Delivering Safe Water Supplies in Arsenic-Contaminated Areas: A Study from Vietnam

Arsenic in drinking water is a significant public health risk in certain areas of Vietnam, where up to one million people are thought to be at risk of contracting illnesses and other health problems due to arsenic exposure. To help policy makers to develop an effective approach to deal with this important challenge, a new EEPSEA study has looked at the levels of awareness that exist about arsenic pollution in areas where this problem is acute. The study also assessed the factors that stand in the way of households from getting connections to clean and safe piped water supplies.

The study is the work of Le Ha Thanh, Pham Hong Chuong, Trinh Nam Anh, and Le Thai Ha from the National Economics University. The team found that there are a number of barriers stopping households from connecting to safe piped water supplies. These include high connection fees, a lack of awareness about arsenic pollution, and the poor quality of some piped water supplies. Their report outlines a number of key policy recommendations to tackle these issues, including connection subsidies and awareness-raising programs. Overall, it recommends implementing a multi-stakeholder approach to ensure that no households are affected by arsenic poisoning.

A summary of EEPSEA Research Report No. 2017-RR1: "Households' Perception of Arsenic-Contaminated Water and Determinants of Piped Water Connection in Arsenic-Contaminated Areas inthe Red River Delta, Vietnam," by Le Ha Thanh, Pham Hong Chuong, Trinh Nam Anh, and Le Thai Ha.
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The arsenic pollution challenge

Arsenic pollution in drinking water is a problem that came to prominence in Vietnam in the mid-1990s. At this time, the rural population began to change the source of their drinking water from surface water, which was often contaminated by pathogenic bacteria, to pathogen-free groundwater. Unfortunately, survey studies have since revealed that arsenic contamination of groundwater is widespread in Vietnam.

The Red River Delta (RRD) in Northern Vietnam is the region of the country that is most badly affected by arsenic contamination. The provinces in the delta that have the worst arsenic pollution are Ha Nam, Nam Dinh, and Ha Noi, which are all situated along the Red River. According to recent surveys, the arsenic concentration of around half of the tube wells in Ha Nam province is above 50 µg/l. This is significantly above safe level of 10 µg/l prescribed by the World Health Organization.

The problem with arsenic

The toxic properties of arsenic have been known for centuries. The presence of arsenic in drinking water is considered to be one of the most significant environmental causes of cancer in the world. Long-term exposure to high levels of arsenic leads to a wide range of other health problems that include arsenic poisoning, cardiovascular disease, neuropathy, and gangrene.

To date, approximately 30 cases of arsenic poisoning (arsenicosis) have been identified in Vietnam, with two of these cases occurring in Ha Nam province. This is a relatively low number of cases in comparison with other countries that are affected by arsenic contamination. However, this situation may be because tube wells have only been introduced recently in Vietnam. It can take 10 years or longer before the first arsenic poisoning symptoms become apparent when people use water from contaminated wells. Hence, current arsenic-linked health problems in Vietnam are most likely to be only the tip of the iceberg.

The government's response

The Vietnamese government recognizes that arsenic contamination of groundwater causes serious environmental problems, and that it has serious negative health effects. In recent years, several programs and initiatives have been initiated by government agencies to address the problem of arsenic in drinking water.

The government's favored solution is to provide households with safe piped water from centralized water treatment plants. This is thought to be the best and most sustainable solution, especially in the rural areas. However, as is the case in many developing countries, government plans have, so far, have mainly focused on solving engineering challenges and have neglected the needs of end users.

To provide policy makers with the information they need to address the arsenic pollution challenge, the EEPSEA study aimed to understand the perception of arsenic contamination amongst local people in the RRD. It also set out to identify the factors determine whether households have piped water connections or not.

Getting the information required

The study used information from a field survey of 443 households in Ha Nam province. It also used relevant statistical data, policy documents, and literature reviews. The researchers targeted

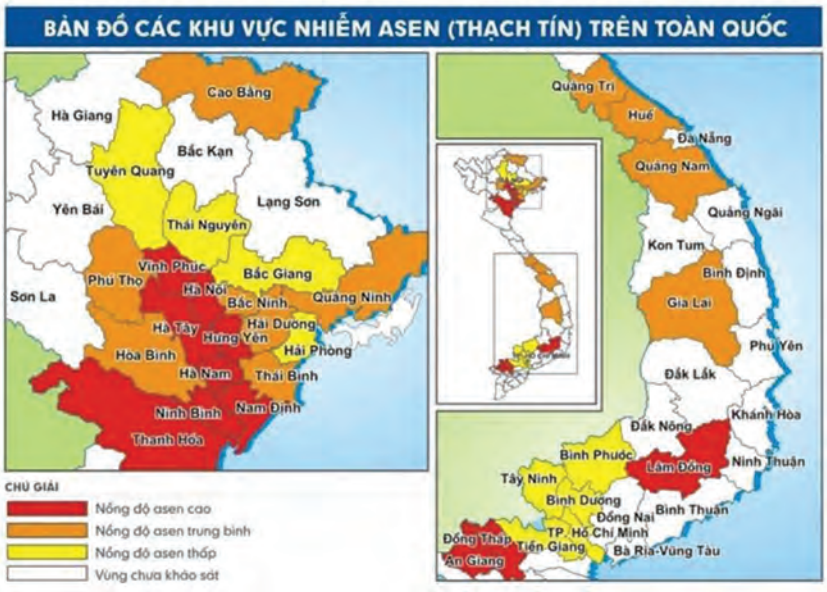

Figure. Vietnam arsenic map
Source: MoNRE (2009)

two districts in Ha Nam province, namely, Duy Tien and Binh Luc. Both districts have been identified as arsenic hotspots. According to the MONRE/UNICEF surveys, the concentration of arsenic in drinking water in Binh Luc and Duy Tien is 30–40 times higher than the acceptable level specified by Vietnam's national technical regulation on drinking water quality.

Households in both districts use a number of different sources of water including piped water, tube well water, and rainwater. Some households in the districts are connected to a piped water system and some are not.

The study team used a questionnaire to obtain qualitative information on people's perception of and attitudes toward arsenic contamination. The questionnaire was also used to collect information about households' water use practices and the factors affecting their connection decisions (i.e.,the decision whether to connect to a piped water system or not). In addition, the questionnaire collected information about the socioeconomic characteristics of all respondents.

Household awareness of the arsenic problems

Most of the respondents in Ha Nam province are aware of general environmental issues. They are also aware that the groundwater in their communes is contaminated with arsenic.

Nearly one-half of respondents recognize arsenic as a threat to their family's health and feel that it was extremely important to take action to ensure that their communes receive a safe supply of water. However, in general, most of the respondents do not have any in-depth knowledge about the arsenic pollution issue and about the long-term health effects of consuming arsenic contaminated water.

Table 1. Arsenic awareness index

Index	Not Connected		Connected		Total Sample	
	Number	Percentage	Number	Percentage	Number	Percentage
1	14	11.7	0	0.0	14	3.2
2	25	20.8	56	17.3	81	18.3
3	32	26.7	84	26.0	116	26.2
4	35	29.2	78	24.1	113	25.5
5	11	9.2	57	17.6	68	15.3
6	2	1.7	35	10.8	37	8.4
7	0	0.0	10	3.1	10	2.3
8	1	0.8	2	0.6	3	0.7
9	0	0.0	1	0.3	1	0.2
10	0	0.0	0	0.0	0	0.0
Total	120	100.0	323	100.0	443	100.0

The study shows that public awareness of the arsenic issue differs between locations, and that it is affected by a household's demographic make-up. For example, households that are connected to a piped water supply are more aware of arsenic pollution than those that are not connected. Meanwhile, older people are more concerned about arsenic-contaminated water than those from the younger generation.

Survey results show that 38.5% of the respondents had checked their drinking water in the last 12 months and had taken measures to protect themselves from arsenic contamination. However, only a few of these people believed that their actions had been effective.

Perceptions of water supply options

Rainwater serves as the main source of drinking water for the majority of households (93%) that took part in the survey. Households also use tube well water, piped water, and a number of other sources. The majority of the households in the survey area use tube well water for cooking and washing, while around 38% of connected households in the sample use piped water for these purposes.

Households use rainwater because of its good taste, color, quality, and low cost. Respondents think that piped water has less arsenic and bacteriological contamination than tube-well water does. They also think that piped water is more convenient.

On the other hand, one-third of the respondents were concerned that piped water is of poor quality and is expensive. The lack of a 24-hour piped water service was also cited as another issue that counted against the use of this type of water supply.

Many other factors affect households' decisions on whether to connect to a piped water supply or not. The higher a household's awareness of the arsenic pollution issue, the more likely they are to get connected. Households with larger expenditure levels are also more likely to get connected, while higher connection fees make it less likely that a household will get a piped water connection.

Awareness-raising and information dissemination

In light of its findings, the study recommends that awareness-raising should be the starting point of any approach to deal with Vietnam's arsenic pollution problem. Special attention should be paid to information and communication programs.

Given the different levels of awareness of arsenic poisoning among the different parts of society, it is strongly recommended that any awareness-raising campaign should target young people and those belonging to households without access to piped water.

Another important aspect of awareness-raising is the dissemination of information to key stakeholders. It will be vital to ensure that information is delivered in an effective way and that it is easy to understand. Openness and transparency will increase trust between the public and government agencies.

Providing connection subsidies and improving water quality

The study shows that high connection fees are a major obstacle standing in the way of households from getting linked to piped water supplies. In light of this, poor and low-income households will need financial support. This will be especially important if connection to a piped supply is made compulsory.

A connection subsidy scheme should therefore be set up as an important step in the process of providing safe water to all households. Once the connection subsidy scheme is approved, the main obstacle for government agencies will be the lack of adequate resources. Establishing a dedicated connection fund is one possible solution to this problem.

The study shows that some households do not use piped water for drinking as it is perceived to be of poor quality. Improving the quality of piped water supplies should therefore be an important aspect of any future policy. Without improvements in the quality of piped water and water services, households may not choose piped water over water sourced from tube wells.

A multi-stakeholder approach

One way forward is to use a multi-stakeholder approach by brining together all major stakeholders to consult and make decisions. It should be based on the recognition of the importance of equity and accountability amongst all stakeholders.

In the case of safe water provision in Vietnam, key stakeholders should include the government, the public and private sectors, international donors, the mass media, and local people.

Government agencies such as the Ministry of Health, the Ministry of Agriculture and Rural Development, and the Ministry of Science and Technology should work together to introduce new technologies, regulations, and quality standards; to facilitate information exchange; and to provide financial assistance. Likewise, the participation of the private sector should be welcomed in order to expand services and introduce fair competition.

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