

Arsenic's fatal legacy grows worldwide

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Fred Pearce, New scientist

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The growing trend around the world to drink water from underground sources is causing a global epidemic of arsenic poisoning. Tens of thousands of people have developed skin lesions, cancers and other symptoms, and many have died. Hundreds of millions are now thought to be at serious risk.

The latest evidence comes from the valley of the river Ganges in India, one of the most heavily populated areas on the planet. High levels of arsenic in groundwater were once believed to be confined to an area around the river delta, and Bangladesh in particular.

But a new study by a leading expert shows arsenic has invaded the valley all the way to the Himalayas, an area that is home to half a billion people. And a new survey to be published this October reveals that arsenic is more widespread than previously imagined (see map).



Jack Ng of the University of Queensland, Australia has found that people are at serious risk in 17 countries around the world - including China, Vietnam, Argentina and the US, where many communities are failing to meet new health limits set by the World Health Organization (*Chemoscope*, vol 52, p 1353).

Mass poisoning

The revelations come as efforts to find and replace millions of poisoned tube wells are making little headway in Bangladesh, where an estimated 50 million people are at risk in what the WHO calls the world's worst mass poisoning disaster.

It emerged in July that the Bangladeshi government has spent less than \$7 million of the \$32 million given by the World Bank in 1998 for an immediate clean-up. Bank officials have now ordered the government to hand over the cash to affected villages.

Tube wells

The new focus of concern is Bihar, an Indian state that is home to 83 million people upstream of the Ganges delta. In northern India, 80 per cent of the population drink water from underground sources, mostly from simple hand-pumped tube wells sunk in the past 30 years to replace polluted surface water supplies. Most tube wells have never been tested for arsenic.

In 2002, Kuneshwar Ojha, a schoolteacher living close to the river, became very concerned after his wife and mother died of liver cancer and other family members developed skin lesions.

He took water samples from the family tube well to Dipankar Chakraborti, director of environmental studies at Jadavpur University in Calcutta, who originally uncovered the mass arsenic poisoning on the Ganges delta (**New Scientist** print edition, 16 September 1995).

Chakraborti confirmed high concentrations of arsenic in the sample, and enquiries revealed that 18 young people had died from apparently arsenic-related illnesses in the village of Semria Ojha Patti in the past five years, and a hundred more were sick with early symptoms, such as skin lesions.

The only fit people were the Dalits, or untouchables, who because of their lowly status were not allowed to drink water from village tube wells.

Since then, hundreds of similar cases have emerged in the district, and the authorities have banned people from using many tube wells. Parts of Semria Ojha Patti are now abandoned.

Over the limit

In July, Chakraborti reported that more than half of 200 wells surveyed around Semria Ojha Patti contained levels of arsenic above the government limit of 50 micrograms per litre, which is itself five times the WHO limit (*Environmental Health Perspectives*, vol 111, p 1194). This is a higher proportion than in Bangladesh, he says. But it remained unclear whether the poisoning is more widespread.

This week, Chakraborti told **New Scientist** that a new survey of 3000 tube wells, completed only days ago in a wide area of Bihar, has found that arsenic levels in 40 per cent of them exceed the WHO limit, and 12 contain water at more than 20 times the limit. More than half of adults examined show symptoms of arsenic poisoning.

"The same pattern we saw in Bangladesh is being repeated," Chakraborti says. "There, we began with the discovery of three villages. Now thousands are known to be affected and more are being discovered all the time. Our early warnings were ignored then. Now we are warning about Bihar. We feel that this is just the tip of the iceberg."

Earlier in 2002, doctors in Nepal also warned that 10 million people in the Terai plain, part of the upper Ganges valley, may be drinking contaminated water. Many already have symptoms of arsenic poisoning.

Chakraborti says large proportions of the half a billion people living on the plain, from crowded northern India to the delta region of Bangladesh could be at risk. Because the poison only builds up slowly in the body, every year of extra exposure increases the risk.

Deadly deposits

In most of these areas, few people drank groundwater until around 20 years ago, when aid agencies began promoting it as a safe reliable source of drinking water to replace surface water contaminated with sewage.

But rivers leach arsenic from mountains and often deposit it slowly in silts beneath major rivers. Typically, high levels dissolve in underground water when the local chemistry leads to reducing conditions. The British Geological Survey is being sued in the UK courts for failing to spot arsenic in a survey of Bangladeshi groundwater a decade ago.

Vietnam is also facing its own arsenic crisis. Recent tests by Michael Berg at the Swiss Federal Institute for Environmental Science in Duebendorf show that groundwater from tube wells sunk beneath the Red river delta, home to 11 million people, including the capital Hanoi, contain arsenic levels up to 300 times the WHO safe limit. Symptoms of arsenic poison could soon emerge, says Berg, as people accumulate poisons from tube wells first installed seven years ago.