



[Vol. 21, No. 2 \(July 1993\)](#)

Water Without Arsenic

by John Eberlee

The altiplano plateau of northeastern Chile is a sparsely populated, desolate area. What little water can be found contains high levels of arsenic, a poisonous element that leaches out of the plateau's volcanic soils.

With no water treatment plants serving the region, local residents drink water containing levels of arsenic up to 200 times higher than the maximum recommended by international guidelines.

But in some quarters, arsenic exposure is decreasing. As a result of a project funded by IDRC, school children there are now drinking safer water that has more acceptable levels of the element. They are the beneficiaries of a portable arsenic filtration device developed in the project led by Dr Ana Maria Sancha at the University of Chile and tested with the help of Canadian researchers.

"It costs only four dollars a month to use and generates around 200 litres of water per day," says Jean-Charles Meranger, a chemist at Health and Welfare Canada. "It's a very simple system that school teachers can operate." The device features iron scrubbing pads, located in plastic tubes, that precipitate out dissolved arsenic. Over an eight-hour period, the filtration device can remove up to 96% of the arsenic in a sample of contaminated water -- becoming less efficient the longer it is used, notes Mr Meranger.

Mr Meranger taught instrument-based analytical techniques for measuring arsenic levels to Chilean chemists, who then used their new skills to evaluate the arsenic filtration device. The team also examined the arsenic content of foods and soils in different communities to identify other potential sources of arsenic contamination.

REGIONAL CENTRE

This research was extremely sensitive to small errors, says Mr Meranger. For example, even washing vegetables before analysis presented difficulties. "The arsenic content of the water was so high it actually contaminated the samples," he says. By mastering such challenges, the Chilean team has become a regional reference centre for arsenic determination.

The project also collected detailed information on the health effects of arsenic exposure. A total of 700 people from areas contaminated with arsenic were compared to 175 individuals from a community with relatively safe drinking water. All the participants were interviewed and hair and urine samples were taken to measure their arsenic levels.

Among the group exposed to arsenic, common symptoms of illness included darkened and discoloured skin and scaly lesions on the hands and feet. There was also a high incidence of skin cancer, says Bette Meek, a Health and Welfare toxicologist who helped design the survey. According to Ms Meek, this information is useful not only for health care professionals in Chile but for researchers in other countries, including Canada, who are currently establishing new arsenic guidelines.

"There's been quite a lot of debate lately concerning how much arsenic is too much," she says. "In Canada, there have been a few instances of arsenic contamination, but we don't have any population exposed to the same degree as in Chile. The Chilean data should help us settle the question."

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ISSN 0315-9981. This magazine is listed in the Canadian Magazine Index.

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