

**BUILDING COMMUNITY BASED ARSENIC MITIGATION RESPONSE
CAPACITY IN FOUR UPAZILAS OF BANGLADESH**

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BUILDING COMMUNITY BASED ARSENIC MITIGATION RESPONSE CAPACITY IN FOUR UPAZILAS OF BANGLADESH

Executive summery

BRAC in collaboration with DPHE and UNICEF implemented the project entitled “Building community based arsenic mitigation response capacity” during July 2001 to June 2002 in four upazilas named Barura, Haimchar, Bahanga, and Monirampur of Comilla, Chandpur, Faridpur, and Jessore districts respectively. The objectives of the project are to (i) raise awareness among the community (ii) determine the extent of arsenic contamination in all tubewell water in the project areas; and (iii) develop resource maps of different villages of the project area to locate safe water sources.

The activities executed in the project were creation awareness among the people through training, workshop, formation of different types of arsenic mitigation committees, training for tubewell testing and blanket tubewell testing, providing technical advice on safe water and collation and dissemination of knowledge generated and lessons learnt.

At the upazila level, upazila project co-ordinator of BRAC actively participated at upazila monthly co-ordination meeting in order to appraise different stakeholders and government officials about activities and progress on arsenic mitigation. BRAC provided quarterly report to the co-ordination committee. A working committee was formed whereby local DPHE and BRAC project personnel worked together to plan and review different project activities and its progress.

A total of 85937 shallow tubewells, among those 21003, 26339, 3585 and 35010 in Bhanga, Barura, Haimchar, and Monirampur upazilas respectively were tested. Among the four upazilas the highest contamination was found in Bhanga (91%) and the lowest was in Monirampur (51%). A total of 378 deep hand set tubewells were tested in the project areas. Among these deep hand set tubewells only 14 (3.7%) were found to be contaminated with arsenic of above permissible

limit. In the four upazilas a total of 14989 irrigation wells were tested of those 70% were found contaminated.

Field testing of the tubewells for arsenic was validated by laboratory analysis using AAS (Atomic absorption spectrophotometry). It was found that the field testers did reasonably well in testing the tubewells. The percentage of correctly tested tubewells (green-green and red-red) was 92% and 90-91% respectively. There was no significant seasonal variation in concentration of arsenic in tubewell water.

Achievement in formation of arsenic mitigation committees was 100% at the Upazila level to Ward level in all the four upazilas. In case of formation of VAMC achievement was from 84 to 100% in the project areas. Success in fulfilling the target of organizing meeting in the committees ranged from 63 to 95% in the villages of the project areas.

The following issues were encountered during the course of the project implementation below.

- Number of communication materials like routine card, flash card, leaflet, posters were not adequate in number.
- Although training was arranged for the communication officers of the project but there was no manual for using these materials in written form.
- Although the Imams of the mosques were found very vital in disseminating the messages on arsenic it was not possible to give orientation and training due to inadequate logistics.
- The owners of the restaurant or the teashop were found erasing red paint of the tubewells which were found arsenic and they marked those tubewells with green paints.
- In few cases the members of the committees did not work spontaneously since there was no provision of incentive as they expected against their services.

Lessons learnt

- Joint collaboration among the agencies of government and non-government organizations in implementing the arsenic project were found very effective and encouraging.

- Since the problem of arsenic poisoning is new to the country and devastating in its nature people were found to respond quickly in initiatives taken in the project. They participated at the different stages of the project activities spontaneously.
- People exposed to arsenic were willing to share contribution money for installation of arsenic safe water projects. The villagers were more interested to share the cost for deep tubewells rather than pond sand filter (PSF), rain water harvester and chemical based treatment units.
- Provision of training/orientation and materials for all Imams, schoolteachers (Primary and Secondary) could work as reinforcement to the effective in communication activities for raising awareness among the people.

BACKGROUND

The arsenic problem in Bangladesh

The recent discovery of arsenic in ground water has become a new threat to the success of safe water supply in the country. Estimates suggest that around 27% of the total tubewells installed over the years in the country have an arsenic concentration above the upper permissible limit of 50 µg per litre (DPHE/BGS/DFID, 2000; DoE, 1991). About half of the total population (124 million) of the country spread over almost same proportion of the districts, are exposed to the threat of arsenic contamination (Munim K. M., 1997). A survey was conducted in 20 districts for arsenic patients, and in 18 districts people having arsenical lesions such as melanosis, leucomelanosis, keratosis, hyperkeratosis, dorsum, non-peting oedema, gangrene and skin cancer were identified (Dhar R, K. *et al.* 1997). Some organisations estimate that 25-30 million people are already affected and others claim that nearly half of the total population (120 million) is threatened (Khorasani S. S. M. A., 1998). The health consequences of this exposure may soon develop into epidemic proportions, if judged from the scattered studies performed in Bangladesh (Biswas *et al.* 1999).

BRAC in arsenic mitigation activities

BRAC, one of the largest national non-governmental organisations, has a proven capacity for field-level programme implementation, socio-economic research, a strong institutional network and experience in training of community members in testing tubewell water for arsenic. It initiated arsenic mitigation activities through testing all the 802 tubewells in its field offices. The situation in Hajiganj upazila was found to be quite alarming; of all of 11,954 tubewells tested in this upazila 93% showed the presence of arsenic. When the results of field testing by VHWs were compared with laboratory results, 93% matched, showing the quality of the field kits and the capability of VHWs in effectively conducting the testing. The cost of testing each water sample was minimal and the testing programme in Hajiganj upazila was completed in just over a month indicating that the methodology used by BRAC is both cost and time effective (Chowdhury and Jakariya, 1999).

In 1998 BRAC completed a countrywide testing of tubewells which were installed by the Department of Public Health Engineering (DPHE) of the government during 1997-1998 with assistance from UNICEF. A total of 12,604 tubewells were tested under this project again using field kits. It took about 35 days to complete the testing which again confirmed the effectiveness of the methodology used by BRAC in carrying out arsenic testing.

BRAC in collaboration with DPHE and UNICEF started a pilot project on arsenic mitigation in the Boidderbazar union of Sonargaon upazila in January 1999. The project was extended into two upazilas of Sonargaon and Jhikorgachha of Narayanganj and Jessore districts respectively in June 1999. The Phase I of the project continued up to June 2000. Based on the lessons learned in Phase I some follow-up and extended works were done in the Phase II of the project that continued up to December 2001. The activities of the project included testing tubewell water for arsenic, marking the wells with appropriate paints of red and green colour, creating awareness among the people, demonstrate and test different alternative safe water options for their technical viability and community acceptance, monitoring water quality, screening and management of the arsenicosis patients etc.

The major lessons learnt from the action research project into community based arsenic mitigation implemented by BRAC can be summarized as follows:

- It has been observed that that with some training it is possible for village women volunteers to test the wells for arsenic; but the technology for testing needs further improvements;
- Community mobilization and involvement is essential for the process of arsenic mitigation. People are willing to participate in testing, priority setting, awareness building, mitigation and cost sharing;
- The feasibility, effectiveness and acceptance of the safe water options available vary from place to place. Some options have been found to be either technically inefficient or disliked by the community; some others were found to have good potentials;
- Following provision of safe water and some 'treatment', the majority of arsenicosis patients report an improvement; and

- NGOs with their base at the grassroots and wide network all over the country are capable of scaling up the arsenic mitigation programme rapidly; however, co-ordination of various agencies involved in the process is very important.

BUILDING COMMUNITY BASED ARSENIC MITIGATION RESPONSE CAPACITY

From July 2001 to June 2002 BRAC in collaboration with DPHE and UNICEF extended the activities of arsenic mitigation and implemented in Borura, Haimcah, Bhanga, and Monirampur of the districts of Comilla, Chandpur, Faridpur, and Jessore respectively in July 2001 to June 2002.

OBJECTIVE

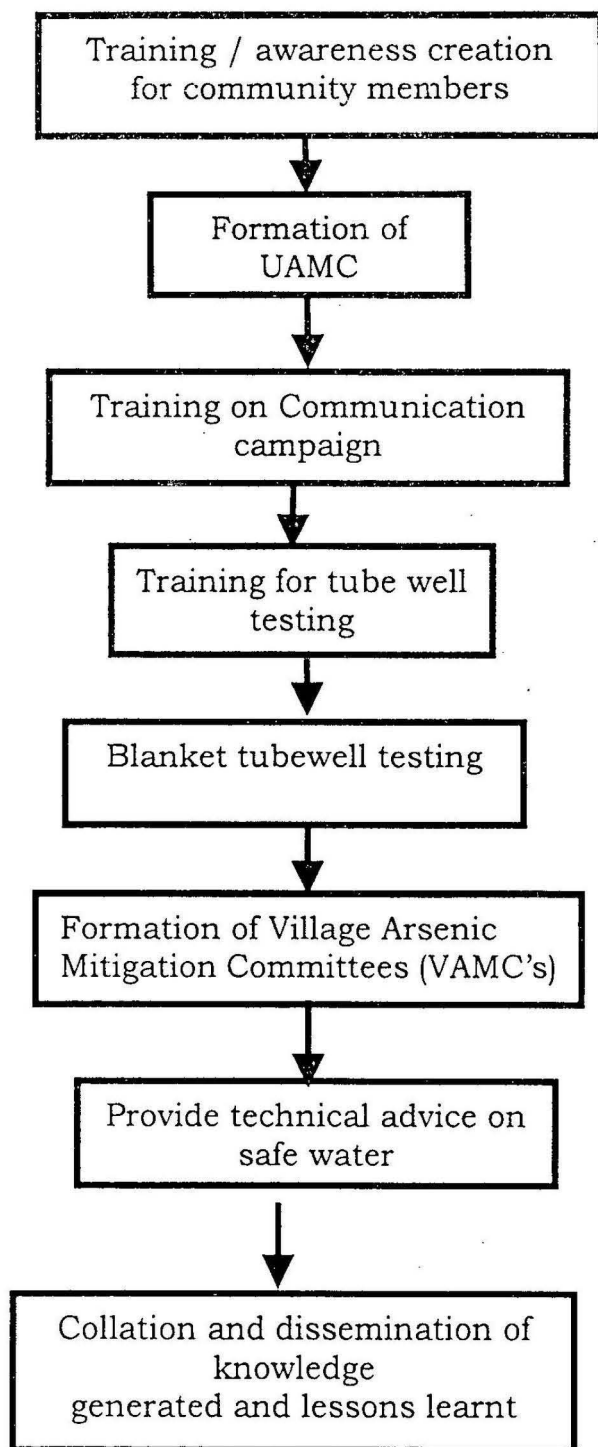
The general objective of the project was to aware people about the problem in order to avoid possible contamination of arsenicosis disease. The specific objectives of the project are to

- develop working relationship with different stakeholders for the sustainability of the project;
- raise awareness among the community;
- determine the extent of arsenic contamination in all tubewell water in the project areas; and
- develop resource maps of different villages of the project area to locate safe water sources;

SUMMARY OF SEQUENCE OF EVENTS

Sequence of activities of this project is presented in the flowchart. This is important as in several stages one activity lays the groundwork for the next activity e.g. communication campaign raises awareness and creates a demand for tubewell water testing.

FLOW CHART: PROJECT ACTIVITIES



ACTIVITIES UNDERTAKEN

Activities executed during the project period have been described below.

Co-ordination

It has been observed that co-ordination of various agencies and involvement of local people of different levels is needed to implement project activities in a more coherent and effective way.

At the upazila level, upazila project co-ordinator of BRAC actively participated at upazila monthly co-ordination meeting in order to appraise different stakeholders and government officials about activities and progress on arsenic mitigation. BRAC provided monthly performance report to the UAMC. Monthly progress report of the project activities was provided to the R & D division of DPHE Head Quarter in Dhaka following the standard format supplied by the DPHE. Survey on Knowledge, Attitude and Practice has completed. Database of the base line and the follow-up of this survey was provided to UNICEF in soft copy.

A working committee was formed whereby local DPHE and BRAC project personnel worked together to plan and review different project activities and its progress.

To involve government officials at upazila level and people's representatives at local levels, different committees were formed. At village level "Ward Arsenic Mitigation Committee" was formed at each ward. This committee along with the villagers assessed the need for safe water options of the respective areas.

At the national level, BRAC worked in close collaboration with different agencies including DPHE, BAMWSP, LGRD, UNICEF, MOHFW, etc.

Training / awareness creation

There is a prevailing attitude about arsenicosis, as with many diseases where immediate effects are not felt or seen, that “it will affect the other person not me.” For this reason awareness creation is essential in the early stages of project implementation. Basic background training aimed mainly at raising awareness and removing misconceptions about the arsenic problem. The essential information regarding arsenic issues was given to the communities by conducting workshops at different levels (e.g. local elite, religious leaders, school teachers, local science clubs etc.) BRAC has already prepared a training manual to conduct such workshops. One full-time communication expert from BARC was responsible for conducting such workshops at different levels of a upazila.

Formation of upazila arsenic mitigation committee (UAMC)

Upazila Nirbahi (Executive) Officer (UNO), the DPHE Sub-Assistant Engineer (SAE) and the BRAC upazila co-ordinator for arsenic were responsible for organising Upazila Arsenic Mitigation Committee. Each committee was composed of these 9 members including the Union Parishad chairmen, the Upazila Health and Family Planning Officer (UHFPO) and other stakeholders as identified.

Training on use of communication materials and communication campaign

Materials for a comprehensive communication campaign was developed by UNICEF and DPHE and approved by the Government and BAMWSP. BRAC, with assistance and support from all relevant parties implemented the campaign programme. Health and family planning workers, block supervisors, tubewell mechanics, imams, head teachers of secondary schools, Union Parishad Chairmen, all UP members and local NGO workers was trained on use of communication materials. During training each worker formulated an action plan to indicate time, place and date of sessions with community people. The action plan, which was prepared jointly with the DPHE and UZAMC, was made available for the DPHE and UNICEF for necessary information.

The communication campaign raised awareness of arsenic contamination in the upazila and created demand and interest in tubewell water testing and other arsenic mitigation activities.

Training on tubewell water testing

The testers to test tubewell water was selected by BRAC taking into account the suggestions and recommendation of the UAMC. The possibility of implementing the national framework for arsenic testing designed by the LGD (4 testers per ward - 2 male, 2 female) was tried out at the time of selecting testers. Tubewell water testing training was conducted for the selected village level workers by BRAC, with DPHE supporting. The testing procedure was little complex and an important task of the project.

Blanket tubewell testing

In a campaign style approach, the village level workers carried out blanket tubewell testing. Tubewell testing in itself created further awareness of the arsenic problem and created demand for alternative sources of water in the affected areas. Test kits were provided by UNICEF-Bangladesh.

Result of tubewell testing was recorded on the standard format developed by BAMWSP. Tubewells were numbered following the Bangladesh Bureau of Statistics (BBS) system currently in use by BAMWSP. Results of tubewell testing database of the 4 upazilas were provided in soft copy in time to UNICEF following the software supplied by UNICEF.

Tables 1-5 show the results of the tubewell testing for arsenic in water. Union-wise results of tubewell testing for arsenic are shown in the Table 1-4. A total of 85937 shallow tubewells were tested in the four upazilas. Results of testing for arsenic in the tubewell water revealed that there are some variations in the level of contamination in four upazilas. The rate of contamination is high in Bhanga (91%) and followed by Haimchar (86%), Barura, (73%), and Monirampur (51%). Handset deep tubewells found in the four upazilas were tested for arsenic. In Bhanga upazila all the handset deep tubewells (99) were found to be safe whereas some were found unsafe in the other upazilas. The average depth of all the handset deep tubewells ranged from 600 to 800 ft.

Although the number of irrigation wells found in Bahnga, Monirampur, and Barura ranged from 2666 to 8860 but only one irrigation tubewell was found in Haimcahar and it was arsenic contaminated. In Bhanga and Haimcahr all the irrigation wells were found 100% contaminated and 93% in Barura. Average depth of the irrigation wells ranged from 90 ft to 100 ft. These were installed during 1995 to 2002.

Table 1: Union-wise tubewell testing results (located in household and institution) of Bhanga upazila.

Sl. No.	Name of Union	Total tubewell tested	No. of tubewell contaminated (%)
1	Bhanga Municipality	3023	2820 (93)
2	Algi	2128	1991 (94)
3	Chumurdi	899	882 (98)
4	Gharua	2080	2028 (98)
5	Hamirdi	1636	1510 (92)
6	Manikdha	1702	1501 (88)
7	Nurullahgonj	1617	1566 (97)
8	Kawali Bera	1643	1432 (87)
9	Chandra	1215	1150 (95)
10	Azimnagor	1326	979 (74)
11	Kalamridha	1458	1250 (86)
12	Tuzarpur	989	931 (94)
13	Nasirabad	1287	1087 (84)
Total		21,003	19,127 (91)

Table 2: Union-wise tubewell testing results (located in household and institution) of Barura upazila.

SI. no.	Name of Union	Total tubewell tested	No. of tubewell contaminated (%)
1	Adra	2202	2160 (98)
2	Galimpur	2992	2826 (94)
3	Jalam	1541	1494 (97)
4	Chitadda	1165	1111 (95)
5	Daura	640	591 (92)
6	Pourashava	3080	1546 (51)
7	Shilmuri(N)	1290	315 (24)
8	Shilmuri(S)	2173	589 (27)
9	Adda	2229	2202 (99)
10	Payelgasa	1965	1870 (95)
11	Laxmipur	1593	1550 (97)
12	Khosbas(N)	1616	1355 (84)
13	Khosbas(S) (Mohespur)	1070	834 (78)
14	Aganagar	1317	218 (17)
15	Bhabanipur	1466	201 (14)
Total		26,339	18,870 (72)

Table 3: Union-wise tubewell testing results (located in household and institution) of Haimchar upazila.

Sl no.	Union	Total tubewell tested	No. of tubewell contaminated (%)
1	South Algi	1243	1187 (95)
2	North Algi	731	714 (98)
3	Char Bhairabi	1137	1045 (92)
4	Gazipur	17	0
5	Nilkomol	410	153 (37)
6	Haimchar	47	0
Total		3585	3098 (86)

Table 4: Union-wise tubewell testing results (located in household and institution) of Monirampur upazila.

Sl. No.		Total tubewell tested	No. of tubewell contaminated (%)
1	Shaymkur	2336	1843 (79)
2	Moshchim Nagar	3040	1989 (65)
3	Horihar Nagar	2771	1605 (58)
4	Monoharpur	815	255 (31)
5	Horidas Kathi	1623	582 (36)
6	Kulatia	1156	404 (35)
7	Dhakuria	1829	753 (41)
8	Khedapara	2423	1376 (57)
9	Durba Danga	1742	1028 (59)
10	Khanpur	2129	1618 (76)
11	Chalua Hati	2127	1069 (50)
12	Monirampur	1463	645 (44)
13	Jhanpa	3091	1766 (57)
14	Monirampur Poursobha	2489	1201 (48)
15	Rohita	2691	817 (30)
16	Kashimnagar	1259	524 (42)
17	Bhojgati	1107	357 (32)
18	Nehalpur	826	128 (15)
Total		34,917	17,960 (51)

Table 5: Results of different types of tubewell testing for arsenic in four upazila.

Sl no.	Activities	Achievement (%)			
		Bhanga	Monirampur	Barura	Haimchar
1	*Total No. of tubewell tested	23,669	44,143	29,801	3,588
	>50ppb (painted red)	21,780 (92)	22,637 (51.3)	22072 (74)	3,101 (86)
	<50ppb (painted green)	1,889 (8)	21506 (48.7)	7729 (26)	487 (14)
	Tubewell re-testing	1,005	1754	346	180
	Tubewell lab. testing	500	500	500	300
	No. of Tubewell out of order	1,397	745	1308	256
2	Deep hand tubewell tested	99	158	41	80
	>50ppb	0	8 (5)	5 (13)	1 (1)
	<50ppb	99 (100)	150 (95)	36 (87)	79 (99)
	Tubewell out of order	4	0	4	0
	Average depth	800 ft	767 ft	700 ft	600 ft
	Year of installation	2,000	1992-2001	2000	1997-2002
3	Irrigation tubewell tested	2,666	8860	3462	1
	>50ppb	2,653 (99.5)	4611 (52)	3202 (92)	1 (100%)
	<50ppb	13 (0.5)	4249 (48)	260 (8)	0
	Tubewell out of order	80	273	155	0
	Average depth	100 ft	100	90	95
	Year of installation	1995-2001	1995-2002	1994-2002	2000

* Deep hand tubewell and irrigation tubewells wells are included.

Validity of field level tubewell testing with the laboratory testing

It is to be mentioned here that although 2% of the tubewell per upazila was to be re-tested by laboratory using AAS but later on, for research interest, to see whether any seasonal variation occurs in concentration of arsenic in tubewell water samples were tested in three different seasons during the project period. The first and second rounds testing were completed and the results shown in the Tables 6 and 7. The third round sampling is going on and it is delayed due to rainy season.

To validate the field test results of the tubewell testing by the field testers, samples of tubewells were selected randomly and sent to the laboratory for analysis using AAS (Atomic absorption spectrophotometry). Results of the laboratory test are shown in the Table 6-7. A total of 180 green marked and 421 red marked tubewells from all the four upazilas were re-tested in the laboratory in December 2001. These tubewells were again re-tested in March 2002 to see whether any seasonal variation occurred in the concentration of arsenic in the tubewell water. It was found that the field testers did reasonably well in testing the tubewells. The percentage of correctly tested tubewells (green-green and red-red) was 92% and 90-91% respectively (Table 7). This percentage of accuracy in testing tubewells by the field testers is higher than that in the action research project of BRAC conducted in Sonargaon and Jhikorgachha (Chowdhury AMR, 2000). Table 6 shows that the highest accuracy in green-green was found in Manirampur upazila (94%) and the lowest was in Haimcahr (87%). There was no significant seasonal variation in concentration of arsenic in tubewell water.

Table 6: Validity of field level tubewell testing in different season of the four upazilas.

Upazila	Results of tubewell testing by VHWs using Merck (<i>sensitiv</i>) kit		Re-tested using AAS			
			Green (<0.05 mg/L)		Red (\geq 0.05 mg/L)	
	Paint	No. of tubewell	Dec '01	Mar '02	Dec '01	Mar '02
Monirampur	Green	50 (100%)	47 (94%)	49(98%)	3 (6%)	1(2%)
	Red	117 (100%)	107 (91%)	103(88%)	10 (9%)	14(12%)
Barura	Green	50 (100%)	48 (96%)	47(94%)	2 (4%)	3(6%)
	Red	117 (100%)	111 (95%)	113(97%)	6 (5%)	4(3%)
Bhanga	Green	50 (100%)	45 (90%)	43(86%)	5 (10%)	7(14%)
	Red	117 (100%)	104 (89%)	102(87%)	13 (11%)	15(13%)
Haimcahr	Green	30 (100%)	26 (87%)	27(90%)	4 (13%)	3(10%)
	Red	70 (100%)	61 (87%)	59(84%)	9 (13%)	11(16)

Table 7: Validity of field level tubewell testing in different season of in the project .

Results of tubewell testing by VHWs using Merck (<i>sensitiv</i>) kit		Re-tested using AAS			
Paint	No. of tubewell tested	Green (<0.05 mg/L)		Red (≥0.05 mg/L)	
		Dec '01	Mar '02	Dec '01	Mar '02
Green	180 (100%)	166 (92%)	116 (92%)	14 (8%)	14(8%)
Red	421 (100%)	383(91%)	377(90%)	38 (9%)	44 (10%)

Formation of committee and conduction of meeting

Different types of committees among the representative from the different stakeholders were formed. The committees in the project areas were as follows

1. Upazila Arsenic Mitigation Committee (UZAMC)
2. Union Arsenic Mitigation Committee (UAMC)
3. Ward Arsenic Mitigation Committee (WAMC)
4. Village Arsenic Mitigation Committee (VAMC)

Achievement in formation of arsenic mitigation committees was 100% at the Upazila level to Ward level in all the four upazilas. In case of formation of VAMCs achievement was from 84 to 100% in the project areas. Success in fulfilling the target of organizing meeting in the committees ranged from 63 to 95% in the villages of the project areas. Achievements of the project activities are shown in the Table 1.

The arsenic mitigation committees organized the meetings to take the initiatives for their locality regarding the arsenic problem. In the meetings they usually decided the type of options, sites for installation of the options, collection of the contribution money for the safe water option, and management of the options. The VAMCs conducted special meetings to follow-up the activities of the project and other committees. Awareness raising meetings on arsenic problem were conducted

informally by the project staff. The project staff also discussed the arsenic issue with the people found in their working areas.

Formation of Village Arsenic Mitigation Committees (VAMC) *

Once the extent of the problem was identified and the awareness level has been raised upto a certain level, village level committees were formed. Wherever possible these committees were formed based on the existing committees and CBO's at village level, who were found to be representative of the local community. Local UP members was included in these committees.

In the areas where no committees existed, BRAC through a participatory process formed new committees with the local community. BRAC staff jointly with the respective UP member called on a meeting at each of the villages and a committee was formed in each villages based on the nominations and recommendations of the villagers.

Village level committees consisted of village level workers, local teachers, imams, arsenicosis patients and leaders of community. The inclusion of women representation and poor communities in these committees was ensured.

Once selection of the members for the VAMC was completed, village meetings were held in order to initiate discussion on the results of tubewell testing in the community and about the possible alternative water supply technologies available.

Once the villagers are aware of the degree of arsenic contamination in their village, BRAC field staff provided information to villagers on alternative water supply technologies available, costs to the community, implementation procedures and operation and maintenance requirements. The WHO protocol for arsenic mitigation technologies were used and participatory techniques were introduced to assist the villagers in this process. Table 8 shows the number of the different types of committees formed and the meetings held in the project areas.

Based on assessment of available resources and information provided on alternative sources of water, the community and individual households decided upon which options to pursue.

Table 8: Formation of different level committees and number of meetings held.

Sl. No.	Activities	Achievement (%)			
		Bhanga	Monirampur	Barura	Haimchar
1	Upazila committee formed	1 (100)	1 (100)	1 (100)	1 (100)
2	Union committee formed	13 (100)	18 (100)	15 (100)	6 (100)
3	Ward committee formed	117 (100)	162 (100)	135 (100)	54 (100)
4	Village Arsenic mitigation Committee formed	208 (100)	212 (83)	317 (94)	47 (100)
5	Upazila coordination meeting	10 (83)	11 (92)	8 (80)	8 (80)
6	Union Committee meeting	74 (54)	19 (86)	133 (63)	41 (88)
7	Ward Committee meeting	227 (84)	144 (89)	665 (65)	146 (84)
8	Follow-up meeting of VAMC	313 (91)	212 (83)	317 (94)	90 (80)
9	Awareness raising meeting	7450 (77)	587 (95)	4,354 (88)	250 (95)
10	Courtyard session	1431 (90)	551(95)	25,899 (87)	113 (84)

Training on communication

Training on communication was imparted for different stakeholders including village health workers, UP chairmen, members, health and family planning workers, block supervisors, tubewell mechanics, Imam of the mosques, head teachers, primary school teachers, and NGO workers. Achievement of training is shown in the Table 9. While working at villages the project staff found that effective for the participants in disseminating the messages on arsenic to the villagers specially to the Imams and school teachers.

Table 10: Other awareness raising activities.

Sl no.	Activities	Achievement (%)			
		Bhanga	Monirampur	Barura	Haimchar
1	Popular theatre staged	43 (91)	126 (84)	55 (93)	35 (67)
2	Village resource map	206 (100)	93 (86)	200 (100)	41 (87)
3	Display Board distribution	15 (100)	21 (100)	17 (100)	8 (100)
4	Folder bag distributed	52 (100)	40 (83)	64 (100)	28 (100)
5	Leaflet distributed	32,800 (100)	56000 (85)	61,500 (99)	42,400 (100)
6	Flash card distributed	156 (100)	206 (93)	195 (100)	78 (100)
7	Prayer time clock distributed	130 (100)	135 (96)	140 (100)	140 (100)
8	Routine card distributed	2000 (100)	2000 (100)	2000 (100)	2,000 (100)
9	Different types of poster distributed	5,520 (100)	6100 (97)	5800 (100)	2,560 (100)

Need assessment of safe water options

Assessment of need of safe water options was done through PRA technique in the project areas. Firstly various types of safe water options and their advantages and disadvantages were discussed with the villagers. Then the villagers were asked to express their preferences for safe water options. After that requirement of the options was determined in consultation with the villagers. Finally, the types and number of the safe water options were approved by the UAMC. The types and the number of the options are shown in the Table 11-14.

Experiences revealed that each of the unit of rain water harvester, pond sand filter, dugwell and deep hand tubewell will serve safe water to about 1-5, 40 to 50, 5 to 10 and 40 to 50 families respectively.

Table 11: Demand for different safe water options in Bhanga upazila.

Sl. No.	Union	Total population	People exposed	Options preferred				Population served
				RWH	PSF	DW	DTW	
1	Bhanga Municipality	17,283	16863	112	0	17	60	16692
2	Algi	19,308	18703	0		25	76	20500
3	Chumurdi	6,497	6363	0	0	6	20	5360
4	Gharua	24,165	23593	0	0	5	96	24300
5	Hamirdi	12,662	11935	0	0	22	48	13320
6	Manikdha	13,174	12799	0	0	13	57	15030
7	Nurullahgonj	19,375	18901	2	3	20	79	22012
8	Kawali Bera	13,927	13180	0	0	14	45	12090
9	Chandra	12,571	120207	18	0	12	38	10328
10	Azumnagor	5,101	4632	0	0	4	23	5990
11	Kalamridha	11,448	10420	4	0	7	41	10694
12	Tuzarpur	11,711	11027	2	0	8	39	10242
13	Nasirabad	12,139	11406	39	0	13	41	11264
Total		179,361	172028	177	3	166	663	177822

Table 12: Demand for different safe water options in Barura upazila.

SI. no.	Union	Total population	Popu. Affected	Options proposed by the UAMC				Population served
				RWH	PSF	DW	DTW	
1	Adra	13382	13134	0	1	0	73	18600
2	Galimpur	49949	47238	19	44	0	108	42514
3	Jalam	32309	29996	15	14	0	54	18490
4	Chitadda	20323	18397	5	8	0	40	12830
5	Daurà	8184	7732	0	0	0	32	8000
6	Pourasaba	11241	10819	0	4	0	40	11400
7	Shilmuri(N)	1061	937	0	0	0	4	1000
8	Shilmuri(S)	1030	948	0	1	0	5	1600
9	Adda	30183	29792	0	18	0	61	21550
10	Payelgasa	16667	16004	0	14	0	64	20900
11	Laxmipur	28872	28470	13	18	0	68	23378
12	Khosbas(N)	27912	26440	4	9	0	75	21924
13	Khosbas(S) Mohespur	10325	9373	2	0	0	48	12012
Total		251438	239280	58	131	0	672	214198

Table 13: Demand for different safe water options in Haimchar upazila.

Sl. No.	Name of Union	Total population	People exposed	Options preferred				Population served
				RWH	PSF	DW	DTW	
1	South Algi	28,800	26,414	4	17	0	60	20974
2	North Algi	36,856	32,527	7	26	0	64	25142
3	Charbhairabi	35,548	31,696	44	17	0	81	32464
	Total	101,204	90,636	55	60	0	205	78580

Table 14: Demand for different safe water options in Monirampur upazila.

Sl. No.		Total population	People exposed	Options preferred				Population served
				RWH	PSF	D/W	DT/W	
1	Shaymkur	21266	20416	0	0	1	36	12060
2	Moshim Nagar	13838	11595	0	1	0	19	5100
3	Horihar Nagar	9418	8106	0	0	0	11	2750
4	Monoharpur	527	516	0	0	0	2	500
5	Horidas Kathi	2865	2447	0	0	0	5	1250
6	Kulatia	1557	1388	0	0	0	7	1750
7	Dhakuria	1768	1598	0	0	0	3	750
8	Khedapara	5533	5405	0	1	0	10	2850
9	Durba Danga	12970	11542	1	0	0	22	5506
10	Khanpur	11926	11058	0	1	3	26	7030
11	Chalua Hati	6850	6482	0	1	1	10	2910
12	Monirampur	1045	867	0	0	0	3	750
13	Jhanpa	1235	1062	0	0	0	2	500
14	Monirampur Pourasobha	1519	1413	0	0	0	3	750
	Total	92317	83895	1	4	5	159	44456

Issues encountered

The following issues were encountered during the course of the project implementation below.

- Number of communication materials like routine card, flash card, leaflet, posters were not adequate in number.
- Although training was arranged for the communication officers of the project but there was no manual for using these materials in written form.
- Although the Imams of the mosques were found very vital in disseminating the messages on arsenic it was not possible to give orientation and training due to inadequate logistics.
- The owners of the restaurant or the teashop were found erasing red paint of the tubewells which were found arsenic and they marked those tubewells with green paints.
- In few cases the members of the committees did not work spontaneously since there was no provision of incentive as they expected against their services.

Lessons learnt

- Joint collaboration among the agencies of government and non-government organizations in implementing the arsenic project were found very effective and encouraging.
- Since the problem of arsenic poisoning is new to the country and devastating in its nature people were found to respond quickly in initiatives taken in the project. They participated at the different stages of the project activities spontaneously.
- People exposed to arsenic were willing to share contribution money for installation of arsenic safe water projects. The villagers were more interested to share the cost for deep tubewells rather than pond sand filter (PSF), rain water harvester and chemical based treatment units.
- Provision of training/orientation and materials for all Imams, schoolteachers (Primary and Secondary) could work as reinforcement to the effective in communication activities for raising awareness among the people.

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