spending would depend on its enrollment and the political willingness to restrain provider payments.

The Obama campaign says it would finance the $50 billion to $65 billion in new federal spending for its health plan by allowing tax cuts adopted in 2001 and 2003 for families making over $250,000 to expire. However, the Congressional Budget Office (CBO) already assumes in its projections that these tax cuts will end after 2010, so their expiration will not generate new revenues to satisfy congressional budget rules.[4] And if savings from prevention, disease management, and electronic medical records are not realized — or if the CBO does not validate them as an acceptable financing source — then the Obama plan would need substantial additional revenues to fund expanded coverage.

The McCain and Obama health plans are best viewed as sketches rather than finished portraits, with many important details yet to be revealed. Still, the 2008 presidential election clearly offers voters dramatically different alternatives. The candidates' opposing visions of health care reform reflect fundamentally different assumptions about the virtues and vices of markets and government. With the debate over how to reform U.S. health care far from settled, whoever wins the presidency can expect fierce opposition to any attempt at comprehensive reform.

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GLOBAL HEALTH

Talking Dirty — The Politics of Clean Water and Sanitation

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In the wake of Cyclone Nargis, which devastated the Myanmar delta in early May, and the seismic earthquake that shook China shortly thereafter, access to safe drinking water and proper sanitation have become top priorities among those attempting to prevent epidemic diseases. But even without catastrophic disasters, the lack of access to clean water and basic sanitation represents a silent crisis affecting more than a third of the world's population.[1] Some 443 million school days are lost annually to water-related illness, millions of women and girls spend up to 2 hours a day collecting water, and every day in Bangladesh alone 28 million to 35 million people consume drinking water containing dangerously elevated levels of arsenic.[2] Given that the United Nations has declared 2008 the International Year of Sanitation — and that in the United States this year marks the 100th anniversary of the first chlorination of a public water supply — this seems an appropriate time to reengage in an ancient conversation about safe water and sanitation.

Keratosis from Arsenic Poisoning, Bangladesh.

UNICEF/HQ98-0835/Shehzad Noorani

The first documented attempts to treat drinking water, which may date back to 4000 B.C., were recorded in Greek and Sanskrit writings that describe the boiling and filtering of water, primarily to make it smell and taste better, although reducing visible particles and turbidity was also a goal. Hippocrates invented the cloth-bag filter (or Hippocratic sleeve) and was among the first to be-

lieve that this process also rendered water more healthful for the human body. The British scientist John Snow demonstrated that the source of a cholera epidemic centered on the odorless and seemingly clean water provided by a water pump. He proved that sand filtration and chlorination effectively prevented the spread of cholera. Despite 150 years of acceptance of the healthful effects of clean water, an estimated 1.1 billion people still lack access to it, and 2.6 billion people lack access to adequate sanitation.

There are several categories of water-related disease (see table), including diarrheal diseases, skin and eye infections, and the neglected tropical diseases.[3] Common waterborne diseases involve the fecal–oral transmission of a pathogen — a virus (such as hepatitis A or E or a norovirus), a bacterial enteropathogen (such as *Vibrio cholerae*, salmonella, enterotoxigenic *Escherichia coli*, shigella, campylobacter, or yersinia), or a protozoan (such as *Entamoeba histolytica*, giardia, or cryptosporidium). In addition, biofilms (coatings of organic and inorganic materials on water pipes) have been shown to allow the proliferation of several bacterial pathogens (including legionella and *Mycobacterium avium* complex) that are transmitted by inhalation, as well as of pseudomonas species and leptospira, which are transmitted by contact with skin or mucous membranes; leptospirosis epidemics have followed floods and hurricanes.

Water-scarce infections are those whose transmission occurs because of a lack of water for hygiene. Six million people worldwide are blind because of trachoma, whose transmission can be dramatically reduced by simple hand washing.[1] Hand washing also reduces the rates of acute respiratory infections; in one study, a hand-washing intervention halved the incidence of pneumonia in children younger than 5 years. Access to water and soap for hand washing may be as important as access to clean drinking water in reducing the incidence of childhood diarrhea.

Water-based infections are those whose transmission requires an intermediate aquatic host (e.g., a freshwater snail in the case of schistosomiasis, which affects more than 160 million people). Dracunculiasis, which is transmitted to humans through copepods (water fleas) that are infected with guinea-worm larvae, is on the verge of eradication, thanks to simple cloth filtration of water combined with an education program to prevent recontamination — an effort spearheaded by the Carter Center.

Diseases transmitted by water-breeding insects that have dramatic impact on humans include malaria, dengue, yellow fever, trypanosomiasis, and onchocerciasis. The flooding and other ecologic changes associated with global climate change may alter the breeding sites for the mosquitoes, black flies, and tsetse flies that carry these diseases, affecting their incidence and distribution.

The last category of water-related disease results from water polluted by natural toxins such as arsenic or toxins introduced by industrial waste. Arsenic is found in groundwater and released by

Categories of Water-Related Diseases.*

Mode of Transmission	Description	Examples
Waterborne pathogen	The pathogen is in water that is ingested or inhaled	Cholera Hepatitis A and E Noroviruses Typhoid fever Giardia Legionella
Inadequate water	Person-to-person transmission occurs because of a lack of water for hand washing	Shigella dysentery Trachoma Scabies Acute respiratory infections
Water-based intermediate host	Transmission occurs by means of an aquatic intermediate host, such as a snail or copepod	Schistosomiasis Guinea worm
Water-breeding–insect vector	Transmission occurs by means of insects that breed in water or bite near water	Dengue Malaria Trypanosomiasis
Waterborne toxin	Toxins — either naturally in groundwater or introduced by industrial waste — are ingested	Arsenic Fluoride Lead Mercury Nitrates

* Adapted from White et al.[3]

Collecting Drinking Water from a Polluted Pond Shared with Livestock, Western Kenya, 2003.

Greg S. Allgood/Photoshare

the microbial metabolism of organic material that predates modern agricultural practices in many regions. Arsenic contamination of groundwater obtained through tube wells in Bangladesh has caused the largest occurrence of poisoning in a single population.[4] The contamination was discovered during the investigation of an epidemic of skin lesions that included pigmentation changes on the upper chest and keratoses of the palms and the soles of the feet (see photo). Concerns about lung, bladder, and skin cancers have prompted widespread testing and remediation efforts in Bangladesh. Arsenic contamination of groundwater has also been found in Argentina, Chile, China, India, Mexico, Thailand, and parts of the United States. Similarly, the recognition of lead contamination of pipeborne water in the United States and mercury poisoning in people who have ingested large fish that accumulate toxic levels of mercury has led to concern about heavy-metal contamination of water.

The United Nations has set a target for its Environmental Sustainability Millennium Development Goal 7 of halving, by 2015, the proportion of people without sustainable access to safe drinking water and adequate sanitation; it also intends to integrate sanitation into strategies for water-resource management. This initiative will necessitate innovative, collaborative, interdisciplinary, and intersectoral efforts, with commitment from national leaders and heads of international agencies and with public–private partnerships. The West Africa Water Initiative, launched in 2002 to maximize the impact of water-related investments by the private and public sectors, is one example of an alliance that has brought together multiple partners to invest in small-scale potable water supplies and sanitation in Ghana, Mali, and Niger. Such approaches to managing the water supply must be evidence-based, sustainable, scalable, affordable, equitable, and acceptable to the local community.

Most U.S. residents turn on their faucets feeling confident that they won't contract a waterborne disease. Many people in the developing world have access to only 5 liters of water per day, whereas the average American uses 10 times that amount merely to flush the toilet each day and 80 times that amount for all daily activities combined.[2] Hurricane Katrina reminded us, however, that our privileged status can be threatened by natural disasters that lead to contaminated drinking water and make waste removal difficult, which can trigger illness. Disasters that temporarily require a population to defecate in plastic bags, buckets, open pits, agricultural fields, and public areas for want of a hygienic alternative remind us that 2.6 billion people live this way every day.[1,2]

Global health issues have captured the attention of governments, global funds, and foundations. Yet most of this attention and the consequent investment have focused on diseases such as malaria, tuberculosis, and AIDS, which kill a fraction of the number of people who die from water-related diseases. The necessary political will has not been mustered to address the water and sanitation crisis, among the most neglected of the United Nations' millennium development goals. A recent cost–benefit analysis reported by the World Health Organization makes a strong case for investment in this sector, and,

at its Tokyo summit meeting in July, the Group of Eight reaffirmed its commitment to addressing concerns about water.[5] Political support is urgently needed at all levels for the development and implementation of evidence-based recommendations to improve access to safe water, for the enhanced surveillance of water-related diseases, for the financial support of relevant epidemiologic and laboratory research, and for the development of accessible educational materials. Clearly, we need to start talking dirty water.

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