PROJECT WELL

Arsenic-Safe Water

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Arsenic and the Project Well Dugwell Program

Arsenic is a naturally occurring metalloid that is present in the groundwater of the Gangetic delta, in some areas of India, almost all of Bangladesh, and the foothills of Nepal, that may cause severe morbidity and mortality in this densely populated region. There is no effective treatment for arsenic-caused disease and the only solution is limiting exposure by changing the source of drinking water containing high concentrations of arsenic. New studies and reports (2003) show that the Indian states of Uttar Pradesh (India's most populous state) and Bihar, in the upper and middle Ganges basin, respectively, have high concentrations of arsenic in drinking water, primarily in rural areas. In the lower Ganges basin of West Bengal, nine out of 18 districts of the state of West Bengal have been identified as arsenic-affected, and six million people are drinking arsenic contaminated water. Project Well is focusing on the district of North 24 Parganas where the population is 7.3 million. Project Well has provided dugwells for the villages of Kamdebkati, Simulpur, Bamondanga, Ranidanga, Chondipur, Kolsur, Chandalati, and Ranihati.

The Project Well program provides potable, arsenic-safe water to communities by constructing modified versions of the traditional dugwell, and educates users via a comprehensive awareness campaign. The first dugwell was constructed in 2001, and now there are 34 dugwells in total.

Project Well: Past, Present, & Future…

In the past year, Project Well constructed 20 dugwells, including the expansion of the program and construction of 8 new dugwells into the villages of Chandalati, Ranihati, and Ranidanga. Additionally, the monitoring study for 5 dugwells, located in Kamdebkati and Simulpur, which began in summer 2002, was extended from December 2003 to November 2004. The annual average arsenic concentration in all five dugwells was 0.027 mg/L.

Project Well has also been active in community activities, including a series of awareness programs that were held December 28, December 29, and January 2. A meeting with other organizations and local government officials was held at the Kolsur Gram Panchayat office on June 5.

Presently, training programs are being carried out in areas where cooperation and participation levels of the user community are strong. Field workers are regularly visiting the user community, updating the registers of the users and non-users, and educating non-users on the advantages of using dugwell water. In the future, Project Well hopes to improve participation levels in the program and will bring the total dugwell count up to 50 in the coming year, in order to maintain a sustainable arsenic-safe water community program.

Further Reading: Recent Publications

1. Smith AH, Smith MM. Arsenic drinking water regulations in developing countries with extensive exposure. *Toxicology*. 2004. 198(1-3):39-44.II

2. Xavier S, Hira Smith MM, Yuan Y, Khan DK, Chakravarti P, Hore T, Hira A, Smith AH. The one year monitoring program updates of shallow dugwells to provide arsenic-safe water in West Bengal, India. Abstract. Posted on March 25, 2004.

3. Smith, MMH. Field observations of alternate sources of drinking water in the arsenic affected village, Kamdebkati, in West Bengal, India, and recommendations. Posted on March 27, 2004.

4. Smith, MMH. Interesting findings after dredging and Field Report for April/ May 2004. Posted on May 2004.

More information, including field and dugwell reports, articles, and links to arsenic resource, can be found at www.projectwellusa.org

Top: A woman takes water from PW 34/ RND2 (Sponsor: Dr. Ajay Basu and family). **Middle:** Two women collect water from near PW23/RH2 (Sponsor: Mr. Som Konar and family). **Bottom:** Project Well field workers (indicated by arrows)

Skin pigmentation changes (melanosis) on the chest of 12 year old boy.

Gangrene development on a finger. Abutahir Mondol of Chandalati, Deganga block.

Chronic Arsenic Exposure: Health Effects

Some symptoms of long-term arsenic exposure include:

- Skin Effects - pigmentation changes, keratosis, cancer
- Vascular Disease - peripheral vascular disease,
- Blackfoot disease, and cerebrovascular disease
- Cardiovascular Disease
- Cancers - lung, kidney, bladder, and liver cancers
- Hypertension
- Diabetes Mellitus
- Possible Neurological Effects

Arsenic Factsheet

- Arsenic-contaminated water can be found in >30 countries
- In India, arsenic is mainly found in West Bengal, Bihar, and Uttar Pradesh
- In Bangladesh, 59 districts out of 64 are arsenic-afflicted
- In West Bengal, 9 out of 18 districts are arsenic-afflicted (as of 2001)
- Population living in arsenic-afflicted West Bengal: > 42 million
- Population drinking water with arsenic concentrations greater than 0.05 mg/L (Indian standard): > 6 million
- Number of villages affected: 2700
- Number of people with arsenic skin lesions: >300,000
- These numbers are growing each day

Dorsal keratosis. Srimati Kamala Dhali, 40, of Kamdebkati
(Source: Mr. Xavier Savarimuthu SJ, 2004)

Map of arsenic-afflicted areas and Project Well's sites

Above: Gangrene of the foot. Srimati Kamala Dhali, 40, of Kamdebkati. (Source: Mr. Xavier Savarimuthu SJ, 2004). **Right top**: Sri Nibash Ray of Simulpur (Habra Block) who has had his right arm amputated due to chronic arsenic exposure (Source: Xavier Savarimuthu SJ). **Right middle:** PW 29/CHNDP2 in Chondipur.

Arsenic in Drinking Water

- The most common and significant route of arsenic exposure is through the ingestion of water contaminated with arsenic concentrations of greater than the Indian standard of 0.05 mg/L or the WHO recommendation of 0.01 mg/L.
- Because arsenic is colorless and odorless, it is impossible to detect by the user.
- Boiling water does not get rid of arsenic.
- Eating foods cooked in arsenic contaminated water can be a significant route of exposure, so it suggested that food be prepared using safe water.
- Susceptibility to arsenicosis depends on the amount of contaminated water consumed, the length of time the water has been consumed, and the concentration of arsenic in the water.
- Symptoms of chronic arsenic poisoning can take years to develop and a person can drink contaminated water and not look or feel sick right away. This makes it difficult to diagnose, but some typical manifestations are shown and described here.
- Other health factors, such as malnutrition, may have a synergistic, worsening effect.
- There is **no** effective treatment for diseases caused by arsenic.
- Therefore, it is necessary for the complete cessation of ingesting arsenic-contaminated water.
- Arsenicosis is not contagious and people cannot contract it by touching or embracing.

Water from a Project Well dugwell is naturally low in arsenic concentrations and is a safe, alternative source to use for drinking and cooking purposes

Dugwell Maintenance

The Project Well program becomes sustainable by encouraging communities to take "ownership" of the dugwell by:

- Formation of a user group of 20 families, including a beneficiary committee of three.
- Contributions of Rs.10/- from each family for the maintenance program.
- Selection of one or two person(s) for training to measure the volume of water every month and apply the **bacteria-killing disinfectant**.
- Assigning of one person who would be responsible for collecting the maintenance fund from the users and deposit into a local bank account using the dugwell ID number. There should be 3 signatories in the bank.
- Yearly testing of water for arsenic in the month of March/April.
- Yearly testing of water for bacteria in the month of July/August.
- If necessary, dredging of wells in early February/ March to avoid dugwells drying in the summer season.

Note: If there is any odor of theoline, organic matter, or excess iron and salty taste, use of Mawtka filter (Rs.60 to Rs.400 and locally available) is advisable **(see picture, right).**

PW7/KDK5 near Mogra, which serves 20 beneficiary families with 112 consumers

Project Well's Approach

Project Well provides support for arsenic-afflicted communities by:

- Constructing dugwells to provide arsenic-safe water for drinking and cooking
- Holding awareness workshops, campaigning, and monitoring user habits until sustainable practices are established
- Helping form user committees and providing training, education, and support for community members in dug well maintenance

The goal is to encourage communities to take an active role in their personal welfare by developing healthy practices.

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Laboratories

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School of Environmental Studies (SOES), Jadavpur University, Kolkata, India

Support Project Well!

Adoption of one dugwell is $250
(all donations are tax-deductible)

☐ $1000 - Gold star ☐ $100 ☐ $10

☐ $500 - Silver star ☐ $50 ☐ Other Amount $ _____

☐ $250- Bronze star ☐ $25

Please make checks payable to: Project Well

Send checks to Project Well
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