) of 1996 amended both FIFRA and FFDCA, establishing more stringent standards, registration, and regulation requirements for pesticides in foods. The Act mandated endocrine disruption research, a review of pesticides already registered, and research on the hazards of cumulative exposure to numerous pesticides. In addition, FQPA necessitates a focus on risks of pesticide exposure for children, which may be markedly different than the risks assessed for adults.

Several federal agencies have collaborated to improve the ability of health care providers to detect and manage health conditions related to pesticide exposure. This effort between the EPA, HHS, U.S. Departments of Agriculture and Labor, the National Environmental Education and Training Foundation, and provider groups has resulted in the publication of a draft strategic plan, *Pesticides and National Strategies for Health Care Providers* (Implementation Plan). This report recommends reaching providers through formal education, practice settings, and resources and tools in order to improve training regarding pesticides and environmental health. The plan is currently under revision and is expected to be published in 2001.

Research Priorities And Considerations

Participants at the Issue Dialogue concurred on the need for scientific research to document, quantify, and track the impact of both antibiotic resistance on individuals and populations, and the impact of contaminants on human endocrine, respiratory, neurological, and reproductive systems. In addition to supporting research, foundations may be able to advocate for publicly funded research conducted by government or academic institutions.

Some participants, however, cautioned that grantmakers' resources should not go exclusively to scientific research. Many warned against so-called paralysis by analysis, which can prohibit effective work to mobilize communities or effect policy change until exhaustive research has been conducted.

While the need for unassailable research is great, it is clear that perception of the harm caused by systemic contaminants is changing in the scientific community and among the general public. Increasingly, scientists, academics, journalists, and the public accept claims that an altered environment affects human health even if the alterations are invisible or seem subtle. This attitude is bolstered by the precautionary principle, a fundamental precept in the field of environmental health. Although the precautionary principle has a number of different interpretations, it essentially states that prudent action should be taken to avoid harm to humans and the environment, even when scientific certainty has not been established. The successful reduction and elimination of lead in gasoline, paint, and pipes is an example of action guided by this principle. In the case of lead, steps were taken to remove the metal from a number of sources, rather than waiting for conclusive evidence indicating which source was most offensive to human health.

Grantmaker Activities

Foundations with varying missions are addressing systemic contaminants, although few have explicit programs to do so. For example, funding programs and grants based on specific diseases are common in health philanthropy, including asthma and some kinds of cancer that are the endpoints of exposure to a number of environmental pollutants. Environmental funders may address systemic contaminants by focusing on healthy ecosystems or biodiversity. Increasing the organizational capacity of the nonprofit sector in this area is also important, and effective funder collaboration is integral to this capacity building.

The diversity of systemic contaminants creates a number of avenues for foundations to develop grantmaking programs around this environmental health issue. Some may want to focus on various affected populations: agricultural workers exposed to pesticides and low-income children of color exposed to lead. Others may want to support some of the institutions or groups that conduct research or advocate about specific contaminants. All foundations can find systemic contaminant issues in their respective communities that need attention. Grantmaking in this area falls in four main categories: research and public awareness, policy and systems change, community organizing, and convening and collaboration.

Research and Public Awareness

Several foundations put substantial resources into furthering research and increasing public awareness of systemic contaminants. In a society where risk management is based more on scientific proof than on the precautionary principle, improving the knowledge base regarding the health hazards of systemic contaminants

can prove valuable. Solid research to fill out the understanding of these complex and interrelated issues will provide even more persuasive evidence for those who remain skeptical of the link between environmental contaminants and human health.

The Jessie B. Cox Charitable Trust provides funding for the Silent Spring Institute, a partnership of scientists, physicians, public health advocates, and community activists united around the common goal of identifying and changing the links between the environment and women's health. The Institute's principal research project is the Cape Cod Breast Cancer and Environment Study, which aims to discover the causes of increased breast cancer incidence in Cape Cod, Massachusetts. The Institute collaborates with the state public health department and a number of medical and public health schools in this effort.

The W. Alton Jones Foundation has been a leader in the grantmaking community in addressing systemic contaminants. The Foundation's initiative on eliminating systemic contaminants focuses on the ways in which pesticides and other endocrine-disrupting chemicals undermine children's futures. The initiative involves several issues, including reducing the global exposure to bioaccumulating pollutants; supporting the use of the precautionary principle in public health; increasing consumer activism regarding product safety; and supporting communities in their efforts to decrease pesticide use. The initiative supports the development of practical solutions to many of the risks created by pesticides, including pesticide alternatives, reduction in the intensity of these pollutants, and better education regarding their use and risks. Grants range from support for Consumers Union of the United States to perform assessments of the impacts of alternative pest management systems, to support for the Healthy Schools Network to advocate for the phase-out of the use of toxic pesticides in New York schools.

Policy and Systems Change

Another strategy for grantmakers is to address the public and private systems and institutions that contribute to the damage caused by systemic contaminants. The Pew Charitable Trusts established a commission to bring together national leaders in health, business, environment, government, and communities to strengthen the nation's public health defenses against environmental threats. The Pew Environmental Health Commission produced a series of reports that provide policymakers, health and environmental organizations, and the public with a proposed framework to improve the public health infrastructure. The commission's first report addressed asthma, a disease induced and exacerbated by a number of environmental factors, including systemic contaminants in the air. The report charges that the federal government must increase its efforts to find the causes of asthma and effective methods for reducing asthma incidence and prevalence. The commission has also addressed the "right to know" principle and the scientific and policy capacity of the federal public health system.[4]

The Jenifer Altman Foundation has been a primary supporter of the Health Care Without Harm Campaign (HCWH). This national effort focuses on the health care industry and its role in producing systemic contaminants and other pollutants. The campaign aims to change policies and practices currently employed by health care institutions both domestically and abroad to reduce negative environmental

[4]The "right to know" principle indicates that individuals should have appropriate access to information concerning the environment, including information on hazardous substances and community activities, and individuals should have an opportunity to participate in decision-making regarding these issues.

HEALTH CARE WITHOUT HARM

Health Care Without Harm (HCWH) was formed in 1996 when a number of issues about low dose contaminant exposures were coming to the fore. An earlier report by the Environmental Protection Agency found that the 5,600 medical waste incinerators across the country were the single largest source of dioxin air pollution. These incinerators were also responsible for at least 10 percent of the mercury load in the environment. Further analysis indicated that IV bags and other supplies made from polyvinyl chloride (PVC) – in addition to creating dioxin when incinerated – also leach plastic softeners (phthalates) into patients' bloodstreams, a dangerous situation for vulnerable patients, including infants in intensive care and pregnant women.

The EPA's findings highlighted the unfortunate irony that the health care industry itself was a major source of pollution and threat to health. This situation, in turn, prompted the formation of the Health Care Without Harm campaign.

HCWH aims to change policies and practices currently employed by health care institutions both domestically and abroad. These changes include improving practices of medical waste disposal, product purchasing and recycling, and phasing out PVC plastics and mercury. HCWH promotes comprehensive pollution prevention practices; supports the development and use of environmentally safe products and technologies; and educates health care institutions, providers, workers, and consumers about their impact on public health and the environment. The campaign, which began with 23 organizations, today brings together 310 in 30 countries.

What makes the campaign such a success is the diversity of interests and groups that have come to the table to solve these issues. Some hospitals led the way in changing their behavior, demonstrating to the rest of the industry that these changes are feasible. Physicians, nurses, patient advocacy organizations, religious groups, and labor unions have all participated and, together with hospital administrators, are working to pressure large medical equipment suppliers into providing alternatives. As Philip Lee noted, "Unexpected groups of people can produce unexpected results."

Another element of success is the campaign's ability to give consumers a way to participate on a local, even personal, level. One example is the campaign's goal of eliminating the use of mercury in the health care system. To make the campaign real to individuals and empower them, HCWH has begun engaging communities in thermometer exchanges, providing opportunities for individuals to trade in their old mercury thermometers for new digital ones that contain no dangerous contaminants. Individual participation also helps move hospitals to do the same, as community members become aware of these dangers and expect health and safety enhancements in their local facilities. As hospitals respond by becoming more environmentally friendly, more practitioners have the opportunity to learn about and encourage safe policies and procedures. This, in turn, leads to achievement of one of HCWH's long-term goals – educating and empowering health professionals to become advocates for environmental health improvements in society at large (Cohen 2000).

impacts. This includes addressing practices of medical waste disposal, policies regarding recycling, and the use of hazardous substances like mercury and PVC plastics.

Community Organizing

Foundations also make grants to support community organizing and involvement in order to increase community members' ability to address systemic contaminant and pollution issues in their neighborhoods. The San Francisco Foundation provides support for the Asian Pacific Environmental Network's (APEN) Laotian Organizing Project Youth Initiative. When APEN's work indicated that a number of Superfund sites and other contaminated areas overlapped with growing Asian and Pacific Islander communities, the organization began to mobilize community representatives to address the hazards in their environment. The Project aims to develop knowledgeable community advocates, create models for outreach and education for marginalized groups, and build the community's capacity to understand and take action regarding environmental health issues. The Youth Initiative targets young Laotian women who can serve as cultural liaisons, educating their own communities, assessing risks, and communicating with others outside the community in order to limit environmental hazards.

The Public Welfare Foundation's environmental initiative focuses its grantmaking on addressing the human health impact of environmental damage and pollution, particularly in those communities most affected. The Foundation has provided a number of grants to organizations that support agricultural workers in addressing pesticide exposure. One of these organizations, Piñeros Y Campesinos Unidos Del Noroeste, Oregon's farmworkers union, receives support to further its pesticide poisoning project. The project is designed to educate farmworkers about the hazards of pesticide exposure and enable them to advocate for further protection. The foundation supports similar efforts in California, New Jersey, New York, and other states and regions, including the United States - Mexico border.

The California Wellness Foundation supports community-level solutions to environmental health issues in East Los Angeles and Bayview-Hunters Point, working-class minority communities in Los Angeles and San Francisco. Centro de Niños and the Urban Habitat Program, the Foundation's grantees, received funding in order to recruit and train neighborhood residents to determine the most dangerous environmental health hazards and find ways to reduce pollutants through organizing and legislative advocacy. These community-based efforts are examples of taking what is known about the science and putting it into policy to effect change.

Convening and Promoting Collaboration

Funders have also utilized their strategic position in communities to convene meetings around key environmental issues. Unlike other nonprofit groups and government organizations, grantmakers are often seen as impartial institutions, dedicated to addressing health problems through a number of effective strategies. Furthermore, foundations can bring together parties who may not be natural partners, may have no tradition of working together, or may perceive each other as adversaries but who must work together to solve community problems. This convening function can support meetings and discussions, or can be used as a grantmaking strategy to support collaborations in communities.

The California Endowment supports a community-wide collaboration in San Francisco to address the issue of asthma. Entitled YES WE CAN Urban Asthma Partnership, this collaborative effort of health agencies, community-based organizations, nonprofit hospitals, educators, and others attempts to combat asthma among poor children using a comprehensive management system. Health teams of doctors, nurses, and community health workers collaborate for diagnosis, education, and home-based disease management planning.

The New York Community Trust also exercised its role as a convener by supporting a two-day national funders forum through a grant to the Center for Land Renewal. This forum addressed development of brownfields – abandoned or underused properties that have toxic contamination. The purpose of this forum was to bring together key funders to share lessons learned, explore potential collaborations, and understand how they can become effectively involved in brownfield reclamation. Other conveners included the James Irvine Foundation and the Heinz Endowment.

Looking Ahead: Additional Grantmaker Opportunities

Steps are being taken but much work remains to address both systemic contaminants and antibiotic resistance. The diversity of factors contributing to various environmentally linked diseases provides a wide range of opportunities for grantmaking, and opens doors for partnership with a broad range of stakeholders – providers, consumers, community groups, and other grantmaking entities – all looking to limit health threats. While strategies vary, work can continue on many fronts: through research and policy, public awareness, and community involvement. Many potential activities and strategies span the issues of antibiotic resistance and systemic contamination.

Research

- Social marketing research defines messages and language to build educational or advocacy campaigns. Funders can support focus groups, message development and testing, campaigns, and campaign evaluations.

- Scientific research based in communities, such as defining local levels of environmental hazards, makes issues more tangible. To date there is little or no public information about the levels of antibiotics or various contaminants in local water supplies, for example.

Communication and Education

- Reports and white papers can provide the documentation needed to conduct campaigns. Funders may consider supporting dissemination of research about local levels of environmental hazards or information regarding levels of contaminants found in individuals in target communities.

There has to be collaboration, cooperation, coordination, communication. It's got to happen at the national level, and it's got to happen at the community level.

PHILIP LEE,
INSTITUTE FOR HEALTH
POLICY STUDIES,
2000

- Outreach to community members who, in turn, have the ability to reach target audiences directly can greatly increase community mobilization. Community leaders may include educators, faith-based organizations, and day care managers, among others. Different strategies and messages may be required to ensure that the issues are salient to various groups.

- Media outreach is important as journalists and producers shape opinions on a large scale. These professionals need credible information, solid research findings, and access to respected experts.

- Educational efforts aimed at policymakers can help create awareness and an environment in which they can act in the interest of their citizen constituents. Informing the policy process is not lobbying, and is an activity that many foundations support.

- Broad public information campaigns, drawing on consumer research, can have substantial effects on public knowledge and action. These campaigns typically include community and media outreach. They may also include public forums and venues such as the Internet, which lends itself to interdisciplinary and accessible dialogue.

- Public service announcements and advertisements greatly amplify educational campaigns. These have the potential of carrying more controlled messages more pervasively. Many organizations (notably the CDC) already have distribution networks throughout the country. Funds are needed for message development and production. Additional airtime in local markets might be provided by community funders.

Providers and Health Care Systems

- Medical practice guidelines are greatly needed for the appropriate prescription of medications. Additionally, funders can support the development and dissemination of the tools and resources necessary to track prescriptions and health outcomes.

- Outreach to medical professionals is important as these community leaders can be engaged in educating patients and communities. Professionals from all practice arenas can be considered: clinics, hospitals, private practices, and nursing homes.

Convening

- Foundations are frequently seen as neutral conveners and can bring together organizations that generally do not collaborate.

- Local foundations can support engagement in national campaigns by convening local chapters of national groups, or bringing together community activists. Foundations can also provide the support that makes it possible for diverse community groups to maintain their momentum.

Health funders and environmental funders may want to help inform each other's work, and should consider collaborating with one another. Participants in the Issue Dialogue discussed the notion of pairing funders one-to-one so each would have a partner to call on for consultation and guidance.

Conclusion

"Neither environmental funders nor health funders can do this work by themselves," noted Michael Lerner of the Jenifer Altman Foundation. Added Mark Walters of The Nathan Cummings Foundation, "This intersection of health and environment is potent because citizens care about the environment as it affects their health. The story here is that our fates are interconnected. We've always known it metaphorically and spiritually, and now we have science giving us a much more literal and factual sense."

The challenges before environmental health educators, activists, and their sponsors or potential funders are many. While the day's Dialogue and this Issue Brief focused on addressing the consequences of earlier scientific and technological advances, the public and private sectors also need to draw from lessons learned to build systems to monitor, anticipate, and quickly respond to adverse effects of future innovations. Most importantly – especially if long-term progress is to be made – it is critical to build environmental health considerations into production processes and health care innovations in order to create safer systems and products from the outset.

The story here is that our fates are interconnected. We've always known it metaphorically and spiritually, and now we have science giving us a much more literal and factual sense.

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