



WORLD HEALTH ORGANIZATION

Water, Sanitation, and Neglected Disease

By Guy A. Edouard

Introduction

Consider the case of Mare Alehgn, a 42-year-old Ethiopian woman suffering from a disease known as **trachoma**. Caused by the **bacterium** *Chlamydia trachomatis*, trachoma infects the underside of the eyelid, and repeated infections result in scarring of this sensitive area of the eye. This causes the eyelid to contract and actually turn inside out, leaving the eyelashes to point inwards towards the eye instead of away from the face. At this point, blinking causes the eyelashes to scrape against the sensitive surface of the eyeball, slowly clouding the **cornea**. Left untreated, the damage cannot be reversed and the condition causes permanent blindness.

After suffering for months from the effects of trachoma, Mare Alehgn thankfully received the fifteen minute procedure necessary to reverse the damage caused by the infection. A small incision in the eyelid relieves the pain of the condition, and, if the patient is kept from being re-infected, prevents any further eye damage. The procedure requires approximately \$10 USD of materials per treatment and a couple of weeks of training to learn. However, at the Carter Center in Ethiopia, training for the procedure costs around \$600 USD and a medical kit to perform the procedure costs \$800 USD.

In the developed world, infections stemming from trachoma are rare, and blindness caused by trachoma is virtually unheard of. However, due to conditions in the developing world, trachoma is much more common. *Musca sorbens* flies in Ethiopia and related species in neighboring countries spread trachoma by feeding on the eye discharge of individuals suffering from the disease. These swarming flies then breed profusely by laying their eggs and raising their young in human waste found in outhouses and ditches. The concern of a rapid spread of trachoma in a developed nation is much less pressing because these nations have modern sewage systems, in which these flies cannot breed.

Trachoma can easily be prevented in sanitary environments by regularly washing the eye with soap and water as the body's immune system responds to the infection. In the worst cases, a few applications of **antibiotics** and medical attention for no more than a few days in a clean hospital room can also cure the condition. However, despite the easy prevention and treatment of this disease, health professionals in Ethiopia are rare. In reporting on Alehgn's case, the *New York Times* found only 76 Ethiopian **ophthalmologists** qualified to treat the disease.

In the **third world**, infectious diseases like trachoma spread rap-

Trachoma—a contagious bacterial infection of the eyes.

Bacterium—single-celled organism that can cause infectious diseases.

Cornea—the clear outer coating of the eyeball.

Antibiotics—a chemical substance that has the ability to limit or destroy disease-causing bacteria.

Ophthalmologist—a doctor who specializes in the structure and diseases of the eye.

Third world—the collection of the world's underdeveloped nations.

idly due to the scarcity of running water, soap, and antibiotics. The United Nations (UN) estimates that approximately one million people need the surgery necessary to relieve the symptom of trachoma, although its best estimate is that only 60,000 surgeries were completed in 2005. The World Health Organization (WHO) estimates that of the roughly seventy million individuals suffering from trachoma, two million suffer from its late stages, and about one million have been blinded due to lack of access to treatment. Given the simple treatment of this disease, these numbers are staggering, though when compared to the “big killers” like malaria, AIDS, and tuberculosis, the figures of those infected by trachoma are significantly less shocking. Nevertheless, trachoma is one of fourteen diseases recognized by the WHO as **neglected diseases**. Once known as tropical diseases, these infections are most common in low-income populations in developing nations.

Over one billion people suffer from one or more of these diseases, which kill roughly 1.5 million people a year, particularly in disadvantaged areas of Africa and Latin America. Eradication of these diseases not only requires medical treatment, but it also depends upon the development of sanitation and improved access to clean water in the third world. Without all three of these components, a dramatic improvement of medical conditions is made nearly impossible. For example, although relieving the effects of trachoma begins with direct treatment through medication, administration of that treatment is made much easier with access to clean, running water. Furthermore, the treatment is rendered useless unless sanitation facilities are improved to prevent re-infection. This session of the WHO will explore the connections between water, sanitation, and treatment of neglected disease and attempt to find a resolution which addresses health concerns stemming from inadequacies in access to the three.

Neglected diseases—a group of infections, which are most common in low-income populations in developing nations.

Explanation of the Problem

Colonial Roots

The history of hygiene through human civilization has not been pleasant. In fact, an examination of the current conception of hygiene reveals that it is actually a rather recent phenomenon. Other than crude plumbing systems in ancient city centers, hygiene, until the 19th century, consisted solely of the isolation of the sick. The Black Death that wreaked havoc in Europe in the late 1340s is a prime example of a disease exacerbated by poor hygiene. The plague spread quickly due to the lack of proper sanitation in thickly settled urban centers. Primary sources are full of reports of weekly baths, trash heaps and ditches, and other evidence of unsanitary conditions.

Centuries after the Black Death, European colonists would encounter similar problems as they traveled to the Americas, Africa, and

Asia. Records at the 1607 **Jamestown** settlement in Virginia showed that 80% of the settlement's inhabitants died of sickness and disease in the first year alone. Populations worldwide boomed in the 16th and 17th centuries due to technological advances; however, these were not matched by similar advances in medicine, the sciences, and an understanding of the cause and spread of disease. Thus, across the globe, trends of urbanization were met by the increasing **burden of disease** and recurring issues concerning the disposal of waste.

Germ Theory

Until the mid-1800s, doctors and scientists actually believed the ancient historical view that disease arises through **spontaneous generation**. It was not until the 1860s and the pioneering discoveries of Louis Pasteur that scientists began to embrace germ theory, which postulates that infectious and contagious diseases arise from organisms. Pasteur's experiments proved two simple principles that became the basis for sanitation initiatives through the first half of the 20th century. First, Pasteur proved that germs were microscopic organisms that existed in the air; he did this through an experiment in which meat broth kept in a sterile environment only showed signs of contamination by microorganisms after being exposed to air. Second, Pasteur was the father of vaccination against disease. Pasteur's work is actually the basis for hand washing, milk **pasteurization**, government inspection and approval of food products, sanitation of hospital rooms and instruments, and other public health reforms in the first half of the 1900s.

It is important to note that colonies of European powers did not gain the full benefits of the sanitation reforms which followed the discovery of germ theory. For example, in Latin America, former colonies which earned their independence in the first half of the 19th century did not have the **capital** to invest in extensive sewage and plumbing development, especially in the countryside. In other parts of the world, such as Africa, colonial development would be severely delayed by spending on World War I, the economic crisis of the Great Depression, and the turmoil of World War II. After World War II, when colonies in Africa and Asia were granted independence, internal conflict and economic hardships prevented wide scale modernization of water and sanitation, especially in rural areas. Conversely, industrialized economies were able to complete urban renewals and extend technological advances into suburban and rural spheres.

Sanitation and Neglected Disease at the End of the 20th Century

By the 1970s, most major pharmaceutical companies had ended their research and development (R&D) programs devoted to treating neglected diseases. Because of this disengagement of the biotechnology sector, neglected disease research suffered over the next three decades.

Jamestown—the first permanent English settlement in America.

Burden of disease—the impact of a health problem on an area, as measured by cost and mortality rates.

Spontaneous generation—belief that living organisms were created directly from lifeless material.

Pasteurization—process of exposing food, such as milk, to very high temperatures long enough to destroy disease-causing microorganisms.

Capital—resources used in the investment of producing more wealth.

Because advances made in fields like molecular biology, medicinal chemistry, and genetics were not applied to neglected diseases, today's medications for neglected diseases remain based on relatively outdated technology.

In response to the significant gap in funding for neglected disease research, the UN Development Program, the World Bank, and the WHO created the Special Program for Research and Training in Tropical Disease (WHO/TDR) in 1975. Prior to the WHO/TDR, the research in neglected diseases was driven by colonial requirements during the first part of the 20th century. As Western interests and investors moved away from colonial Latin America, Africa, and Asia, the money behind the eradication of these diseases moved along with them.

This trend of post-colonial **disinvestment** in public health in the developing world was examined at the turn of the century in a comprehensive study carried out by *The Lancet*, which drew upon data from the last quarter of the 20th century. This study's sobering results illustrate why neglected diseases have remained such a problem in developing nations. Although 1,393 new chemical entities were created by pharmaceutical companies between 1975 and 1999, only 16 were registered as treatments for neglected diseases—three for tuberculosis and 13 for other diseases. The study also found that medicines for neglected diseases took an average of nine years to make it to the market, whereas other medications only required about five years to reach the market. Not only is this delay enough to raise concerns about whether enough attention is being paid to these diseases, but an even more critical issue is that over time, bacteria and microbes build resistance to medicines, rendering them somewhat ineffective. This means that the longer it takes to distribute these medicines to the people that need them, the more chances the diseases have to change into a form that can resist the medicine. Often, this problem can be overcome by using combination therapies in which multiple drugs are prescribed as a mixture to control infection. Unfortunately, even development of combination therapy requires money for long-term clinical trials that is not readily available for neglected disease.

Perhaps the most sobering statistics presented by *The Lancet* concern the makeup of the global disease burden. Globally, one-third of the disease burden was attributable to infectious and parasitic disease. However, in developed, high income countries, infections and parasites only contributed to about 5% of the disease burden. These statistics clearly highlight the disparities between the industrialized and developing world, and they also emphasize the need for a new approach to dealing with the problem in the new millennium.

Disinvestment—the withdrawal of invested funds or the cancellation of financial aid, subsidies, or investment plans

The Lancet—one of the world's most prominent and respected medical journals.

Recent Developments

Neglected Disease Today

Officially, there are fourteen neglected diseases recognized by the WHO: Buruli ulcer, Chagas disease, cholera, dengue, dracunculiasis, treponematoses, human African trypanosomiasis (sleeping sickness), leishmaniasis, leprosy, lymphatic filariasis, onchocerciasis, schistosomiasis, helminthiasis, and trachoma. Over the past decade, major steps have been made in eliminating neglected diseases as official public health problems; according to the WHO, this means that the disease infects less than one person per 10,000 people. The WHO reports that infection with guinea worm or Dracunculiasis has been reduced from nearly 50 million cases in the 1950s down to below 100,000 cases today. The World Health Assembly resolved to eradicate the disease in 1991, and as humans are the only carriers of the disease, experts are optimistic about the possibility of a total **eradication** of the disease. Similar progress was made by the efforts of the WHO and other health organizations in the fight against leprosy, with an estimated 212,802 cases in 2008 down from approximately 254,500 cases in 2007. Over 14 million leprosy patients have been cured over the two decades.

Eradication—the elimination of.

Two important lessons can be learned from studying past success with Dracunculiasis and leprosy. First, the efforts in treating both conditions show the importance of providing convenient access to treatment throughout affected areas. By training nurses and health workers to boost the capacity of local health care system, making medicines available, and creating mobile units of health professionals to service remote areas, infections can be nearly eradicated. The second key lesson is that total eradication cannot be achieved without some level of development to address problems of sanitation and lack of access to clean drinking water. Dracunculiasis in particular is spread through the ingestion of guinea worm larvae that live in stagnant water. Based on these case studies, experts agree that a two-pronged attack is necessary to eliminate neglected diseases—medical treatment and the elimination of sources of transmission. Though these efforts may sound daunting, these goals are well within reach: yearly, the developed world has only a handful of isolated cases of each of the neglected diseases.

Water and Sanitation Today

The Joint Monitoring Program for Water Supply and Sanitation (JMP), a collaboration between the WHO and the United Nations Children's Fund (UNICEF) reports that today approximately 2.5 billion people lack access to "improved sanitation." Improved sanitation is loosely defined by the JMP as toilets that ensure that human **excrement** does not come in contact with the human body. Of those who lack improved sanitation, 1.8 billion (70%) live in Asia and over 500 million (22%)

Excrement—waste matter discharged from the body.

live in sub-Saharan Africa. Beyond inconvenience, these numbers represent hundreds of millions of people across the globe that are vulnerable to illness and disease, which not only extols a heavy burden in lives, but costs billions in lost productivity and healthcare costs. The JMP reports that 1.2 billion people, or nearly one-sixth of the world's population, have no access to sanitation facilities whatsoever.

From 1990 to 2006, WHO and UNICEF efforts increased sanitation coverage in the developing world from 41% to 53%. However, Southeastern and East Asia saw increases of only 17% in sanitation coverage, and sub-Saharan Africa saw gains of only 5% in its coverage. Communities without proper coverage must resort to open **defecation**, which can contaminate drinking water and leave communities at greater risk of **diarrheal** diseases and worm infestations. Children are at a significantly higher health risk due to lack of sanitation as a result of their increased vulnerability of their **immune systems**. Childhood infections with neglected diseases in the third world, complicated by malnutrition, often result in long illnesses that negatively effect children's social development and can keep them out of school for weeks at a time.

The JMP also provides global statistics on the availability of clean drinking water, defining "improved drinking water sources" as piped water, available in households, public taps, and clean sites for protected rainwater and spring water collection. Estimates in 2006 reported that nearly 90% of the world's population uses drinking water from improved sources. The developed world enjoys 99% coverage, whereas the developing world has coverage closer to 85%. Glaring disparities exist in the Pacific Islands and Sub-Saharan Africa, where about half of all inhabitants do not have access to clean drinking water. Treatment of neglected diseases rests upon access to clean water for health professionals to sanitize instruments and hospitals and for patients to prevent re-infection after treatment. Lack of access to clean water in these areas translates directly into the spread of infectious disease, not only within those regions but into neighboring regions as well.

The International Year of Sanitation

On December 4, 2006, the WHO declared the year 2008 the International Year of Sanitation (IYS). This declaration was designed to raise international awareness of inequities concerning access to sanitation and aid the global effort at reaching the **Millennium Development Goal (MDG)** for sanitation, to halve the number of people without access to sanitation by 2015. Although the IYS has seen remarkable progress in terms of reaching goals concerning access to clean drinking water, progress on sanitation objectives has been stalled.

Originally, the lack of access to sanitation was seen as a primarily rural problem. Sanitary reform was a product of the urbanization of the 19th century, and the global attitude has been primarily geared to-

Defecation—*act of discharging waste from the body.*

Diarrheal—*intestinal disorder characterizes by abnormal frequency and fluidity of excrement..*

Immune system—*the bodily system that protects the body from foreign substances and diseases.*

Millennium Development Goal—*the International development goals that the UN member states and many international organizations agreed to achieve by 2015.*

wards extending sewage and waste management technologies outside of urban centers. Recently, however, relief organizations have begun to note that migrants and displaced refugees often find themselves in suburban areas without proper sanitation, or, often, urban areas unequipped to deal with the increased sanitation demand of rapidly growing populations. The United Nations Populations Fund (UNFPA) estimates that there is a weekly influx of about one million newborns and migrants into urban areas in the developing world each week. These weekly movements generally involve stays in **slums** and refugee camps without proper sanitation, thus positioning unsanitary conditions that breed disease just outside of large urban population centers.

A solution capable of dealing with this unexpected phenomenon and successfully reaching the sanitation MDG has yet to be found and is a major problem facing the WHO. The WHO estimates that the Sanitation Goal would save approximately \$66 billion in terms of time, productivity, averted illness, and expenditures on medicines and health care. Further, a great deal of concern has been raised over the risk of a reintroduction of diarrheal diseases in large cities in the developing world. This subset of neglected diseases is the second most common cause of death in children under the age of five, and doctors estimate that 88% of these cases are completely preventable through proper hygiene practices, access to proper sanitation, and access to clean drinking water.

Pharmaceutical Company Initiatives and Private Initiatives

In the past decade, pharmaceutical companies, partly in response to public pressure, have moved to restart projects abandoned in the 1970s aimed at eliminating neglected disease. In March 2008, one such company, GlaxoSmithKline partnered with the Drugs for Neglected Disease Initiative (DNDi) to reopen research and development projects working to find cures for visceral leishmaniasis, human African trypanosomiasis, and Chagas disease at dedicated drug discovery laboratories in Madrid, Spain. Novartis launched a similar initiative when it opened the Novartis Institute for Tropical Diseases (NITD) in Singapore in 2004.

It is unclear what motivated recent pharmaceutical reinvestment into fighting neglected disease. Although profits for drugs to fight neglected diseases are smaller than those for more prominent conditions, new medications will have **market exclusivity**, which is highly attractive. Some experts consider these efforts to be an attempt to better public relations. Either way, charitable arms of the private sector have moved to put capital behind these initiatives, often in matching programs. The Wellcome Seeding Trust, launched in 2005 with a £91 million endowment, provides grants to assist researchers and companies in taking early-stage drug discovery forward to clinical trials. DNDi, mentioned above, has been operation since 2003. Older humanitarian or-

Slum—*run-down area of a city, typically characterized by poor housing conditions, urban decay, and high poverty and unemployment rates.*

Market exclusivity—*state of being the only drug on the market for a certain disease or need.*

ganizations have also incorporated combating neglected disease into their work to fight poverty in the developing world—Médecins sans Frontières (MSF, also known as Doctors without Borders) is a good example of this.

In the public sector, some legislation exists to incentivize development of medication for neglected diseases. In 1983, the landmark US Orphan Drug Act provided tax credits and market exclusivity for seven years to companies that developed solutions to neglected diseases. In Europe, the European Medicines Agency (EMA), formed in 2004, provides similar benefits to European pharmaceutical companies that research projects concerning treatment of neglected disease.

Focus of the Debate

The “Big Three”

There is a great deal of tension between advocates of increased funding and research into neglected disease and those who believe that the most good for the most people can be achieved by attempting to eradicate the “Big Three” diseases facing the world community – namely, malaria, tuberculosis, and HIV/AIDS. The WHO estimated that in 2007, HIV/AIDS killed 33 million with about 2.7 million new infections. The US Department of Health and Human Services’ Center for Disease Control (CDC) estimates that 41% of the world’s population lives in areas where malaria is transmitted and reports 350-500 million cases a year worldwide with over one million fatalities. A 2005 CDC study investigating the **prevalence** of tuberculosis estimated that there are about 8.8 million new cases yearly, and that the disease is responsible for killing 1.5 million a year. These statistics are comparable with the disease burden reported for the fifteen neglected diseases taken together. The eradication of any single neglected disease would not, however, have the incredible impact of a cure for malaria, tuberculosis, or HIV/AIDS. This is part of the reason research into the Big Three is much better funded than that into the neglected diseases.

Still, treating the Big Three as well as the neglected diseases should not be **mutually exclusive** goals. Experts agree that funding for water and sanitation, two initiatives which all can agree require no advanced research, would have a drastic effect in reducing the world’s neglected disease burden. Small, easily distributable medicine kits to provide available treatments for neglected diseases into areas of the developing world without the health care capacity to treat patients with neglected diseases would be an incredible step forward in controlling outbreaks and would provide some immediate relief to those suffering in the third world without the investment necessary to develop new medications. Although the debate about the best way to allocate resources to the Big Three and the neglected diseases can be heated, all sides agree

Prevalence—*total number of cases of a disease in the population at a given time.*

Mutually exclusive—*two events, conditions, or variables which cannot occur at the same time.*

that something must be done about both sets of diseases. Advances in understanding the modes by which any of these infectious diseases work may help in developing treatments for others, so sharing of funding dedicated mainly to the Big Three with the neglected diseases may indirectly further drug development for the Big Three down the line. Because a fraction of the capital behind the top three diseases would do so much to further the cause of fighting neglected disease, the international health community must find a way to balance both interests.

Infrastructure

The lack of infrastructure in developing nations hinders research efforts. The best way to find solutions to diseases is to work with patients actually suffering from the disease, but this is not possible in developed areas that have the advanced equipment and trained medical professionals necessary to perform sophisticated research. Any treatments designed in the developed world must be shipped over to the developing world for clinical trials, and often the developing nation lacks even the resources to carry out these trials. Bringing research into areas hardest hit with neglected diseases would undoubtedly speed up drug development, but, in much of the third world, resources are not available to operate such research centers. Emigration of medical professionals and inequities in educational systems hinder these efforts.

Similar infrastructure concerns are intimately linked to the issue of providing clean water and sanitation in the developing world. Nearly 20% of Sub-Saharan Africa relies on a clean drinking water source over thirty minutes away on foot, by WHO estimate. Similar concerns exist in Oceania, where only 37% of the rural population has access to clean drinking water. Large disparities exist in rural areas in the developing world, where coverage outside of urban city centers is limited at best. Strategies to provide a combination of new laboratories as well as facilities to provide clean water and sanitation in the developing world would do much.

Innovation in Pharmaceuticals

Pharmaceutical development is a costly process. A company must develop dozens of drug candidates which must prove effective in clinical studies and **scalability** analysis. On average, this process takes about ten years. Even after all this, drugs proven safe and effective must then be manufactured and administered. Developing medication for any disease, then, requires a long term commitment and significant financial backing. Additionally, *Nature* reports only 10% of global pharmaceutical R&D resources are dedicated to infectious and neglected disease.

The Medicines for Malaria Venture (MMV), a private organization, has developed strategies to affect positive benefits over both the short term and the long term. In their approach, fixed-dose combina-

Scalability—a system's capacity to keep pace with changes and growth.

tions of existing drugs are administered to increase **efficacy** and limit resistance. In the medium-term, five to seven years, new molecules are developed that belong to a known class of drugs, which should speed up the development process but still provide improvements in the drugs. Over the course of a decade, MMV hopes that more sophisticated research will provide new breakthrough drugs to apply to diseases kept in check by the use and alteration of older medications. This may indeed be an effective model to control neglected diseases in the short-term as well as the long-term as infrastructure is developing to eradicate them.

Efficacy—*capacity or power to produce a desired effect.*

NGO Perspectives

Greenpeace

Greenpeace carries out a strong campaign against toxic substances and pollutants that intersects with the health and sanitation goals of the WHO. Greenpeace strongly advocates for large industrial polluters to put capital behind providing clean water in areas that have been polluted by manufacturing plants or other polluters. The organization as a whole is highly distrustful of big pharmaceutical corporations and prefers **capacity building** in the developing world as opposed to ventures with large biotech companies.

Amnesty International

Issues of health and health care are not traditionally targeted by Amnesty International; however, it has always defined health and sanitation as a basic human right. Amnesty International has also noted that denial of access to health, water, and sanitation is increasingly used in the developing world to undermine democracy and exercise control over underprivileged populations. By developing increased access to health care and sanitation, the organization is well aware that denial of those services will be more difficult to use as a political tool of dictators and cruel regimes.

Oxfam International

Oxfam International has been a strong critic of large pharmaceutical companies and biotech firms. In August of 2008, at the International AIDS Conference held in Mexico, representatives of Oxfam International went as far as saying: “Big pharm has gone all out to destroy India’s role as the pharmacy of the developing world.” The organization points to arguably flagging economic performance in the pharmaceutical sector as evidence of short-sighted policies and a need for increased regulation. Oxfam International supports stringent regulations being placed on pharmaceutical companies to force excess profits to be dedicated to developing medications to combat neglected diseases.

Capacity building—*the development of personal skills or social infrastructures within a community or organization.*

Red Cross

The Red Cross is very serious about the issues of water and sanitation. The organization has even recently begun training water supply specialists to protect, improve, and repair existing water sources. These health professionals are trained in implementing water treatment methods ranging from chlorine tablets to solar disinfection to sand and ceramic filtration. Over the past decade, the Red Cross has realized that its immediate relief efforts alone are far more effective when combined with efforts to better long-term sanitation in areas in and surrounding relief efforts. Removing stagnant water and waste eliminates breeding grounds for the bacteria, worms, and mosquitoes that spread infectious diseases, and leaves communities safe from future outbreaks or crises.

Possible Solutions

Public Private Partnerships (PPPs)

Recently, executives from the private sector, philanthropists from the private sector, and government officials have formed **public private partnerships** (PPP) to further the cause of drug development for neglected diseases. The DNDi estimates that it costs about \$20 million to put a drug into development and an additional \$1 billion to actually fully develop a new drug, once taking into consideration **false positives** and failed drugs. PPPs combine the advanced technology of pharmaceuticals with the money of the private sector to get projects off of the ground. Market exclusivity, funding, and tax incentives from governments help drive a project through development stages to completion.

In the US, the Hatch-Waxman Act of 1984 increased the standard **patent** time on a developed drug from six years to fourteen. In 1993, the Supplementary Protection Certificate provided for similar protection for pharmaceutical companies in Europe. The MERCOSUR treaty in South America and the ASEAN technical cooperation treaty in Asia are other examples of regulations that allow pharmaceuticals to recoup losses from drug development by granting extensive market exclusivity as an incentive to develop drugs that would otherwise not be profitable. Charitable organizations have also begun creating **steering committees** consisting of prominent experts, academics from renowned universities, and pharmaceutical executives who volunteer their time to work as a team to guide research projects exploring development of medications for neglected diseases. This level of expertise is an invaluable resource, and such partnerships due much to attract funding for R&D projects as well as make sure these projects are getting the most out of available funding.

Public private partnership—a government service or private business venture which is funded and operated through a partnership between the government and one or more private sector companies.

False positives—test results that indicate the presence of a certain condition when, in fact, the condition is not present.

Patent—a set of rights issued to an inventor or organization for a fixed period of time which grant the patent-holder the exclusive right to produce and sell the invention.

Steering committee—a committee that sets agendas and schedules of business, as for a legislative body or other assemblage.

Bridging the Gaps

In areas of the developing world where money does not exist for governments to launch urban renewal projects and extend running water to rural areas, private companies offer a very interesting solution. The World Bank estimates that the cost to begin properly implementing clean drinking water will be close to \$60 billion over the course of the year. Education could play a critical role in helping communities understand the incredible importance of clean drinking water to their health and aid in the profitability of private companies working to extend water and sanitation into rural areas. Where governments are having immense difficulty, many feel that the private sector with its massive amounts of capital may be able to succeed if communities and charitable organizations support the efforts of utility companies in the developing world.

Questions for Policymakers

A successful resolution must, first and foremost, define a direction for treatment of infectious disease, particular in the form of new drugs. In addition, it must go on to answer the following questions: How can clean water be provided in the developing world? How can advanced sanitation be extended to rural areas of the developing world? An effective resolution will stimulate development in the third world to slow the spread of infectious disease while at the same time setting into motion long term drug development that will provide the drugs of tomorrow to eradicate neglected disease in the next two to three decades. In the words of Kofi Annan to the 54th **World Health Assembly** held in Geneva in 2001: “We shall not finally defeat AIDS, tuberculosis, malaria, or any of the other infectious diseases that plague the developing world until we have also won the battle for safe drinking water, sanitation, and basic health care.” We would do well to remember Kofi Annan’s observations nearly a decade later and attempt to complete the battle against inferior conditions.

World Health Assembly—*is the forum through which the WHO is governed by its 193 member states. It is the world's highest health policy setting body and is composed of health ministers from member states.*

Conclusion

As you are now well aware, this is a very serious and grave issue. The World Health Organization at HMCE 2009 has been charged with considering the widespread trauma and death that neglected diseases are causing around the world. In coming up with policies to address these problems, there are several aspects to this issue that must be weighed in your decision-making process.

It is now up to you to come up with an efficient, realistic, and successful resolution to this pressing global crisis. Good luck!

Guide to Further Research

In addition to this briefing on neglected diseases, learning more about the effects and current efforts to control specific diseases will help better your understanding of the scope of the problem. The United Nations' website is an excellent source of information in that area:

- http://www.who.int/neglected_diseases/en/
The WHO-NTD website has information about all of the neglected diseases as well as the UN's efforts to eradicate them. It is the best website for reviewing statistics on infection rates and neglected diseases effects on quality of life.
- <http://www.who.int/tdr/>
The WHO-TDR website has the most up-to-date news on research in the field of neglected disease. A careful review of this site is useful in deciding how much of the problem lies in the need for more basic research and how much of the problem depends on bettering infrastructure and access to treatment.

Beyond the information collected by the UN, there are many more websites that offer different perspective on the problem of neglected disease. A few more are listed here:

- http://www.nytimes.com/ref/health/2006_BRINK_SERIES.html
This is the New York Times piece from which the opening of this briefing was drawn. The story is an excellent piece of reporting, and has several other interesting articles about what is standing between medical professionals and the eradication of these diseases.
- <http://www.dndi.org/>
DNDi was touch upon during this briefing—there website offers a chance to see what private non-profits are doing in the fight against neglected disease.
- <http://www.scidev.net/en/opinions/universities-should-push-work-on-neglected-disease.html> & <http://www.essentialmedicine.org/>
Recently, students and those in **academia** have been trying to put more pressure on universities to research the neglected diseases and pledge to make their discoveries widely available. This is a relatively new angle on the issue of neglected disease. The first link briefly explains the debate's start in *Nature*, widely recognized as the premier scientific journal. The second link is to Essential Medicines, which attempts to pressure universities to dedi-

Academia—the academic community.

cate more resources to fighting neglected disease.

As a delegate to the World Health Organization debating this issue, it's critical to have an understanding of the problem as well as the solutions that have thus far been employed. Before deciding a course of action, it is important to carefully evaluate the efforts of organization fighting neglected disease now to get an idea of what is working and what is not.

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