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Position Paper

ARSENIC CONTAMINATION IN GROUNDWATER

POSITION STATEMENT

UNICEF supports countries in providing clean drinking water for children as a fundamental right stipulated by Article 24 of the Convention on the Rights of the Child. About 700,000 children under five die each year from diarrhoea, mainly caused by human waste in drinking water. Water safety must address both biological and environmental contaminants.

Naturally occurring arsenic contamination of groundwater presents a serious threat to public health. It has been found in at least 70 countries and could affect more than 140 million people, most of whom live in Asia. The effects of arsenicosis (the result of ingesting too much arsenic) appear gradually, often over years. Arsenic kills and cripples both children and adults by causing cancers, heart and lung disease, and stillbirths. It harms the futures of children through intellectual impairment. There is no medical cure; the solution to the threat of arsenicosis is preventing arsenic exposure.

Effective solutions require actions led by governments, based on solid knowledge of local conditions, and involving communities and partners across all sectors related to water supply and public health. In countries where millions are being exposed to toxic levels of arsenic, substantial national funding and government action is needed now to eliminate the threat. Through appropriate mitigation actions it should be possible to end further arsenic exposure in a given area, ensuring no additional persons are poisoned. Such permanent solutions should be the objective.

UNICEF works with governments to help affected communities find alternative, safe water sources. Our support is based on five tenets: assisting government water safety planning; assisting governments in monitoring arsenic levels; marking wells that should not be used for drinking or cooking; finding low-cost alternative, safe water supplies; and helping change knowledge, attitudes and practices so that vulnerable populations can protect themselves. UNICEF's experience with supporting behaviour change is thus a key asset.

Context and Considerations

A serious threat to water quality in affected areas, particularly in Asia

Water quality is a major concern for the developing world, and especially for child survival and health. Safe water must be free from harmful microorganisms and dangerous concentrations of environmental contaminants such as arsenic, fluoride or manganese. Article 24 of the Convention on the Rights of the Child outlines the responsibility of States Parties to support the highest attainable standard of health for children, and to provide 'clean drinking-water, taking into consideration the dangers and risks of environmental pollution.'

Knowledge of the potential extent of arsenic contamination and of the severity of its health effects has grown significantly in recent years. Naturally occurring arsenic contamination of groundwater has been discovered in at least 70 countries to date. In half of these countries, the discovery took place within the last 10-15 years. This trend, as well as reasoning based on current geological knowledge, indicate that arsenic contamination will almost certainly be discovered in more countries and locations. The problem is most threatening in Bangladesh and in a few parts of India and China. Tropical river basins draining the Himalayas are the largest sites of pollution. Current estimates suggest arsenic contamination could affect more than 140 million people.

Arsenic distribution in groundwater is highly variable: even in affected areas, only a percentage of wells are normally found to be contaminated, while others are arsenic-safe. Drinking and cooking with contaminated groundwater is considered the main conduit for human exposure to arsenic. Other avenues of exposure include food (from crops irrigated with contaminated water, which transfers arsenic into the food chain), and polluted air from burning contaminated coal. Bathing in and laundering clothes with contaminated water do not present significant risk, as arsenic is absorbed through ingestion, inhalation, and *in-utero* but not through the skin. Some human activities such as mining may cause arsenic pollution; anthropomorphic problems from such pollution may be severe but are generally limited in extent. In certain countries, natural arsenic contamination of surface water is a problem.

Children are particularly vulnerable to harmful effects of arsenic contamination

While arsenic's acute toxicity at high levels has long been known, the harmful effects from low-level, long-term exposure have only been recognized in recent decades. Knowledge of these effects is still evolving.

Arsenicosis usually occurs slowly, often taking 2-20 years to manifest. The symptoms include disfiguring skin lesions, cardiovascular and lung disease, reproductive disorders (including increased likelihood of stillbirths), and various types of cancers. Those suffering from arsenicosis may die from these or other effects of the condition. Some studies show that children are particularly vulnerable to arsenic and that it can inhibit their intellectual development. Stigma arising from the skin lesions that result from arsenicosis can ruin the lives of affected persons and their families: in Bangladesh, sufferers have been shunned by spouses or communities, due to mistaken beliefs that arsenicosis is contagious or is the result of a curse.

The longer a person is exposed to arsenic from any source (such as contaminated water, food or air), and the higher the levels of arsenic, the more likely they are to develop arsenicosis, and the more serious their condition will be. At present there is no medical cure for arsenicosis. Once a person has been chronically exposed to arsenic, the health risks remain for decades, even after exposure ceases.

The World Health Organization (WHO) threshold for arsenic in drinking water is 10 micrograms/litre (µg/l), revised down from 50 µg/l in 1993. The latter level is now known to be seriously unsafe, with risks of cancer death of perhaps 1 in 100 over lifetime exposure. Nevertheless certain developing countries have retained the older WHO standard, arguing that the new threshold is too expensive and difficult to implement.

A key factor in the emergence of arsenic contamination as a global issue was experience in South Asia, particularly Bangladesh and India

Arsenic contamination of groundwater emerged unexpectedly as a major health issue in Bangladesh in the 1990s, arising from what had been considered a highly successful tubewell boring project advocated for and sponsored in part by UNICEF. Although the tubewell water was microbiologically pure, the naturally occurring arsenic contamination was of such scope as to constitute a public health 'emergency', according to independent experts in a widely-cited article published in 2000, in the *Bulletin of the World Health Organization*.

In Bangladesh, surface water sources were, and still are, often microbiologically contaminated; this was the impetus for the drilling project. By 1987, the first cases of arsenicosis in Bangladesh had been reported. By 1993, arsenic contamination of groundwater in Bangladesh had been confirmed, and by 1998, its extensive scope was understood.

Context and Considerations

Once the problem emerged in Bangladesh, UNICEF worked actively with the government and other partners to avert and mitigate arsenic contamination, while expanding access to sources of microbiologically-safe water. With donor support, more than 160,000 safe water points have been installed by the Government. In addition, 4.7 million tubewells have been tested and 1.4 million were clearly marked as unsafe. Today, more than 700,000 public safe water options exist in affected areas. UNICEF's role in this effort was to support a massive awareness campaign and the testing of 1.5 million tubewells. UNICEF also explored options for expanding access to safe water, installed thousands of safe water points in arsenic affected areas, and distributed household and community filters.

After 2005, national funding for arsenic mitigation in Bangladesh ran low, and subsequently the major government entities responsible for arsenic mitigation ceased functioning. In the late 2000s, international agencies attempted to refocus attention on the problem. The Government has recently committed to a revised implementation plan, which requires setting quantitative, time-bound targets for reducing arsenic exposure. UNICEF's support for arsenic mitigation continues in 2012, with plans to carry out an arsenic testing, capacity building and awareness campaign to test and mark 300,000 wells.

Today, an estimated 25-40 million people in Bangladesh have been exposed to arsenic levels above the national limit (which is still at 50 µg/l). About 5.6 million are using drinking water exceeding 200 µg/l of arsenic, or more than 20 times the WHO standard. At least 40,000 people in Bangladesh currently show symptoms of arsenicosis; the true figure may be far higher.

In India, after the spread of tubewell drilling technology, water service providers increasingly began tapping groundwater sources. The first reports of arsenic contamination in water were in 1976 in the north-central region. By 1983, the first cases of arsenicosis had been confirmed in West Bengal, the most severely affected area. Extensive government mitigation efforts have been underway for many years, with involvement of UNICEF, WHO and many other partners. Some 28 million people are potentially at risk in West Bengal, about two-thirds of whom now have at least a degree of access to arsenic-safe water. Only limited information is available on arsenicosis prevalence; a 1998 survey found a prevalence of 4.6 per cent in areas with contaminated water.

While governments are ultimately responsible for water quality, UNICEF is a committed partner in arsenic mitigation efforts

The responsibility for providing safe water for all citizens falls on national governments. UNICEF advocates for the highest level of political support, to ensure that government financing is commensurate with the scale of the problem.

As a result of its work in Bangladesh, India and other countries, UNICEF has extensive experience in mitigation of groundwater arsenic contamination. UNICEF has supported arsenic mitigation efforts, to varying extents, in Afghanistan, Bangladesh, Burkina Faso, Cambodia, China, Democratic People's Republic of Korea, India, Lao People's Democratic Republic, Mongolia, Myanmar, Nepal, Nicaragua, Nigeria, Pakistan, Thailand, and Viet Nam.

UNICEF is able to provide capacity building, collaborate on water safety planning, support development and implementation of programme strategies, help provide education and advocacy around solutions for arsenic mitigation, and provide technical support to improve operation and maintenance of alternative supply options. The organization supports learning from experiences among affected countries and promotes regional dialogue among policy-makers and technical experts.

UNICEF has collaborated with WHO and the UN Food and Agriculture Organization (FAO) to leverage their experience and expertise in general health aspects of arsenic and implications for food and crops. Solutions to arsenic exposure must address not only water contamination but also food-borne and airborne arsenic. UNICEF is not the lead agency on these last two issues, and consequently, commitment and action from other UN agencies will be essential in order to find solutions.

The objective should be permanent solutions, based on a coordinated approach across sectors, using detailed local knowledge

Tackling an arsenic problem effectively requires testing of water sources for contamination, as well as marking to indicate whether they are safe for drinking and cooking. It may require promotion of existing arsenic-safe sources, construction of new safe sources, or both. (UNICEF's experience does not support the long-term use of arsenic removal filters, due to problems with sustainability, but household removal

Sources and Consultations

through filtration may remain an important option in areas where there are no alternatives or as a short term solution in areas with high levels of arsenic.)

Changes in knowledge, attitudes and practices are vital: affected populations need to change the water sources they use, but may resist change because of lack of understanding of the danger from arsenic, and because contaminated sources may be more convenient to use. UNICEF's experience with supporting behaviour change is thus a key potential asset for effective arsenic mitigation.

Monitoring should address not only water quality but also diagnosable features of arsenicosis and biomarkers of exposure. Where widespread contamination occurs, central monitoring/coordination units should be set up.

Effective solutions require coordination across all sectors involved in water supply and public health, including government departments, local authorities, non-governmental organizations, water supply providers and the private sector, development agencies, international donors, experts in public health and in geoscience, and communities themselves. Through appropriate mitigation actions it should be possible to end arsenic poisoning in a given area. Such permanent solutions should be the objective.

In global terms, the biggest waterborne killers of children are diseases arising from faecal contamination: More than 2,000 children die every day from water-borne diseases, most of them caused by faecal bacteria and viruses in water. But the health of children and families depends on the quality of the specific water sources they use. While biological contaminants are the biggest concern in most locations, environmental contaminants like arsenic may pose a bigger threat in others. Thus with respect to planning and implementing safe water solutions, there is no substitute for detailed local knowledge of contamination and exposure. National authorities should assess both biological and environmental contaminants, and should be prepared to undertake mitigation programmes for any contaminant that poses significant health risks. ■

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Consultations

UNICEF experts consulted in the preparation of this position paper include: Sanjay Wijesekera, *Associate Director*, Water, Sanitation and Hygiene (WASH) Section, *Programme Division*; Cecilia Scharp, Senior Advisor, WASH Section, Programme Division; Magnus Andre, *Programme Officer*, WASH Section, Programme Division; Henk van Norden, *Regional Adviser, Sanitation and Hygiene*, UNICEF Regional Office for South Asia; Peter Ravenscroft, *Water and Environmental Sanitation Specialist*, UNICEF Bangladesh Office; Aidan Cronin, *Water and Environmental Sanitation Specialist*, UNICEF India Office.

This position paper was prepared by the Policy Advisory Unit in UNICEF's Division of Policy and Strategy.