



Arsenic plagues wells throughout Vietnam

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Children play with water in

an arsenic-contaminated well in An Giang Province in the Mekong

Phan Cong Tai had to dig deep two years back.

He was pulling unclean water out of his well which was located just 16 meters underground. Tai drilled 200 meters into the ground before the water came up clean.

The farmer says he was unaware of severe arsenic contamination in groundwater until inspectors from the Dong Thap Province Department of Natural Resources and Environment visited the Binh Phu Commune in Tan Hong District.

"After that, I had my well water tested. It tested negative for arsenic. But most other wells in the district are much shallower and many produce arsenic-laden water," he said, adding that he had seen an unusually high number of cancer cases lately.

"Between five and ten people from each neighborhood in the area have cancer," he told *Thanh Nien Weekly* on the phone.

This year, the Ministry of Health estimated that 21 percent of Vietnamese drink and cook with water containing unsafe levels of the element. Arsenic poisoning, they say, is increasingly becoming a health concern.

Last month, the Tan Hong District Medical Center reported "a very high proportion" of the area's 5,000 wells contained high concentrations of arsenic.

Tan Hong is not alone.

Six years ago, wide-scale contamination was discovered in wells around the Mekong and Red River deltas. Since then, experts have called for the government to take further steps to prevent rural residents from drinking, cooking, and bathing in the contaminated groundwater.

Chronic arsenic poisoning has been linked to cardiovascular diseases, skin lesions and numerous forms of cancer. These diseases may take years to manifest. And, while the symptoms of arsenic poisoning are treatable in the short-term, there is no way to reverse its long-term affects.

Trouble on tap

A team of Swiss scientists studying arsenic concentrations in the region have attributed the high concentrations of arsenic in wells around Burmese, Vietnamese and Bangladeshi river deltas to a phenomenon that began around 10,000 years ago.

Michael Berg, PhD, of the Swiss Federal Institute of Aquatic Science and Technology has conducted extensive research on arsenic levels in and around wells in Vietnam. Berg and his team first discovered the high levels of contamination in Northern Vietnam in a study conducted in 2001 "at that time, few cases of related diseases had been reported.

He offered the following explanation for the recent rise of the cancer-causing metal in local drinking water:

Geologically speaking, these rivers are very young and still packed with decaying organic material. As the material breaks down, it saps the soil of oxygen.

Arsenic, an element found everywhere in the world, binds with iron. When oxygen disappears from the water, iron begins to break down and arsenic dissolves into the water.

Berg said that, traditionally, many people in rural Asia relied on large open ponds for communal water use that included bathing, toilet use and drinking.

100 years ago, when the link between bacteria and illness was discovered, many rural Vietnamese turned to naturally filtered groundwater.

"They made so-called "dug wells," Berg said. "You just dig until you hit water. They had a diameter of one meter and [the farmers] used a bucket to get the water."

These open systems of water were always exposed to the air which proved a double-edged sword. The oxygen kept the arsenic from dissolving but it also, occasionally, contaminated the water with pathogens.

In the early 90s, Berg says, people started creating "closed tube" systems, like farmer Tai's new well. Many INGOs urged farmers and local governments in Southeast Asia to create tube wells, in which a narrow pipe is inserted deep into the ground until clean water came up. Few people

bothered to test this water for arsenic.

"Finally, you have a very closed system with no contact with oxygen or pathogens," Berg said.

In 1982, a project to install tubewells in rural Vietnam was carried out by the Vietnamese government under the sponsorship of UNICEF in a bid to solve demand for clean water. Most residents then collected rain water or relied on surface water for cleaning and drinking.

In 1998, Berg and his team began their research here and discovered startling levels of arsenic in these wells.

Depending on the concentration in the water, it can take about ten years for users of arsenic-added water to become chronically ill, Berg says. In this way, the effects of these new systems of drinking water are just starting to rear their ugly heads.

He has found that the use of sand filters, which can be made cheaply using cheap, natural materials can help reduce arsenic levels by, on average, 80 percent.

"But if you're starting with water that contains 1,000 times more arsenic than is recommended," he said. "You end up with water that is 200 times over the limit."

Emerging killer

Professor Nguyen Khac Hai, chairman of the National Institute of Occupational and Environmental Health's Science Council, said that studies conducted over the past 20 years found significant arsenic contamination in groundwater in the Red River and Mekong deltas.

"Recent tests found concentrations of arsenic in groundwater in An Giang and Dong Thap [in the Mekong Delta] up to hundreds of times higher than the recommended level," he told *Thanh Nien Weekly*.

An Giang's Provincial Department of Natural Resources and Environment discovered about 1,500 wells contaminated with high levels of arsenic this July.

The World Health Organization (WHO) recommends a limit of 0.01 milligrams of arsenic per liter of drinking water. Since 2006, the United Nations body has warned against arsenic contamination in groundwater in Vietnam.

"Arsenic in groundwater is an emerging problem in Vietnam," WHO researchers warned in their report. "The Red River Delta in Hanoi has geology similar to that found in Bangladesh."

The problem there has only got worse. A study published in the *Lancet* this June linked arsenic to one in five deaths in Bangladesh.

"The Red River Delta potentially exposes over 11 million people to elevated levels of arsenic and similar geological conditions exist elsewhere in the country including the highly populated Mekong Delta," the WHO authors stated in their report.

Berg said that, in rare and the most extreme cases, wells in the Red River Delta yielded samples containing 3,000 parts per million of arsenic - or three grams per liter.

The long road to clean water

Prof. Hai of the National Institute of Occupational and Environmental Health said that concerned

agencies have taken several steps in tackling the problem. They have begun mapping the country's arsenic contaminated areas and they are currently conducting research on treatment methodology.

So far, he said, no effective treatment has been discovered and the best way to prevent harmful health effects is to cease the use of tainted water for everything from bathing to drinking.

"Ceasing the use of arsenic-polluted water is the best and only way to prevent contracting related diseases or worsening one's condition after contracting such an illness," he said.

He also advised intensive research on filtering polluted water for household use as an emergency measure before installing community-wide plumbing systems, especially those in the rural areas.

A recent study by the National Institute of Occupational and Environmental Health found that nearly half of the groundwater from household wells in the Red River Delta contained high levels of arsenic. The study results, which were announced in June, were derived from surveys conducted in Hanoi, Vinh Phuc, Bac Ninh, Hung Yen, Ha Nam, Thai Binh and Nam Dinh.

Hai, who leads the researchers, said that nearly all of the families that participated in the survey had attempted to use sand filters. Hai found that 63.5 percent of the filtered samples were discovered to contain arsenic exceeding 10 micrograms per liter.

In a recent effort to reduce arsenic contamination in well water, An Giang authorities have pledged to fill in more than 1,000 polluted wells in the province and hook up pipe and filtration systems to affected households.

Dr. Berg remained confident that Vietnam is taking appropriate steps to mitigate the problem, which he feels can only be addressed by centralized treatment facilities connected to household users with plumbing systems.

"In Vietnam, people don't wait for things to happen," Dr. Berg said. "They act."

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