

A CHINA ENVIRONMENTAL HEALTH PROJECT RESEARCH BRIEF

Water-borne Illness in China

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CHINA'S WATER QUALITY CALAMITIES

Floods and Disease

China has contended with water-borne disease epidemics for millennia following each of the many extreme flood events on the Yellow and Yangtze rivers. During the 1998 Yangtze River flood, the Chinese government responded to potential infectious disease outbreaks rapidly—quickly deploying the People's Liberation Army and medical personnel, whose efforts to rescue and treat flood victims helped avert a potential public health disaster (Lee, 2004). CNN estimated that only 600 people in the Yangtze Basin perished in 1998 due to flood-related diseases (CNN, 1998). This stands in stark contrast to a huge flood on the Yangtze in 1954, in which 90 percent of the 30,000 deaths were disease related. The 1998 disease response highlighted how China had developed the ability to respond effectively to an infectious disease emergency.

Since 1998, however, growing pollution combined with failures in health-care reform have increased the emergence of disease and environmental health problems in China, straining the public health authorities' ability to contend with emerging public health crises. The rising prevalence of diseases linked to water and air pollution, as well as animal husbandry practices—such as diarrhea, SARS, avian flu, typhoid, and cholera—has been growing. China's severe water pollution stems from poorly regulated emissions from industrial, agricultural, and municipal sources.

For example, lax enforcement of municipal and industrial discharge into water bodies left three quarters of China's lakes and one-third of the rivers too polluted for use in agriculture or industry, endangering the health of at least one billion people who rely on surface water for drinking, cooking, and cleaning (Shalizi, 2006). Further, according to the *OECD Environmental Protection Report: China*, a nationwide survey on drinking water and water-related diseases has not been conducted since 1988 (OECD, 2007). As often occurs in rapidly developing countries, investment in wastewater treatment facilities, industrial effluent monitoring, and protection of public water supplies, has been slow and spotty. When the facilities are available, poor incentive structures leave them inoperable or sometimes simply turned off to save on energy costs (OECD, 2007). In 2006, nearly half of China's major cities did not meet state drinking water quality standards (OECD, 2007).

Organic and inorganic pollutants are both main sources of water degradation threatening human and ecological health in China. Organic pollutants generally originate from animal or human

fecal waste released untreated into a water body. Organic waste causes diseases including dysentery, typhoid, trachoma, and cholera. Inorganic pollutants are made up of metals, minerals, and toxic chemicals released by industries or improperly stored wastes, which are seriously degrading both surface and ground water in China. Inorganic effluent has been found to cause neurological damage, paralysis, and other serious health conditions and is a potential source of various cancers (Banister, 1998).

Organic Pollutants and Sanitation

The connection between water-borne illness and inadequate provision of water and sanitation is long established (UN-HABITAT, 2003). The incidence of infectious diseases in China has been rising since 1990 despite annual gross domestic product (GDP) growth of 8 percent (Lee, 2004). Diseases previously thought to have been contained—such as viral hepatitis, diarrhea, and typhoid fever—recently have reemerged as significant threats (UNDP, 2001). The World Health Organization reported an incidence of 108.4 mortalities per 100,000 persons from diarrhea-related illness in 2002 (WHO, 2003). For a regional comparison, in 2002, Vietnam's diarrheal disease mortality rate per 100,000 persons was 10.7 and Thailand's is 4.6 (WHO, 2004). Children in China are particularly vulnerable to diarrhea-related illnesses (See CEHP Research Brief on *Child Mortality and Water Pollution in China*).

Water quality degradation runs both deep and wide in China. According to China's State Environmental Protection Administration (SEPA), 63 percent of monitored river sections did not meet the Grade IV and V surface water standards (Economy, 2004). Water categorized as Grade IV or V renders the river water unsuitable even for industrial or agricultural use. Provision of clean water, however, is an expensive endeavor. Under China's regulatory system, municipal governments are responsible for the treatment and release of sewage from the country's booming urban centers. In 1999, China had 266 modern wastewater treatment plants with capacity accounting for 14.7 percent of the total 20.4 billion tons of domestic sewage (UNDP, 2001). The Tenth Five-Year Plan (2001-2006) mandated the construction of thousands of new wastewater treatment plants, yet a 2006 survey by SEPA revealed that half of the new plants were either turned off or run intermittently. Even after careful provisions to protect the Three Gorges Reservoir from pollution, the city of Chongqing alone releases nearly one billion tons of untreated wastewater a year into the Yangtze River, which runs downstream to other municipalities after passing through the hydroelectric turbines (Hodum, 2007).

Industrial and Inorganic Pollutants

According to SEPA, dramatic progress has been made since 1998 in treating inorganic pollution, with a reduction of 60 to 70 percent in mercury, lead and arsenic from factory to river. In 2004, SEPA declared 90.7 percent of industrial waste met national standards, but chemical spills and highly polluting industries still are causing health problems. For example, in September 2006 the Chinese news media widely reported a case in which nearly 2,000 people—including 300 children—in two villages in Gansu Province were hospitalized with lead poisoning caused by pollution from a nearby smelter. The local environmental protection bureau had illegally approved the construction of the smelter (*Reuters*, 2007). Excessive amounts of lead can damage the nervous and reproductive systems, as well as cause high blood pressure and anemia. Lead accumulates in bones, and is particularly harmful to pregnant women and young children.

Inorganic pollution also continues to be a long- and short-term health threat in China. Although most Chinese boil their drinking water, inorganic pollutants are unaffected, so that about 70

million Chinese are drinking contaminated groundwater leading to diseases such as chronic arsenic and fluoride poisoning (OECD, 2007). Untreated factory wastewater, toxins from inorganic agricultural chemicals, and leeching landfill waste are all significant sources of surface and groundwater contamination in China. Besides lethal poisoning and minor skin ailments, inorganic pollutants, such as lead from old city pipes and factory effluent, can cause more serious diseases in the relative short-term including learning and behavioral disabilities in children.

Long-term exposure to toxic drinking water in China has been linked to increasing rates of chronic diseases, such as stomach and liver cancers. Chen Zhizhou, a cancer expert at a research institute affiliate of the Chinese Academy of Medical sciences, recently stated, “The main reason behind the rising number of cancer cases is that pollution of the environment, water and air is getting worse by the day” (*Asia Economic News*, 2007). A study conducted in Lujiang County, Anhui Province looked for an explanation for rising rates of pollution-related cancer. The authors found that rising mortality rates for stomach and liver cancers were associated with high levels of inorganic compounds in the local surface water bodies (UNDP, 2001). In China’s most polluted river basin, the Huai, there are many villages where no men have been able to pass the physical examination for entering the People’s Liberation Army, which some have linked to certain pollutants in the river (Economy, 2004). Dirty water also poses threats to food safety, particularly aquaculture, for farmers must pump fish with excessive antibiotics and fungicides to keep them alive, which in the long term potentially harms the health of consumers.

WATER PROBLEMS BURDEN CHINA’S FALTERING PUBLIC HEALTH SYSTEM

Illnesses stemming from inorganic and organic pollution overburden China’s health agencies and medical service providers as they make a shaky transition from a socialist- to a market-based healthcare system. The rural population of China, comprising 70 percent of the total population, is served by only 37.5 percent of the nation’s trained health workers (Lee, 2004). Lack of affordable health care and increasingly degraded water make the burden of disease much greater in China’s countryside. Typhoid is endemic in southern China and remains a public health problem despite recent progress in water and sanitation coverage. Efforts to improve water sources and reduce typhoid by providing sewage treatment require capital resources still scarce in impoverished areas of south China (IVI, 2006; Ochiai, 2006). Between 1995 and 1999, typhoid incidence rates from the site of a case study in rural Guangxi Province ranged from 27 to 153 per 100,000 (Yang, 2005). One of China’s most vulnerable groups of citizens, migrant workers who travel from the countryside to work in the cities, are particularly susceptible to water-borne illnesses. Because these people live away from home most of the time, they constitute the population least likely to receive preventive care, and most likely to transfer diseases (Yu, 2005).

GOVERNMENT EFFORTS

The 2003 SARS outbreak served as a wake-up call to China’s healthcare authorities, by illuminating the low capacity of its healthcare system to respond to a serious disease outbreak. Since 2003, major efforts have been taken to protect human populations from infectious diseases, including water-borne illnesses. One notable initiative is China’s commitment to research and develop new generation vaccines for infectious diseases (IVI, 2006). Advances are underway to produce high-efficacy vaccines, at low cost, to immunize vulnerable populations against cholera and typhoid.

Water quality is increasingly cited as a major priority of the central government, as illustrated by the greater water pollution control investment in the Eleventh Five-Year Plan and efforts to close gaps in China's Water Pollution and Prevention Law. Another effort is the recent enactment of China's first national environmental performance information disclosure program that requires the government to rate the environmental performance of local companies, particularly by the quality of effluents released into the water system (Li, 2006). This initiative will be facilitated by SEPA's new Environmental Information Disclosure Regulation that was released in the spring of 2007. Such steps towards corporate accountability will potentially increase pressure on high-polluting firms to improve environmental performance. Another significant bureaucratic move is a new network between SEPA and the Ministry of Health to more quickly share information on environmental health accidents.

The initiatives targeting industry, improving information exchange, and amending water protection laws hold promise, but monitoring mechanisms and enforcement remain critical barriers to improving environmental health factors related to China's water pollution.

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