ARSENIC IN DOMESTIC WATER SOURCES: THE HUMAN SIDE OF THE BANGLADESH AND WEST BENGAL CRISIS

Suzanne Hanchett, Ph.D, Planning Alternatives for Change, LLC[1]
Guy Howard, Ph.D., Department for International Development, United Kingdom

[unpublished manuscript, written in 2005]

Abstract

This paper reviews the social issues associated with arsenic contamination of drinking water and mitigation programmes in Bangladesh and West Bengal. Poor people are more likely to be susceptible to arsenic related illnesses and suffer significant social and economic consequences if they develop arsenicosis. Awareness of arsenic is relatively good. People have become aware of arsenic through a variety of means, although educated people tend to know more about the arsenic problem than uneducated. Referring to arsenic as a 'poison' may cause confusion. The idea that arsenic poisoning symptoms are contagious is widespread; public education programs appear to help people understand that they are not. Because of differences in social status, affected women are less likely to receive health care than men; and girls with arsenicosis appear to have greater difficulty getting married than boys. Introducing new technologies to arsenic affected communities is as much a social exercise as a technical one, but mitigation projects have not been as successful with water management group formation as they claim, with the result that some safe water options are not maintained. In Bangladesh villages, people of different socioeconomic levels respond differently to the various safe water options on offer through mitigation projects. Poor people need community-managed options more than others. There is a need for further research on why people do or do not change water sources when they learn that their usual sources are contaminated with arsenic. Areas of mitigation programme planning generally needing further review and improvement are: cost sharing arrangements,

more involvement of women in planning mitigation options, and a greater role for local government institutions. Future projects should be more sensitive to the social factors influencing people's awareness and their receptivity to mitigation options.

Introduction

High concentrations of arsenic in drinking water have created a serious public health problem in Bangladesh and in West Bengal, India. The numbers of people affected in Bangladesh remain uncertain, but it is now generally agreed that between 20-25 million people are at risk of exposure to arsenic, meaning they drink or cook with tube well water containing over 50 μg/l of arsenic, which is the Bangladesh standard. Many more would be at risk of exposure to arsenic above the provisional WHO Guideline Value of 10 μg/l. Around 14 million people in eight districts of West Bengal are at risk of exposure (UNICEF, 2004). The problem can be traced back to the 1970s, when donors and governments began promoting and subsidising use of pathogen-free groundwater for all domestic purposes. At least 10 million tube wells, tapping underground aquifers, subsequently were installed in Bangladesh alone, about 1.3 million from projects supported by government, donors and NGOs. Water from these tube wells helped to reduce incidence of water-borne diseases, as people stopped drinking surface and dug well water. Those promoting the use of tube wells, however, overlooked the need to check the new water sources for chemical contaminants. It was only in the mid-1980s that tube well water was tested and large numbers of tube wells in West Bengal were found to have unacceptably high levels of arsenic. Bangladesh authorities officially recognised the same problem in 1993, with detection of arsenic in tube-wells in the north-west of the country (United Nations Foundation, 1999).

Chronic arsenic poisoning causes skin discolouration, skin lesions, calluses on palms of hands and soles of feet; and it can lead to cancers of the skin, lung and bladder. The epidemiology of arsenicosis remains only partly understood. There is no proven treatment that

reverses the symptoms apart from cessation of drinking contaminated water. The use of vitamins is known to reduce susceptibility, and vitamins and anti-oxidants promote greater excretion of arsenic. Very serious conditions require services of specialists and tertiary care facilities available only in large metropolitan centres.

Both rural and urban communities are affected, with the problem being most acute and widespread in urban fringe and rural areas lacking piped water systems. Recent estimates indicate that about 17% of all shallow tube wells in Bangladesh have an arsenic content exceeding the standard of 50μg/l (NAMIC, 2005). Previous surveys suggest that about 46% of tube wells would exceed the provisional WHO Guideline value of 10μg/l. When tube wells were tested in Bangladesh, those that had arsenic in excess of the national standard were painted red and those with arsenic content less than the national standard were painted green. In West Bengal only those tube-wells exceeding the Indian standard of 50 μg/l were painted (red).

Much work has gone into development of arsenic-removal technologies and identification of alternative water sources. The most popular solution to the problem is the hand-pumped 'deep' tube well. Such tube wells exploit older (Pleistocene) aquifers, the water of which has little or no arsenic. Another option, widely used in West Bengal, is to install one of several different types of arsenic removal units on tube wells. Revival of the traditional but easily-polluted dug well is another approach found in both countries. Surface water is abundant in this region at certain times of year, but it tends to be polluted. Various treatment and filtration systems are in use, the most popular being the pond or river sand filter. A sand filter system needs careful maintenance by a trained caretaker, as does an arsenic removal unit. Another frequently chosen option is a rainwater harvesting system, usually suitable for use by only one or

two households at most, but occasionally designed for communal use. Most rain water harvesting systems are currently marketed at prices poor people find unaffordable.

The Need for a Social Perspective

Public information campaigns began in Bangladesh only at the end of the 1990s. One study of an early campaign found it to be effective but not to a degree sufficient to eliminate the public health risk posed by arsenic (Hanchett et al., 2002). By 2005 efforts to identify patients, train health personnel, and systematically promote alternative water sources became significantly better organised.

Arsenic mitigation projects are conducted (almost exclusively in rural areas) by both governmental and non-governmental (NGO) organisations. Progress with provision of arsenic-free water supplies in Bangladesh has been relatively slow, but now shows signs of increasing (APSU 2005). Such projects in both Bangladesh and India have shown that change comes slowly and with difficulty. The problems are both technical and social. A recent report described coping strategies of affected peoples (Hassan et al., 2005).

Introducing the public to new, arsenic-free water sources is not a simple process, as Everts has said, 'Technology transfer' is not simply 'bringing a machine to another place'. Technology transfer is bringing the machine tool plus bringing or creating the necessary organization, information and human context, without which the machine is nothing.…' (Tomizawa, 2001:17, quoting Everts, 1998).

One study mentions the 'Gap between perceived needs of the people and approaches of implementing agencies' as a major factor impeding the progress of arsenic mitigation projects

(Majumder & Kahali 2003). The points covered in this paper are meant to define the nature of the gap and help identify ways to enhance social credibility of mitigation projects.

Most of the leadership on the arsenic issue is coming from engineers. Much more is known about the chemistry of arsenic than about the human interactions and socio-economic factors at play in arsenic-affected communities. This paper discusses social aspects of the arsenic problem and attempts to solve it.

Our primary sources of information on social issues are: (a) a social acceptability survey in Bangladesh conducted as part of a broader risk assessment exercise funded by the Government of Bangladesh Arsenic Policy Support Unit/APSU (Ahmed et al., 2005); (b) interviews with approximately 55 professionals working on the arsenic problem in both Bangladesh and West Bengal in June 2004; and (c) a literature review. Relevant findings from the 'grey literature' of project reports and other unpublished manuscripts not easily accessible to the general reader are presented. Some of the sociological information presented is inconclusive, as no fully definitive study ever has been done of this topic.

Social Issues Related to Health and Health Care

Given the limited capacity of rural and small town health services in both countries and the lack of surveillance data, it is not possible to say accurately how many people currently suffer from arsenic-related illnesses in West Bengal and Bangladesh. In Bangladesh, 40,000 arsenicosis patients were identified in a recent mass screening programme, but this data is considered unreliable because of methodological weakness in the data collection. Epidemiological studies to date have shown that 1) Poor people are more likely than non-poor to be affected by arsenic-related disorders, presumably because of their poorer nutrition levels

(Milton et al., 2004); and 2) prevalence of skin lesions is higher among men than among women, as is prevalence of lung disease, when populations are exposed to concentrations of arsenic above 50 µ/l in their drinking water (Guha Mazumder et al., 2001; Rahman et al., 2006). Further study is needed of gender distribution of symptoms. There are anecdotal reports of depression and other mental health problems, including suicidal tendencies, among people with arsenic-related illnesses. Mental health issues need further study within the broader health and social context.

Although there has been considerable progress in both countries in training physicians to recognise and treat arsenic-related illnesses, the delivery of health care for arsenic-affected patients through both governmental and non-governmental health systems of both countries needs much improvement. Screening programmes have often include identification of patients with arsenic-related illness, although a common patient identification protocol has been lacking until recently. Overall, access to adequate health care is often limited and particular difficult for poor patients and women (APSU, 2006). Patient confidentiality is a concern raised in one evaluation study (United Nations Foundation, 2003).

People's Knowledge and Ideas About Arsenic

Information about the arsenic problem is not evenly distributed in the population. Educated people tend to know more than do the uneducated, a group that is almost entirely poor. Being more mobile, men seem to have access to more varied information sources than women do. Even in regions with generally satisfactory services and information programmes, there still are population pockets and remote villages where people know little or nothing about arsenic. Focus group discussions have shown that for many people 'arsenic' is a very abstract or remote

concept, since the chemical does not affect the taste, smell, or colour of water (Hanchett et al. 2002). The recent social acceptability survey found that one-quarter to one-third of respondents had heard of arsenic only within the previous two years, that is, since arsenic mitigation projects began their work in earnest (Ahmed et al., 2005).

Sources of Information

The most frequently mentioned sources of information among Bangladeshis are indicated in Table 1. One survey (Asian Development Bank, 2003) found that men were more likely than women to get information from television (60% vs. 54%) and radio (33% vs. 20%). An evaluation study in West Bengal found that word-of-mouth and NGO or governmental field staff were rural people's primary sources of information about arsenic (UNIDO, 2001).

Describing Arsenic as a 'Poison'

The great majority do not see arsenic as a poison (Asian Development Bank, 2003). This is despite the fact that it is common practice to explain to the public that arsenic is a 'poison', using the Bengali word *bish*. Some consider this to be a confusing message. One researcher argues that most people in Bangladesh think that 'poisons', such as pesticides, have distinctive smells and colour, and that a 'poison' kills quickly when ingested2. Staff of a cohort study-*cum*-mitigation project in Bangladesh avoid the word 'poison' in order to not frighten people. They prefer to explain the nature of arsenic in a way that makes sense locally. 'We use the colour sort of idea to explain about arsenic in water. We say it's like colour, fertilizer, or pesticides', according to a senior staff member. As arsenic is an ingredient in some homeopathic medicines, they feel that referring to it as a 'poison' might create resentment3.

Other professionals mostly maintain the view that it is effective to use the word 'poison' in discussing arsenic. Several say, however, that they modify the description, referring to arsenic,

for example as ‘one type of poison’. It is difficult to translate the phrase ‘slow-acting poison’ into Bengali, although that is the expression that is needed (Hanchett, 2004).

Ideas About Contagion

Another standard message of public awareness campaigns is that arsenic-related illness is not contagious. This is important, as chronic arsenic poisoning may produce symptoms resembling leprosy. Ahmed et al. (2005) found that 97% of respondents considered the conditions to be contagious. According to the 2003 ADB Bangladesh survey, 47% of all respondents -- 53% of those living in rural areas -- considered arsenic-related illness to be contagious. Such beliefs cause emotional pain and interfere with normal social life, as several reports have mentioned (Asian Development Bank, 2003; Rosenboom, 2004; Hassan et al. 2005). Contagion beliefs also are reported from West Bengal, although the most thorough study from this area claims that, ‘...Arsenicosis is not perceived to be a contagious disease’ (UNIDO, 2001:52).

Even if they ‘know’ that arsenic-related illness is not contagious, people may be reluctant to touch, take food or water from, or share a bed with a person having symptoms of arsenic poisoning4; and high percentages express reluctance to form marital connections with families of arsenic patients (Rosenboom, 2004). Some people regard arsenic-related illness as a ‘curse of God’ (United Nations Foundation, 2003). The afflicted may be ostracised even in death. In one West Bengal case, for example, the body of a person who had died from an arsenic-related illness was not touched in a normal way during the funeral because of fears of contagion or curse5.

Awareness raising, done properly, certainly can help. For example, in one evaluation study it was found that an intensive public education programme had lessened the tendency to ostracise arsenicosis patients (United Nations Foundation, 2003). A lower proportion of households consider arsenic to contagious once people are exposed to intensive awareness programmes (Rosenboom, 2004; Sultana, 2006).

Arsenic and Social Structure

Status, Honour, and Shame

Social roles and relationships strongly affect people's receptivity to arsenic mitigation efforts. For example, there may be a degree of shame associated with a family's tube well water being known to be contaminated by arsenic. There are occasional reports of people removing the red colour from their tube wells after testing, in order to avoid having neighbours and potential in-laws know that their water sources are affected. One report mentions that owners of more than one tea-shop or restaurant 'were found erasing red paint of the tube wells, which were found [to be arsenic contaminated], and they marked those tube wells with green paints' (BRAC 2003).

Having an arsenic problem can stigmatise a family, a neighbourhood, or even a whole village. According to one programme staff member, in some places where arsenic awareness is raised, 'A girl's family is beginning to ask about arsenic in the prospective groom's home'. Another in the same group discussion added, 'We have seen whole communities shunned or excluded from society' (Hanchett, 2004; NAISU, July 2001).

Arsenicosis and Poverty

Not only are poor people more affected by arsenicosis than others; but also arsenic-related disorders cause economic damage, as the afflicted are increasingly unable to work or

have to change occupation with an often detrimental effect on their livelihood (Ahmed, 2002; APSU, 2006). In this, the social impact of arsenic resembles that of most water and sanitation illnesses and deaths. Many families are rendered destitute when their earning members die of arsenic-related disease.

Studies have shown that patients frequently struggle to attend sub-district health centres because of the costs involved in transport and in lost income (APSU, 2006). One expert working in the arsenic field finds that all too often, 'Even if they [risk death], the earning members won't come to Kolkata [for treatment in tertiary care facilities], because there wouldn't be anyone to support their families'6. A study in five upazilas (sub-districts) in Bangladesh showed that when women were patients, the costs were often doubled because a woman had to be accompanied by a male relative. Travel took longer because cultural norms demand women must sit separately from men; and if available women's space is taken, they have to wait for another bus (APSU, 2006). Once they reach the health centre, the care offered is often limited and expensive.

Impacts of Arsenic-related Illness on Females and Males

Male-female status differences lead to differences in social responses to men's or women's arsenic-related illnesses. As a consequence of their generally lower social status, women's needs for health care are taken less seriously by others, and at times even by women themselves. It is generally considered inappropriate in Bengali society for women to bother others with their health problems, even if they feel very ill. The cultural value, rather, is on women's attending carefully to others' health needs. In group discussions with arsenic experts, there was some disagreement as to whether women accept this cultural norm willingly, or

whether it is foisted upon them by relatives who do not want to be bothered escorting them to medical appointments (Hanchett, 2004).

Arsenic-affected women's difficulties with marriage arrangement or their being abandoned or divorced by their husbands are regularly mentioned in press reports and discussions among professionals. A serious but less frequently mentioned consequence for people with visible symptoms of arsenic poisoning is that they have difficulty finding or keeping jobs involving close contact with the people they work for, for instance, as maids or tailors (Hanchett, 2004). Other reports note that skilled professionals, such as plumbers, have had to leave their profession and take less well-paid occupations such as rickshaw-pulling because of the pain cause by their symptoms (APSU, 2006).

One field report on 13 arsenicosis patients in a specific mitigation project area mentions an important difference between family attitudes and community attitudes. The author states that, 'Unfortunately most [difficulties suffered by female arsenicosis patients come] from their own households. Community people are empathetic to the arsenicosis patients. But sometimes the husbands of the patients are not exactly as concerned or sympathetic as [they] should be' (Hassan, 2004; APSU, 2006). Hassan et al. (2005) also found cases of patients suffering from ostracism within their own families. These observations, if widely valid, pose a challenge to any awareness-raising programme. Even in a 'successful' awareness-raising programme social hierarchy and other status constraints may limit the extent to which people translate new knowledge into health-promoting actions.

An issue urgently needing investigation is the experience of adolescent or younger unmarried girls in highly affected areas. Anecdotal reports suggest that families want to hide

them from view and prevent anyone from learning that they have symptoms of arsenic related illness, so as not to jeopardise their marriage prospects. Unmarried girls and boys both have problems getting married if they are visibly ill; but there is more open discussion of girls' problems. It seems all too likely that, if arsenic consumption makes them ill, unmarried girls are even more likely than other females to be denied access to medical treatment.

Installation and Use of Alternative Water Sources

Selecting and Installing a New Water Source

Active participation of communities in water supply development and local assumption of long-term maintenance responsibility are widely recognised as essential to sustain community-based safe water supplies. Some studies have tried to assess the extent to which rural people in Bangladesh have in fact participated in the selection and installation of new water sources.

Site selection and choice of mitigation option are done in various ways. The most frequently mentioned procedure in Bangladesh is through consensus of users, but in many cases the process is either unclear or is dictated by local social arrangements. Pond sand filter (PSF) users, of course, have little flexibility in choice of location of the water point. The poor seldom, if ever, own ponds that may be used for PSFs. The socio-economic reality in Bangladesh invariably biases choice of location for the PSFs towards the rich (Ahmed et al., 2005).

Ahmed et al. (2005) found only 63% of dug well and deep tube well users knew that their new water point was installed because of arsenic contamination of existing tube wells, although 72% of pond sand filter users were aware of this. Others thought it was just another water point for people's use.

User Groups and Community Based Organisations (CBO)

Although formation of community groups to plan and manage alternative water points is an almost universal part of arsenic mitigation projects, Ahmed et al. (2005) found that the majority of Bangladesh user groups do not function, at least not at the initial stages, when a facility is first installed.

Such findings raise serious concerns about the long-term viability of alternative, arsenic-free water sources. User groups or CBOs formed to satisfy project requirements without a genuine, participatory process of consultation and consensus building tend to be short-lived. As might be expected, weak processes of CBO formations tend to result in poor maintenance of newly installed water points (Ahmed et al., 2005). However, this matter needs further investigation. One survey of the functional status of arsenic mitigation options in Bangladesh suggested that the presence of a committee was a less important determinant of the functional status of the water source than the activity level of the caretaker (Kabir and Howard, draft).

Problems with user groups or committees, while frequent, are not universal. One case study, for example, describes a situation in which women and men who had been active in a 1980s sanitation campaign recently drew on their prior experience and mobilised their neighbours to learn about their arsenic problem and develop suitable safe-water alternatives (Hoque et al., 2000). Rural surface water management systems are known to have been developed and managed entirely through local initiative when there is a perceived need (Duyne, 2004).

Ownership, Payments, and Access to Safe Water

People who pay for a water treatment/mitigation option tend to have more secure rights of use and access than people who do not pay. To ensure full public access to facilities, several programmes try to make sure that all users pay some amount towards upkeep, no matter how small. It is very common for cooperating households to pay greater or lesser amounts according to their ability. While it is tempting to allow the most affluent to carry all financial responsibility, many have seen such individuals change from generous donors into bullies who control and restrict access. Such problems can be daunting, but a diligent field team can identify and overcome them.

People's Responses to Arsenic-free Water Options

Whether an alternative water option is considered a permanent solution to the arsenic problem is critical to whether the alternative water source will be maintained. Under the prevailing socio-economic circumstances, poor households are likely to see community-managed water supply options as their only hope of accessing arsenic-free water for drinking and cooking (United Nations Foundation, 2003). Wealthier households vary more in their views about the permanency of solutions, but they also tend to consider that some technologies - particularly deep tube wells and pond sand filters - are permanent solutions. Table 2 shows data on Bangladesh respondents' views about permanency of their mitigation options.

Filtration of pond water is a logical but socially complex way to make it safe for drinking. Problems arise because village ponds, passed down as inheritances, tend to have multiple owners. All must agree to reserve their water body for use as a neighbourhood or village drinking and cooking water source, foregoing lucrative fish culture opportunities and sharing the water source with non-relatives.

In areas where dug wells have been traditionally used, they tend to find ready acceptance as an arsenic mitigation option. Even if there is a history of dug well use, various wells can have different types of social meanings. If a well was originally used by a whole neighbourhood or village, as were some of those installed by *zamindars* (land agents established under colonial rule), then people may perceive them as facilities suitable for use by the general public. Rehabilitating privately owned dug wells, however, may be less socially beneficial unless programmes and community groups make a special effort to overcome their history as private facilities (United Nations Foundation, 2003).

Ahmed et al. (2005) found the proportion of poor respondents who consider the dug well option a permanent solution to be much lower than the proportion of middle-class and rich respondents, as Table 2 shows. It may be that, because middle-class and rich families still have access to tube wells close to their homes with water that can be used for purposes other than drinking and cooking, the more affluent are satisfied to use the alternative source only for drinking and cooking. Poor families, on the other hand, needing the alternative source for all purposes, may want a higher quality supply.

The perception of quality of the water supplied by the option is also important. As Table 3 shows, in general most households are satisfied with the quality of water from arsenic mitigation options, with variation between income groups and different technologies.

Changing Water Use Patterns

The question of whether people's water use patterns change, and why they do or do not, needs further study. People's notions about and practices of cooking vs. drinking arsenic-contaminated water in particular deserve close attention. The 2001 UNIDO evaluation study in West Bengal sounded a cautionary note:

> …Several case studies revealed that people reverted back to tube well water after a while, bringing into question the sustainability of the [arsenic removal] plants. This is specially so in the case of cooking, because apparently foods like rice do not cook well in ... treated water using a particular technology. (p.53)

In Bangladesh multiple water sources, including arsenic affected tube wells, continue to be used in areas where arsenic-free water becomes available. Pond and river water remain major sources for cooking, washing and bathing, but not for drinking among households having access to an arsenic free option (Ahmed et al., 2005).

One recent evaluation study found an arsenic removal technology, the Sidko plant, to be widely acceptable to users. This technology, however, is expensive to install, needs rather complex technical maintenance, and requires regular replacement of the filtration medium (Pathways, 2005).

Ahmed et al. (2005) found that while 98% of DTW users use this water for drinking, the figures were less for users of RWH (82%), DW (79%) and PSF (61%), indicating concerns over the quality of water. In general households with access to mitigation options that drink water from other sources were found to use water from green-painted (i.e., safe) shallow tube-wells, although higher numbers of DW (4%) and RWH (7%) used red tube wells. Use of water from mitigation options for cooking is less frequent than use for drinking (Ahmed et al., 2005).

The range of uses decreases with the increase in distance to the arsenic-free water point. Households that perceive the safe water point to be far away primarily use the water for drinking and cooking and supplement it with pond water or from an arsenic-affected tube well for other purposes. Perceptions of 'near' and 'far' tend to be social as well as physical, as social distinctions influence interaction between different neighbourhoods.

Social Considerations in Arsenic Mitigation Programme Planning

Women's Responsibilities and Women's Limited Capacity to Participate

Most of the answers to the questions about why people do or do not change their domestic water use behaviour are literally in the hands of women. Bengali women make almost all decisions about collection, storage, and uses of domestic water. It is they, and they alone in the great majority of cases, who will or will not change to safer sources. Women's sense of responsibility for careful water use as a way of protecting their families' health can be so strong, that women at times may be blamed or even blame themselves for any and all problems with water-related illness, including arsenicosis (Tomizawa, 2001).

As Sultana (2005) observes, '…Women's role in water resources management is generally high, but their role in policy-making and decision making at multiple scales is low compared to men'. Others agree that women have played little or no role in planning local arsenic mitigation projects to date, although some micro-credit groups have engaged women in arsenic related problem solving.

Women face at least four major constraints in responding to the news that their tube well water is contaminated with arsenic. First, they may or may not be welcomed at public meetings where the problem is explained in detail. Second, being generally less well educated than men, they may have difficulty understanding or remembering the information communicated to them. Third, they are very busy with household work and may choose to continue using arsenic-affected tube well water in the interest of saving time. Lastly, they are vulnerable to violence if they venture too far from their homes; so girls' and women's personal security needs may prevail over their concerns about getting safe water from a distant source. If a new, safe water source is too inconvenient for any of the above-mentioned reasons, it is likely that most women will continue to cook with and/or drink arsenic affected water at least some of the time (Jakariya et al., 2003a).

Potential Role of Local Leaders and Elected Councils

At present most community mobilisation to combat the arsenic problem is initiated by representatives of NGOs or other organisations. These outsiders enter an area, analyse water sources, educate people about arsenic, and suggest ways that people can avoid consuming unsafe water. This is a necessary but temporary step in the evolution of the situation. Eventually local

area residents must take control, at least to some extent, if alternative water sources are to be installed in appropriate ways and maintained into the future.

Under optimal conditions local leaders will guide, or at least share in, the process of solving the arsenic problem. One NGO representative, however, explained some of the difficulties of mobilising them:

> …It was quite difficult to communicate with [rural people], much less change their behaviour. Under the political conditions of Bangladesh, with [Union Parishad] Members and Chairmen so dominant, they have to be on the committees…. If people from one party are on a committee, members of the other party don't want to attend meetings. Government people, even the Upazila Nirbahi Officer [sub-district manager], are busy with other activities. People come late to the Union Arsenic Mitigation Committee Meetings. They aren't disciplined. Some of the meetings are even cancelled. Generally government people have a self-serving attitude. They tend to look to their own benefit. This isn't easy (United Nations Foundation, 2003).

There is no way to know how frequently such difficulties arise, but it is clear that these types of situations are not rare. It is also important to understand that NGOs and other outside change agents may or may not be using locally appropriate community mobilisation strategies.

Local institutions, such as the Indian Gram Panchayat [village council] or the Bangladesh Union Parishad, would seem to be the most logical agents to take responsibility for guiding change in water sources7. The Gram Panchayat has a much stronger position than its Bangladesh counterpart and because the Panchayat is legally responsible for overseeing local water supplies, any organisation working in its area must inform or otherwise involve the elected body in decision-making. The Union Parishad, in contrast, can be bypassed, and sometimes is, with

impunity. In Bangladesh the government has mandated formation of arsenic mitigation committees at union and sub-district (upazila) levels. All reports indicate, however, that the majority of union level arsenic mitigation committees exist only on paper; and the work of the sub-district committees, chaired by Upazila Nirbahi Officers, seems to vary, depending on the interest of the UNO himself and the degree to which he is informed about the arsenic problem and any local mitigation programmes.

The arsenic problem lends a special urgency to efforts at decentralisation of crucial planning and management functions. Devolution of authority, capacity-building, and endowment with adequate resources are all needed, of course, if decentralisation is ever to become a reality. Despite the mixed experience with decentralisation to date, transparency and accountability can reduce the likelihood of problems, as Minnatullah (2003) has argued.

Professionals' Views of the Major Social Challenges

Perceptions and organisational constraints of mitigation project personnel are themselves social factors deserving consideration. Almost every professional interviewed in a review of mitigation programmes (Hanchett, 2004) therefore was asked the question, 'What do you consider to be the biggest social challenge in arsenic work nowadays?' A brief summary of the eight most frequently mentioned challenges is presented below in Table 4. Some comments were made in group discussions; so the respondent counts are not precise.

Given plenty of time to express themselves, these experienced people all made thoughtful and lengthy comments. No two have exactly the same point of view; and there were, of course, plenty of debates and disagreements. Nonetheless, we now have a general picture of what is on the experts' minds – and also what is not.

As Table 4 indicates, many of those interviewed expressed frustration, even to the point of exasperation, that the public is not responding vigorously to the news of this 'crisis'. Water-user group formation works in some places but not in others. People who supposedly 'know' about arsenic are said not to be sufficiently 'aware' to actually change to safer drinking water sources. Some people are reluctant to take advantage of mitigation options even if they are offered for free. A West Bengal Public Health Engineering officer has observed that, whereas people in his state in the mid-1980s were up in arms and demanding more and better quality drinking water, many have become complacent after seeing that the arsenic 'poison' has not yet produced rampant disease and death8.

Experts expressed a general sense that local government needs to be involved, but few had specific ideas about how such involvement could produce the desired long-term sense of local responsibility for maintaining arsenic-free water sources. A few expressed concern that project efforts may not always benefit poor people; and more than a few admitted that women's voices are not often heard in local-level planning discussions.

Activities were considered mainly in a technical light – developing and introducing an option, persuading people to pay for it and use it, arranging to have it taken care of properly. Very few professionals offered suggestions on how to overcome the social challenges they identified. Health professionals focus on patient diagnosis and care, if they deal with arsenic-related illness at all. Few seem prepared to work on the connection between arsenic-related health/illness and social life.

Conclusions

People get their ideas about their water through social networks, from mitigation project field staff, from mass media, and from their own deliberations. However much they know, people's capacity to respond to warnings about arsenic is constrained by their situation: their social status, education, money, and women's time. Social considerations thus strongly affect the public's response to arsenic mitigation efforts. Poor people's situation deserves careful consideration. They are particularly vulnerable to arsenic-related illness, and perhaps also at especially high risk of arsenic-related death. They tend to have much less education than others and thus generally less access to information about arsenic. Their ability to arrange good quality water tends to be less than others', so they depend on fewer sources. They need community-managed water points because their economic position makes private supplies unaffordable.

There is a need for further research on some key points, especially (1) whether and why people do or do not stop using arsenic affected water sources when alternative options become available; and (2) the experiences of girls in arsenic affected areas: specifically whether girls are as adequately covered as boys by health screening and treatment programmes.

Considering that most alternative water sources are used by groups, not individual households, community level organising, if it is done at all, is too weak, at least in many Bangladesh localities. This will affect the long-term viability/sustainability of arsenic mitigation programmes by jeopardising maintenance arrangements. We have not investigated community organising in West Bengal arsenic mitigation projects, but the topic deserves close attention.

Any effective local-level programme should include women as active participants in planning alternative water source placements and characteristics, since women are the primary managers of domestic water in rural areas of West Bengal and Bangladesh.

Whereas professionals tend to focus on the public's lack of awareness or motivation, service providers and policy makers themselves share responsibility for some programmes' inadequacies. Project WELL, in West Bengal, has found people less enthusiastic about dug well water than was originally anticipated. One reason was: 'Installation of too many options in the same area due to lack of coordination between NGOs working in the villages and lack of proper planning….' (Smith, 2004). The arsenic problem by now has produced a crowded field in which numerous types of agencies – governmental, UN, NGO, religious, and volunteer groups – have rushed into villages to implement schemes in an un-coordinated manner. Sometimes two or more organisations offer competing or conflicting services and messages in one place. Their differing messages, tube well testing methods and results, and ideas about how to solve the problem all too often confuse the people they intend to help. In Bangladesh, there has been much progress in reducing such uncoordinated approaches, as required by the *National Policy for Arsenic Mitigation 2004* (Government of Bangladesh, 2004), but problems still remain.

Well managed arsenic mitigation programmes can influence people's attitudes and understanding, even if they do not entirely change them. Most challenging are the cultural and emotional issues associated with beliefs in contagion, the fear of supernatural curses, and the assumption that one unhealthy individual brings dishonour or bad luck to all his/her relatives.

Staff working in arsenic mitigation projects are concerned about difficulties of communicating with the public about arsenic, especially with uneducated people. These difficulties can be overcome through careful training and project management. The personnel staffing mitigation projects have a responsibility to increase their own awareness of the social causes and consequences of the arsenic problem. An arsenic mitigation project is a social change project at least as much as a technical exercise.

References

Ahmed, C.M. (2002). Impact of arsenic on rural poverty in Bangladesh. Presentation to Regional Workshop on Water and Poverty, Dhaka, 22-26 September. 3pp.

Ahmed, M.F., Samsuddin, S.A.J, Mahmud, S.G., Rashid, H., Deere, D. & Howard, G. (2005). Risk assessment of arsenic mitigation options; Final report. Dhaka: Bangladesh International Training Network Centre (ITN) and Arsenic Policy Support Unit, MLGRD,C, Government of Bangladesh.

Ahmed, M.F., & Chowdhury, M.A. (Eds.) (2002). *Arsenic mitigation in Bangladesh; Outcome of international workshop on arsenic mitigation, in Dhaka, 14-16 January 2002, under 100 Days' Program.* Dhaka: Local Government Division, Ministry of Local Government, Rural Development & Cooperatives, Government of Bangladesh.

Ahsan, H. (2003). Arsenic in drinking water: A global public health problem. Dhaka & New York: Columbia University, Mailman School of Public Health, Department of Epidemiology, Cohort Study (PowerPoint presentation).

APSU (2005). Progress with provision of arsenic mitigation options November 2005. Dhaka: Arsenic Policy Support Unit, Government of Bangladesh.

APSU (2006). The social aspects of access to healthcare for arsenicosis patients. Dhaka: Arsenic Policy Support Unit, Government of Bangladesh (www.apsu-bd.org).

Asian Development Bank (2003). Current status and trends in water quality and health and social impacts; and government's policy and institutional frameworks, strategies, plans and programmes and institutions in groundwater management, water supply and health sectors. (Report by David Sutherland and Shireen Akhter.) Manila and Dhaka: Asian Development Bank (SSTA No. 4170 BAN: Arsenic Mitigation Review and Strategy Formulation).

BRAC (2003). Final report on building community based arsenic mitigation response capacity in four upazilas. Dhaka: BRAC in partnership with Department of Public Health Engineering and UNICEF.

Chakraborti, D., Rahman, Md. M., Paul, K., Chowdhury, U.K., Sengupta, M.K., Lodh, D., Chanda, C.R., Saha, K.C. & Mukherjee, S.C. (2002). Arsenic calamity in the Indian subcontinent; What lessons have been learned? *Talanta,* 58, 3-22.

Curry, A. (2000). *Towards an assessment of the socioeconomic impact of arsenic poisoning in Bangladesh*. Geneva: World Health Organization (WHO/SDE/WSH/00.4).

Duyne, J. (2004). *Local initiatives; Collective water management in rural Bangladesh*. Delhi: D.K. Publishers.

Everts, S. (1998). *Gender and technology*. London & New York: Zed Books.

Government of Bangladesh (2004). *National Policy for Arsenic Mitigation.*

Guha Mazumder, D.N., Ghosh, N., De, B.K., Santra, A., Das, S., Lahiri, S., Haque, R., Smith, A.H. & Chakraborti, D. (2001). Epidemiological study on various non-carcinamatous manifestations of chronic arsenic toxicity in a district of West Bengal. In W.R. Chappell, C.O. Abernathy & R.L. Calderon (Eds.) *Arsenic exposure health effects IV* (pp.153-164). _____: Elsevier Science Ltd.

Hanchett, S. (2004). Social aspects of the arsenic contamination of drinking water; A review of knowledge and practice in Bangladesh and West Bengal. Dhaka: Arsenic Policy Support Unit, Local Government Division, Ministry of Local Government, Rural Development & Cooperatives, Government of Bangladesh.

Hanchett, S., Nahar, Q., van Agthoven, A., Geers, C. & Jamil Rezvi, M.F. (2002). Increasing Awareness of Arsenic in Bangladesh: Lessons from a Public Education Programme. *Health Policy and Planning* 17(4), 393-401.

Hassan, K. (2004). Research report on 13 patients in Sirajdikhan. Dhaka: World Health Organization Environmental Sanitation Unit (unpublished manuscript).

Hassan, M.M., Atkins, P.J. & Dunn, C.E. (2005). Social implications of arsenic poisoning in Bangladesh, *Social Science and Medicine*, 61, 2201-2211.

Hoque, B.A., Mahmood, A.A., Quadiruzzaman, M., Khan, F., Ahmed, S.A., Shafique, S.A.K.A.M., Rahman, M., Morshed, G., Chowdhury, T., Rahman, M.M., Khan, F.H., Shahjahan, M., Begum, M. & Hoque, M.M. (2000). Recommendations for water supply in arsenic mitigation: a case study from Bangladesh. *Public Health*, 114, 488-494.

Jakariya, Md., Chowdhury, A.M.R., Hossain, M.Z. & Rahman, M. (2003a). A note on management of chronic arsenicosis patients in Bangladesh. *Tropical Doctor*, 33,251-252.

Jakariya, Md., Chowdhury, A.M.R., Hossain, Z., Rahman, M., Sarker, Q., Khan, R.I. & Rahman, M. (2003b). Sustainable community-based safe water options to mitigate the Bangladesh arsenic catastrophe – An experience from two upazilas. *Current Science*, 85, 141-146.

Kabir, A., and Howard, G. (draft). The sustainability of arsenic mitigation in Bangladesh.

Majumder, A., & Kahali, S.D. (2003). Benefit of community participation in arsenic mitigation: An overview of participatory approach. *Journal of the Institution of Public Health Engineers, India*, 2003, 20-24.

Milton, A.H., Hasan, Z., Shahidullah, S.M., Sharmin, S., Jakariya, Md., Rahman, M., Dear, K. & Smith, W. (2004). Association between nutritional status and arsenicosis due to chronic arsenic exposure in Bangladesh. *International Journal of Environmental Health Research*, 14, 99-108.

Minnatullah, K.M. (2002). Institutional challenges for scaling up the delivery of safe water and sanitation in Bangladesh. In *Safe water for all: Bangladesh perspective; World Water Day Seminar 2002* (pp. 25-31). Dhaka: NGO Forum for Drinking Water and Sanitation.

NAMIC/National Arsenic Mitigation Information Center (2005).

NAISU/NGO Arsenic Information Support Unit (2001-2004). *Arsenic Bulletin* (Bengali). Dhaka: NGO Forum.

Pathways Ltd. (2005). Final report; Assessment of the efficiency and effectiveness of the project interventions on its beneficiaries. Dhaka: World Health Organization, Environmental Health Unit.

Planning Alternatives for Change and Pathways Ltd. (2006). Final evaluation; Building arsenic mitigation response capacity in Muradnagar, Sirajdekhan, and Bhanga upazilas of Bangladesh. Dhaka: World Health Organization, Environmental Health Unit.

Rosenboom, J.W. (Ed.) (2004). *Not just red or green; An analysis of data from 15 upazilas in Bangladesh.* Dhaka: Arsenic Policy Support Unit, Ministry of Local Government, Rural Development and Cooperatives, Government of the People's Republic of Bangladesh.

Smith, M.M.H. (2004). Field observations of alternate sources of drinking water in the arsenic affected village Kamdebkathi, in West Bengal, India, and recommendations. (www.projectwellusa.org, March 27)

Sultana, F. (2005). Gendered waters, poisoned wells: Political ecology of the arsenic crisis in Bangladesh. In K. Lahiri-Dutt (Ed.) *Fluid bonds: Views on gender and water*. Kolkata: Stree Publishers (draft manuscript).

Sultana, F. (2006). Gender concerns in arsenic mitigation in Bangladesh: trends and challenges. In APSU *Selected social papers on arsenic.* Dhaka: Arsenic Policy Support Unit, Government of the People's Republic of Bangladesh.

Tani, M. (1999). Ethnographic studies for mitigating arsenic poisoning in Samta. In Arsenic contamination of groundwater in Bangladesh; Interim report of the research at Samta Village. Dhaka: Asia Arsenic Network, Research Group for Applied Geology, Department of Occupational & Environmental Health, national Institute of Preventive and Social Medicine. (pp.12-17)

Tomizawa, H. (2001). Arsenic poisoning from ground water in rural Bangladesh: The potential for women's participatory environmental education. The Netherlands: Wageningen University, Programme on Management of Agricultural Knowledge Systems, M.Sc. thesis.

UNIDO/United Nations Industrial Development Organization (2001). Concerted action on elimination/reduction of arsenic in ground water, West Bengal, India. (Report by A.K. Sengupta) New Delhi.

United Nations Foundation (1999). Arsenic poisoning in Bangladesh and West Bengal; A U.N. Foundation Report. New York.

United Nations Foundation (2003). Mid-term evaluation report; A UNICEF-WHO Joint Project on Building Community Based Arsenic Mitigation Response Capacity in Bhanga, Muradnagar, and Serajdikhan, Bangladesh. (Report by Suzanne Hanchett, Mohidul Hoque Khan, and Shireen Akhter, of Planning Alternatives for Change & Pathways Ltd.) Dhaka: World Health Organization Bangladesh, Environmental Sanitation Unit.

UNICEF/United Nations Children's Fund (2004). Arsenic pollution in West Bengal. Kolkata, India (information kit).

Zuberi, M.I. (2003). Final report; Arsenic mitigation through AMP-Christian Aid support: Awareness, communication and scaling-up. Rajshahi, Bangladesh: Rajshahi University, Department of Botany.

Table 1. Primary Source of Information on Arsenic Among Users of Arsenic-free Water Sources in Bangladesh (multiple responses)

Source of information	**Percent of respondents (n=614)**
Word of mouth	37%
Radio or TV	26%
NGOs	21%
Through testing of tube wells	9%
Poster/newspaper	2%
Others	5%
Total	**100%**

Adapted from Ahmed et al. (2005)

Table 2. Views on Whether the Alternative Source Is a Permanent Solution in Bangladesh (adapted from Ahmed et al., 2005)

Socio-economic Status:	Poor (n)		Middle (n)		High Income (n)		Total (n)	
Response:	Permanent	Not	Permanent	Not	Permanent	Not	Permanent	Not
Dug Well Users	75.2%(79)	24.8%(26)	85.4%(35)	14.6%(6)	81.3%(26)	18.8%(6)	78.7%(140)	21.3%(38)
Deep Tubewell Users	94.1%(96)	5.9%(6)	98.4%(63)	1.6%(1)	100.0%(12)	--	96.1%(171)	3.9%(7)
Pond Sand Filter Users	96.9%(93)	3.1%(3)	92.4%(61)	7.6%(5)	93.9%(31)	6.0%(2)	94.9%(185)	5.1%(10)
Rain Water Harvesting Unit Users	12.5%(1)	87.5%(7)	73.1%(19)	26.9%(7)	59.3%(16)	40.7%(11)	59.0%(36)	41.0%(25)

Table 3. Views on Water Quality of Alternative Sources in Bangladesh (adapted from Ahmed et al., 2005)

Socio-economic Status:	Poor (n)		Middle (n)		High Income (n)		Total (n)	
Response:	Satisfied	Not	Satisfied	Not	Satisfied	Not	Satisfied	Not
Dug Well Users	85.7%(90)	14.3%(15)	90.2%(37)	9.8%(4)	87.5%(28)	12.5%(4)	87.1% (155)	12.9% (23)
Deep Tubewell Users	92.2%(95)	7.8%(8)	90.6%(58)	9.4%(6)	100.0%(12)	---	92.2% (165)	7.8% (14)
Pond Sand Filter Users	95.8%(92)	4.2%(4)	92.4%(61)	7.6%(5)	87.9%(29)	12.1%(4)	93.3% (182)	6.7% (13)

Table 4. Most Challenging Social and Organisational Issues Mentioned by Programme Staff and Managers and Governmental Planners

Issue	**Nationality of Respondent (rough counts)**	
	Bangladesh (out of 35+)	**West Bengal (out of 7)**
1. Raising public awareness to the point that people actually change their water-use habits and possibly decide to pay for safe water.	18	4
2. No single alternative water option will suit all situations; arranging safe, affordable, convenient and otherwise acceptable domestic water options.	8	
3. Guiding people to develop ways of solving their own arsenic problems; helping people to develop the necessary self-confidence and self-help capacity.	8	
4. The shift from familiar household-level drinking water sources to community-based sources creates the need for community-based systems to manage community solutions in a sustainable way.	6	
5a. Lack of decentralisation of public services interferes with programme implementation; Union Parishad has no authority over arsenic mitigation activities; Government mandated arsenic committees are mostly inactive but should be involved. (Bangladesh)	7	
5b. Panchayats do have authority and often are actively		2

Issue	Nationality of Respondent (rough counts)	
	Bangladesh (out of 35+)	**West Bengal (out of 7)**
over-seeing arsenic mitigation activities; but they tend to be very target-oriented, not strong on "quality" of processes/planning; some let politics interfere, but some do not. (India)		
6. Given the complexity of the arsenic problem – that it is geological, medical, *and* social, there is a need for comprehensive approach; strong coordination needed among various types of mitigation/awareness raising organisations; information sharing needed; cross-cutting issues not getting enough attention.	7	
7. Participatory local planning processes are often too weak; the voices of women and/or poor people are rarely heard.	6	1
8. Better staff training is needed; present staff 'orientations' are not sufficient; evidence-based messages should be communicated to the public by specialists.	5	
9. Economic and social problems of arsenicosis patients	3	2

Source: Hanchett (2004)

[1] Email: Suzanne@planningalternatives.com

[2] Aasma Afroz Shathi, International Center for Diarrhoeal Disease Research, Bangladesh, personal communication, June 2004

[3] Tariqul Islam, Columbia University Cohort Study, Dhaka Office, personal communication, June 2004

[4] Alpana Hira Davidson, personal communication, June 2004

[5] Prioyotosh Mitra, personal communication, June 2004

[6] Personal communication, June 2004

[7] In Bangladesh another possibility is to mobilize people at the level of the ward, a sub-division of the union.

[8] Pradip Kumar De, Chief Engineer, Public Health Engineering Department, Government of West Bengal, personal communication, June 2004