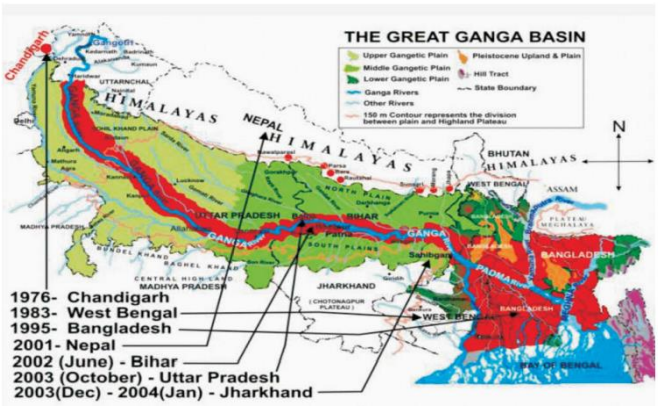
CENTRE FOR ENVIRONMENTAL HEALTH

Arsenic It all started with a public health intervention - to alleviate the disease burden occurring from consumption of surface water, UNICEF together with the Department of Public Health dug tube wells in Bangladesh. Little did they know that they were about to cause the largest poisoning of a population in history. Groundwater contamination of arsenic in the Ganga-Brahmaputra belt in India and Padma-Meghna belt in Bangladesh and its consequences to human health are considered by many as the world's biggest natural groundwater calamities (1).

Arsenic is a naturally occurring element in the earth's crust. It is found in water, soil, air, and food. Most arsenic gets into the body through ingestion of food or water.



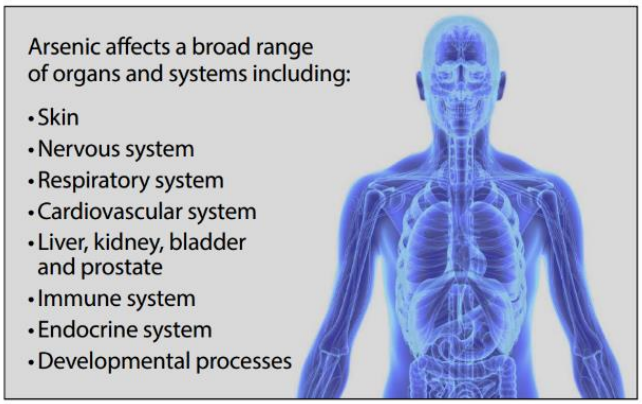
Arsenic in India

A survey conducted in different locations of Punjab, Haryana, and Himachal Pradesh in 1976 was the first documentation of arsenic in groundwater in India. The first case of arsenic poisoning was detected in West Bengal in 1983. Since then, reports of arsenic pollution have been reported from West Bengal, Jharkhand, Bihar, Uttar Pradesh in the flood plain of the Ganga; Assam and Manipur in the flood plain of the Brahmaputra and Imphal rivers and Rajnandgaon village in Chhattisgarh (2). In West Bengal alone, 51 million people are severely affected by arsenic. Parts of West Bengal report groundwater arsenic concentrations of 0.05 -1.6 mg/l (2), which are magnitudes of order higher than the WHO guideline value of 0.01 mg/l (3). The Indian standard for the permissible level of arsenic in drinking water is 0.01 mg/l (4).

Arsenic and Health

Arsenic pollution is a serious human health concern. Not only does arsenic affect a broad range of organs and systems; health effects associated with its long- and short-term exposures, its low-level exposures, and effects in children are raising concerns among clinical and public health professionals worldwide (5).

1.India Water Portal http://www.indiawaterportal.org/topics/arsenic
2.Sanyal, SK.2014. Arsenic contamination in ground water: an environmental issue. Journal of Crop and Weed, 10(1):1-12
3. World Health Organization. 2011. Guidelines for drinking water quality, 4th edition.
4. Ministry of Water Resources, Government of India. http://wrmin.nic.in/forms/list.aspx?lid=327
5. NIEHS Fact sheet on Arsenic. https://www.niehs.nih.gov/health/topics/agents/arsenic/



Source: NIEHS Fact Sheet on Arsenic

Arsenic and arsenic compounds are classified as class I carcinogens by the International Agency for Research on Cancer (IARC) and have been linked to cancers of skin, lung, kidney, liver, and bladder (6). Early life exposures to arsenic have been found to increase incidence of lung and bladder cancer in adults, even 40 years after high exposures stopped (7).

Arsenic in drinking water has been shown to impact a child's intellectual development with a 5-6 IQ point reduction with arsenic levels greater than 0.005 mg/l (8). Association between low to moderate levels of arsenic and metabolic diseases like diabetes have also been reported (9).

Need of the Hour

Availability of safe drinking water sources, along with arsenic education and low-cost water testing solutions can help reduce arsenic exposures (10). Folic acid supplements have shown to markedly lower blood arsenic levels in chronically exposed populations (11).

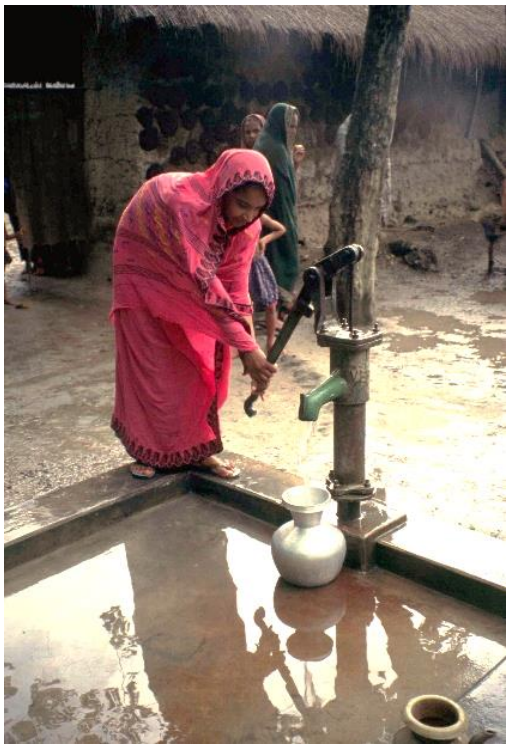


Photo: Hand pumps like this one are a common site in West Bengal. The green paint denotes safe drinking water. Arsenic contaminated water pumps are painted red.

6. National Research Council. 2014. Critical Aspects of EPA's IRIS Assessment of Inorganic Arsenic: Interim Report. Washington, DC: The National Academies Press.
7. Steinmaus C et.al., 2014. Increased lung and bladder cancer incidence in adults after in utero and early-life arsenic exposure. Cancer Epidemiol Biomarkers Prev; doi:10.1158/1055-9965.EPI-14-0059
8. Wasserman GA et.al., 2014. A cross-sectional study of well water arsenic and child IQ in Maine schoolchildren. Environ Health 13(1):23
9. Argos M, et.al., 2014. Arsenic and lung disease mortality in Bangladeshi adults. Epidemiology 25(4):536-543.
10. George CM, et.al., 2012. A cluster-based randomized controlled trial promoting community participation in arsenic mitigation efforts in Bangladesh. Environ Health 11:41.
11. Gamble MV, et.al., 2007. Folic acid supplementation lowers blood arsenic. Am J Clin Nutr 86(4):1202-1209.