



Arsenic mitigation: an integrated approach

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BANGLADESH IS A small country with an area of about 148393 sq. km. It is also known as one of the biggest delta in the world. It is situated between $20^{\circ} 34' E$ and $26^{\circ} 38' E$ North Latitude and between $88^{\circ} 01' S$ and $92^{\circ} 41' S$ East Longitude. The land is surrounded mostly by Indian territory in the south, west, and north. The Bay of Bengal covers the south. The Himalayas lie in the far north of country. The climate of the country is tropical in nature. There are more than two thousand millimeters of rain fall every year. More than two third of the country remains under water every year for 2 to 3 months. Hundreds of rivers carry sweet water for the country in a criss cross manner. By nature it bears a well known fertile land too. About 120 million people live in this small area. The thickness of population per square kilometer is one of the highest in the world.

The people of this country successfully fought against diarrhoeal diseases in last more than three decades. The use of under ground water by hand tube-wells have played a great role in the propaganda. More than 95 per cent of the population are now using tube-well water for their drinking and cooking. The green revolution which is providing the food for the huge population has also been possible by the use of ground water. The use of under ground water has pushed the traditional habit of using surface water from rivers, lakes, ponds, and traditional wells to our lost memory along with the traditional attitude of sharing of water resource in the community. Now after the detection of the deadly poison like inorganic arsenic in Bangladesh ground water has upset the idea of safe water in the country. Nearly all on a sudden a good action has turned to bad and more than three decades old huge investments is now questionable. Dhaka Community Hospital (DCH) and School of Environmental Studies (SOES) have been carrying out countrywide survey for detection of contaminated tube-wells and finding out patients in different districts of the country. By a random survey 54 districts are identified as contaminated by arsenic at a more than 0.01 mg/l and 47 districts at more than 0.05 mg/l, the maximum permissible limit for Bangladesh. The hydro geo chemistry of Bangladesh is so peculiar that it is not possible to comment about the area affected by arsenic before testing almost all the tube-wells of the country. So a survey carried out by Government found 59, out of 64 districts of Bangladesh has been contaminated by arsenic at a level above 0.05 mg/l. Experiences of Dhaka Community Hospital in the 500 villages indicate that the total number of tube-wells in the country will be far more than the amount in Govern-

ment reporting. It is estimated that about 10 million tube-wells are now engaged in lifting ground water in Bangladesh. More than 50 million people are now estimated to be exposed to arsenic more than 0.01mg/l. Considering the health consequences now time has come to decide whether we should drink the arsenic contaminated water and face the consequences of arsenic in the our body or go back to surface water again. Many government and non-Government agencies are now working hard to fight for the issue. So far less than 5 per cent tube-wells of the country have been tested. since the acceptance of the problem in 1997. All the tube-wells of some community found contaminated with arsenic. Still 95 per cent tube-wells need to test, which is a huge work for the country. The panacea is still not known.

Materials and method

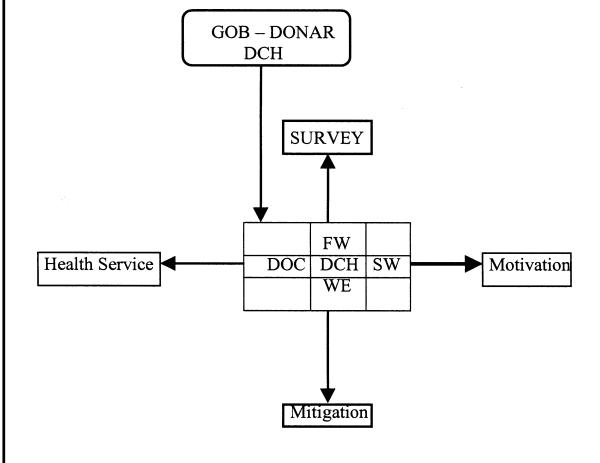
This paper is not a pure scientific one as it happens usually. But we think the approaches called "Community based" adopted to address the issue must be shared with the scientific community for its validity and sustainability. Dhaka Community Hospital has been implementing an integrated arsenic mitigation project in Bera Upazilla under Pabna District from last eight months. It is situated on the southeastern corner of Pabna district, almost in the center of Bangladesh. The area of this Upazilla is about 248 square kilometer with a population of 0.28 million. One of the biggest rivers Brahmaputra flows from north to south just by the eastern side of Bera. Another bigger river padma flows from west to east just by its eastern side. The cultivating land and the lower part of this Upazilla remains under water for 3 to 4 months during and one or two month after rainy season. The area becomes dry and dusty during dry seasons. Safe drinking water becomes a problem in dry season without hand tube-wells. There are 14383 hand tube-wells supplying drinking water to the people of this area. Our main objectives of the project is to develop a model for mitigation program which can if necessary be replicable. The main components were to assess the situation of contamination in the Upazilla, find an option for the owners of contaminated tube-well with an extended service for affected people. This was a government program funded by UNICEF and implemented by DCH. We are also implementing similar projects in smaller areas of Iswardi upazilla of Pabna District and in Faridpur Sadar. The small duration for such a model project may not prove itself fit for replication but the experiences gathered in the field level precious for us..

Since 1996 Dhaka Community Hospital alone and also with School of Environmental Studies visited rural areas of all the 64 districts for water and in 36 districts for patients to over come all the debates about the contamination of arsenic in the ground water of Bangladesh and possible wide range health hazards. Just to identify arsenic affected patients we have to visit more than 268 villages of 36 districts. The interaction with different communities from all these field visits helped us to understand the heart-burning situation of the communities from this contamination of arsenic in water. Water the most essential commodities after air is most frequently available in Bangladesh. Before three decades we would die from diarrhoeal diseases, and that water was blamed to carry germ. Enough high tech exercises, financial investment have been done to forget our traditional water sources and also ruined the attitude and habit of sharing it in communities. Now we to carry a deadly poison again blame the same water. Diarrhea has its immediate deadly effect but almost nothing happened to those who had experienced diarrhoea once or twice in life. Disease created by arsenic from drinking water crippled the man till death or kill them by noxious effects. DCH tried to integrate (Tab-1) different actions to face all the sad and sorrows of these communities through this program. We planned the action to bring down the prevalence of arsenicosis and reduce the ingestion of arsenic through drinking water. Finding all the available water sources in the community, DCH by providing possible and available scientific information, trying to help the community to find a suitable option either for their temporary use or permanent. Through the interaction with the communities DCH also tries to increase the awareness which is variable from community to community. A DCH doctor is appointed to provide health care services for the affected people. We think this type of program can be of great console for the the communities as well as bring them to an understandable solution.

Activities

After we discussed with community we understand that the tube-well achieved its popularity in the community not only for the sweet water supplied through it nor by propa-

Table 1. Integrated program: FW- Field Workers; WE- Water Engineer; SW- Social Worker)



ganda done for it but also because its low cost and very easy technology.

The people, who are now puzzled by the present issue, expect an assured safe water source which is manageable and affordable by the community. Considering the facts that the arsenic contamination in Bangladesh is geological, all sources available in the community were considered in the discussion along with special focus towards sustainability of an option and possible merits and demerits related to change of attitude and behavior in the society.

We tested all the tube-wells of the proposed area by field testing kit on the tube-well sites and marked the contaminated tube-wells with red and safe tube-wells with green colour. By house to house visit each and every family member was checked for signs and symptoms for arsenicosis and provides treatment in need by trained doctors.

A group of our doctors also identified patients in Kachua upazilla, Jhikergasa upazilla and Manikganj upazilla of Chandpur, Jessore and Manikganj districts respectively. Tube-wells of these areas were tested by other NGOs by field kits. The rate with number of patients identified shown in the table above. A water resource map is prepared



Figure 1. Community discussion

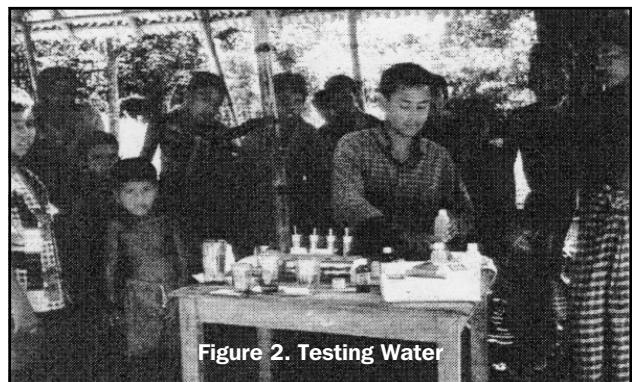


Figure 2. Testing Water

Table 1. Testin water

Name of upazilla	Contamination in %	Number of patients detected
Bera	52%	123
Kachua	98%	240
Jhikergasa	62%	313
Manikganj	28%	26

during the survey. Community committee was formed for the farther steps leading to awareness and selection of option and its future management.

Learning

Bangladesh is as well known for its population as it is for its poverty. Its literacy rate is one of the lowest in the world. 80 per cent people do not see graduate doctors when they die. In many occasions people felt helpless for the problem and expressed dissatisfaction to us. They now hesitate to rely on too. But people when explained, understand the gravity and limitation of situation. People in many communities came to know that their tube-wells were contaminated by a poison which is gradually crippling them to death just the day we talked to them. They feel they have got the right to know immediately whether their water is really safe or not. It is learned from them that need of an ensured, affordable and sustainable safe water source is immediate for all communities. They are very much sensitive for the people who are all ready became victimized by arsenic from the drinking water.

Recommendation

Response of the civil society our nation and different national and international agencies towards present Bangladesh arsenic issue is now very much encouraging. National and international agencies have come forward to face this national problem untidily. The existing gap of sharing experiences of different activities, a coordination at top levels still to be filled. This is now essential for assessing the community need and planning for a sustainable and affordable option for them. Considering wide spread contamination and estimated 90 million people at risk the identification of tube-wells is prime task. As mentioned

above so far less than 5 per cent tube-wells have been tested by different activities throughout country has covered a less than 3 per cent of administrative units called Upazilla. A few programs are there to focus other aspects of the problem in an integrated manner. We have faced problems with detecting tube-wells in identifying patients and also in explaining the issue for making communities aware of their responsibilities to manage the future safe drinking water. We feel it very essential to propose some important issues for any integrated mitigation program for arsenic.

- All the tube-wells should be tested urgently by well-trained person on emergency basis.
- Trained doctors should finally do identification of patients and follow-up should be a part of such program.
- Mitigation should follow immediately or should be an integral part of the process along with a comprehensive program for awareness campaign to achieve sustainability.
- Whole community should be involved in all aspects and in ensuring water quality. The testing facilities should be nearer to them and possibility by them within affordable cost.
- Top level coordination and research must be encouraged to understand the whole issue.

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