Arsenic Contamination in Ground Water: Assessment on Mitigation Approaches in Bangladesh

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To Whom It May Concern

This is to certify that the M.Phil dissertation entitled 'Arsenic Contamination in ground water: Assessment on mitigation approaches in Bangladesh' submitted by Sheshir Gosh, Department of Sociology, University of Dhaka, has been prepared under my direct supervision. To the best of my knowledge, no other research has been done on this title.

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Declaration

I declare that I am Sheshir Gosh, Department of Sociology, University of Dhaka, submitting the dissertation on 'Arsenic Contamination in ground water: assessment on mitigation approaches in Bangladesh' for the partial fulfillment of obtaining M.Phil degree from the University of Dhaka.The dissertation has been prepared under the direct supervision of Professor Mahbuba Nasreen, Department of Sociology,University of Dhaka. To the best of my knowledge, no one has done research under this title and any kind of publication has been presented to any university or institution.

SHESHIR GOSH

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Dedicated to

My Parents

Acknowledgement

In acknowledging the support I have received from others in the work presented here, I must begin by recording that my greatest debt is to Professor Mahbuba Nasreen, who inspired me to select such a burning issue "arsenic" as topic of my M.phil dissertation. She is one of the best sociologists in Bangladesh and her ideas continuously influenced me to carry out the present research. I have been privileged to receive comments, suggestions, questions and encouragement from a large number of people, all of which have been very useful. It is almost impossible for me to express my gratitude to ITN, BUET for the financial support to conduct the field study. DPHE, Dhaka Community Hospital, and Dhaka University Library have provided me with useful materials, I would also like to extend my thanks to all of them. Last, but not least I have received lot of supports from the respondents and participants of the study, without which the study would not have been completed. I am also thankful to the authority of Tala Health Complex who have introduced me with the villagers and study participants.

Sheshir Gosh

Abstract

Groundwater is an important natural resource for most parts of the world. It is often the primary source for domestic and industrial water supply besides its growing demand for agriculture. With increasing exploitation of groundwater resources, a wide range of problems related to quantity as well as quality has emerged during the past three decades.

The health effects of Arsenicosis is a function of time of exposure and the most priority remedial action is to provide Arsenic safe(As-safe) drinking water to the affected population. The magnitude of the human tragedy will depend on the rate of implementation of the mitigation programmes. Several available mitigation options have been developed and provided in the rural areas of Bangladesh. Arsenic contamination of ground water has a social dimension.

Arsenicosis patients often consider themselves burden on family. Affected people are barred from coming out from their houses. The adults are not allowed to move freely at markets or work places. Neighbours do not even allow the arsenic patients to use the water of their tube-wells. People do not want to interact with an arsenicosis patient. Even Children are terminated from schools if their families have arsenicosis patients.

There are two ways to prevent arsenic related health problems – to stop drinking arsenic contaminated water and to take nutritious food. In the study areas most of the people do not know about arsenic contamination and do not take necessary step against it. They think that they will be cured naturally without taking medicine.

The study reveals that although some NGOs have arranged pure drinking water, which is very insufficient in terms of need. Large number of arsenicosis patients is drinking water from the same sources even after being affected with arsenicosis from the source.

It has been observed that arranging marriage for the affected young, especially for girls become very difficult, guardians often need to hide information to the groom's family and pay a higher rate of dowry to the groom's family. In some cases young women remain unmarried who are severely affected with arsenicosis.

Unfortunately, acceptability of the provided options was not encouraging. Instead, two new methods were emerged as people's driven initiative: switching the As-safe tubewells(TW) and lowering of TW depths to 50-100m by looking at particular type of sediment colours. The existing mitigation efforts are insignificant compare to the magnitude of the problem due to lack of a proper mitigation strategy. However, sustainability of the options is not possible without involving local communities in the implementation process and addressing the socio-economic constraints properly

The arsenic affected people are lacking valid and sufficient information regarding the mitigation of arsenic poisoning. Considering the disease as contagious because of extensive arsenic contamination of shallow tubewells a large segment of rural population including children has been in serious crisis in accessing arsenic free safe drinking water. Again lot of educational institutes in rural Bangladesh has also been lacking safe drinking water because of arsenic contamination of the existing water sources.

Despite knowing about arsenic people are generally reluctant to touch an arsenic affected people, take food with him and share bed. Marital connections with families of arsenic patients are very hardly found. Some people appear to regard arsenic-related illness as a 'curse of God' and may ostracise the afflicted.

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CHAPTER-ONE

An overview on the assessment on Mitigation approach and Socio-economic information of the study

1.1 Introduction

Bangladesh is facing a drinking water crisis from naturally-occurring arsenic in groundwater that provides drinking water to millions of people. It is estimated that between 25-30 million people are at risk of consuming contaminated water with arsenic levels greater than the Bangladesh government standards (Ahmed et al. 2005). Groundwater became widely available through proliferation of tubewells (that pump up groundwater for consumption and use) in the last few decades. Mass campaigns were undertaken by the state, NGOs and donors to move the population away from consuming bacteriologically contaminated surface water sources to what was deemed safe groundwater (Ahmed & Ahmed 2002; Smith et al. 2000).

Arsenic contaminated tube well water was first detected in Bangladesh in early 1993. The arsenic comes from arsenic-containing material from adjoining rivers, which was deposited over many years . The excessive level of presence of arsenic in drinking water is redefining water from 'life saver' to a 'threat' to human survival (Nasreen, 2003). Arsenic contamination is not caused by tube wells, or by irrigation .Today, although 98 per cent of the population uses an improved drinking water source the safe water coverage of Bangladesh is 86 per cent3 because of arsenic contamination. In 2009, a household drinking water quality survey conducted by UNICEF found that 12.6%of drinking water samples still do not meet the Government drinking water standard for arsenic. This represents approximately 20 million people at risk of arsenic exposure. Over the past decade, the combined efforts of the Government and development partners have led to notable success in arsenic mitigation and a significant decrease in the number of people exposed to

arsenic. In 2009, a situation analysis of arsenic mitigation has found that there are a total of 705,094 public safe water options available since 1960s in all the arsenic affected areas in Bangladesh. However in the most affected areas, where more than 80 per cent tube wells are contaminated, only 4 out of the total 9 million residents have been provided with safe water options by the government. An urgent task is therefore to reach those people who are still without arsenic safe water in the highly contaminated areas.

One of the features of the institutional landscape is the very large number of agencies (governmental and non-governmental) engaged in arsenic-related interventions. Coordination is challenging because of the multi- sectoral nature of the problem. In 2004, the Government of Bangladesh has formulated the National Policy for Arsenic Mitigation which was translated into the Implementation Plan for Arsenic Mitigation. An Arsenic Policy Support Unit (APSU) and a National Committee for the Implementation Plan for Arsenic Mitigation (IPAM) was established. However, today the APSU no longer exists and the committee is inactive. Policies for the three different sectors affected by arsenic contamination in ground water, namely the National Agriculture Policy, National Water Policy and National Health Policy, do not include provision for arsenic mitigation. In 2009, the Policy Support Unit of the Local Government Division of the Ministry of Local Government, Rural Development and Co-operatives called for a review of the IPAM. This represented an important step in revigorating arsenic mitigation efforts.

The present research will explore the arsenic contamination of ground water and the mitigation approaches available to the people of two Upazillas in Bangladesh. Hanchett (2003) argued that there is a gender side to the arsenic problem because women and men are affected in different ways. "Women who do know about the problem and wish to do something about it are faced with new demands on their time as they search for safer drinking/cooking

water sources. Poor women also face insults – a problem they were able to avoid once they no longer needed to ask more affluent neighbors to share their safer wells".

In this research an attempt has also been made to explore how the people cope with arsenic contamination of ground water. It tried to identify the socio-economic impacts of arsenicosis and the gender specific response to this catastrophe. A comparative analysis will be done between the responses of women and men in two of the selected arsenic prone villages in Bangladesh located in Laksham of Commilla and Tala of Satkhira districts.

1.2 Rationale of the Study

Social aspects of arsenicosis have not specially attracted attention as of technical and scientific issues related to arsenic contamination in drinking water. It can be argued that social aspects must be adequately addressed to understand impact of arsenicosis. This is because arsenicosis has serious social and economic consequences of which social exclusion is common. The poor are greatly affected with arsenicosis and have limited access to water supplies. The social problems inflicted by arsenicosis include the dissolution of marriage or difficulty in marriage, termination from schools, firing from jobs and segregation by the community people. Access to health care services is very difficult for the poor. Besides the voice of women in the planning of arsenic mitigation has been very limited. In the arsenic mitigation programme social issues of arsenic contamination of drinking water have to be addressed and adequately to overcome the challenges of arsenicosis.

Professor Rejuan Hossain and Borhanuddin (2001) conducted a research on social and psychological aspects of arsenicosis patients. The study argued that social and psychological scenarios of arsenicosis patients has a gender perspective. The authors concluded that women are worse victims of arsenicosis and subject to isolation, loneliness and psychological sufferings.

In her article Arsenic Contamination: Bangladesh Perspective Nasreen (2002) has elaborated the social impacts of arsenicosis. Some of the already identified social consequences of arsenicosis discussed by the author are: social instability, supersttion, ostracism, diminishes working ability, increasing poverty, job related problems, marriage related problems and impact of arsenicosis on women. Based on the available literature and prevailing conditions of the arsenic affected people, the present study will try to explore some of the arsenic mitigations options available in Bangladesh in general and to the study location in particular.The socio-economic impacts and coping strategies of people living with arsenicosis in two specific locations were also be explored.

1.3 Mitigation Initiatives and Projects

The Department of Public Health Engineering (DPHE), Director General of Health Service (DGHS), Bangladesh Water Development Board (BWDB) and Geological Survey of Bangladesh (CSB) are the key Government organizations that have been engaged in different arsenic related activities. The Bangladcsh Arsenic Mitigation Watcr Supply Project (BAMWSP) is the largest arsenic project undertaken by the Government and started in 1998 with the financial assistance of the World Bank and Swiss Agency for Development and Cooperation (SDC). BAMWSP took a lead role and coordinated the blanket screening throughout the country, which involved the testing of tube-well, awareness campaigns and patient identification. BAMWSP also undertook some limited provision of alternative water supplies. BAMWSP developed an information centre-the National Arsenic Mitigation Information Centre (NAMIC). BAMWSP also formed several community-based organization (CBO) to ensure participation of the community in combating the problem and involving local government officials and the Union Parishad (A position paper, 2005). BAMWSP strengthened the capacity of DPHE and its officials at different levels by updating and installing the zonal water quality testing facilities and training.

Under BAMWSP there was also training of some health staff in patient idcnti lication and management.

1.4 Policy Initiatives

An Inter-Ministerial Secretaries Committee on arsemc was formed by the GOB Chaired by the Principal Secretary to oversee the development of a Policy and Implementation Plan for arsenic mitigation. This Committee was supported by a National Expert Committee (NEC), which was formed in 2000 and approved by the Secretaries Committee. The NEC supported on technical matters related to arsenic problem and mitigation and has been providing advises on different issues of arsenic problem. The NEC is composed of a multidisciplinary panel of experts of different academic institutions, research organizations, Government agencies and nonngovernmental organizations. The National Policy for Arsenic Mitigation and the Implementation Plan for Arsenic Mitigation in Bangladesh were published in 2004 and provided an overall framework for arsenic mitigation in the country. However, after the completion of BAMWSP, new initiative has been taken by GOB with the financial support of World Bank which is steel in the planning stage.

1.5 Non-Government Initiatives

A number of Non-Government Organizations have 'been active in arsenic' mitigation. The Asia Arsenic Network, World Vision, the NGO fo~m for DWSS, Dhaka Community Hospital, BRAC, Care Bangladesh, IDE Bangladesh, among others, have been engaged in different arsenic related activities in different arsenic contaminated areas of Bangladesh. These organizations have also engaged several other local NGOs as partners to carry out field level activities, particularly in the provision of alternative water supplies and awareness-raising. Several action research projects have also been conducted by these organizations.

1.6 Mitigation Options

The mitigation options include dug wells, rainwater sinking of deep tube well, re-excavation of well, digging new well and installation of a locally developed technology 'pond-sand-filter (PSF)' (Nasreen, 2003). The programme is supported by World Bank and 44 million-dollar is allocated to the Bangladesh Arsenic Mitigation Water Supply Project (BAMWSP) to launch the programme (The Daily Star, June 20, 2001). However, the options for mitigation are controversial because many researcher are strongly against installation of deep tube-well (Vorer Kagoj, April 13, 2001 and Prothom Alo, December, 17,2000). By the time of present research, the project cycle has been over.

1.7 Alternative Water Options

A total of 18 organizations have piloted different mitigation activities In arsenic affected areas of the country through a total of 47 projects and programmes. The organizations involved in provision of water supplies include OPHE, AAN, BRACK, BROB, BWOB, CARE, DAM, DASCOH, DCH, BAMWSP, EPRC, Grameen Bank, ICDDRB, IDE, ISOCM, MOH&FW, NGO Forum for DWSS, World vision with support from the Government of Bangladesh and different development partners. The development partners supporting these projects are AusAID, IDA, DANIDA, UNICEF, Harvard University, IDA JICA, MISERIOR, NIEHS, SAVE THE CHILDREN, USA. SOC, SDC, WHO, UNDP, Rotary Club.

1.8 Dug Wells

The dug well is the simplest technology of groundwater withdrawal. It has been used in many parts of Bangladesh before the introduction of shallow tube-well technology. Traditional dug wells earthen post are used to provide a lining and a bucket to withdraw the water. In an improved dug well, reinforced concrete is used and hand pumps installed to make the dug well more acceptable to the community.

1.9 Rainwater

The people of the coastal belt of Bangladesh have been using the rainwater as the source of drinking water for long time. Globally, rainwater is used as a source of drinking water where the ground water is unavailable, and surface water is highly polluted. Rainwater is abundant and free from iron, bacteria and other harmful material, although it can become rapidly contaminated in collection is not carried out properly and catchments maintained. Rainwater has a good potential for water supply in arsenic affected areas of Bangladesh.

1.10 Deep Tube-wells

In Bangladesh two types of deep tube-wells are installed, manually operated small diameter tube-wells similar to shallow tube-wells and large diameter power driven deep tube-wells called production wells. Deep tube-wells installed in those protected deeper aquifers where an aquiclude exists are producing arsenic safe water. In areas of Jessore and Sylhet where separating impermeable layers are absent and aquifers are formed by stratified layers of silt and medium sand, deep tube-wells are likely show increased arsenic contamination over time due to the mixing of contaminated and uncontaminated waters. The possibility of contamination of the deep aquifer by inter-layer movement of a large quantity of groundwater is also possible.

1.11 Arsenic Removal Technologies

Arsenic removal technologies have been distributed in different parts of the country on a pilot scale. Some of the technologies are imported from outside the country and some are developed inside the country. Arsenic removal technologies introduced by different organizations in Bangladesh principally based on four different process; oxidation/precipitation; were introduced in small and experimental scale. It is very important to consider several factors such as type of materials used in the system, availability of techniques and maintenance, replacement cost of materials, and environmental impact of the arsenic removal technologies.

1.12 Objective of the study

The broad objective of this research is to explore the problems of arsenic contamination in ground water and the available mitigation approaches .Selected options from each of the mitigation measures to assess the impact of the mitigation approach on people in the study locations were observed.The specific objectives are mentioned in the following:

1. To explore the mitigation approaches taken in the study areas by different organizations
2. To assess the knowledge of people on arsenicosis and mitigation options
3. To assess the impact of arsenicosis on the patients and families
4. To assess the coping mechanisms of arsenicosis patients
5. To assess the socio-economic impacts on the arsenicosis patients
6. To assess the (socio-cultural aspects of the respondents, health risks)
7. To assess the gender based impacts due to arsenicosis

1.13 Limitation of the study

Every research has some limitations to overcome; this present research has not gone beyond this limitation. Firstly-there is hardly any more research available on this subject, especially on mitigation approach.Many problems have been encountered in finding arsenicosis patients and also constraints of time for taking interviews.

CHAPTER-TWO

Methodology of the Study

CHAPTER-TWO

Methodology of the Study

2.1 Methodology

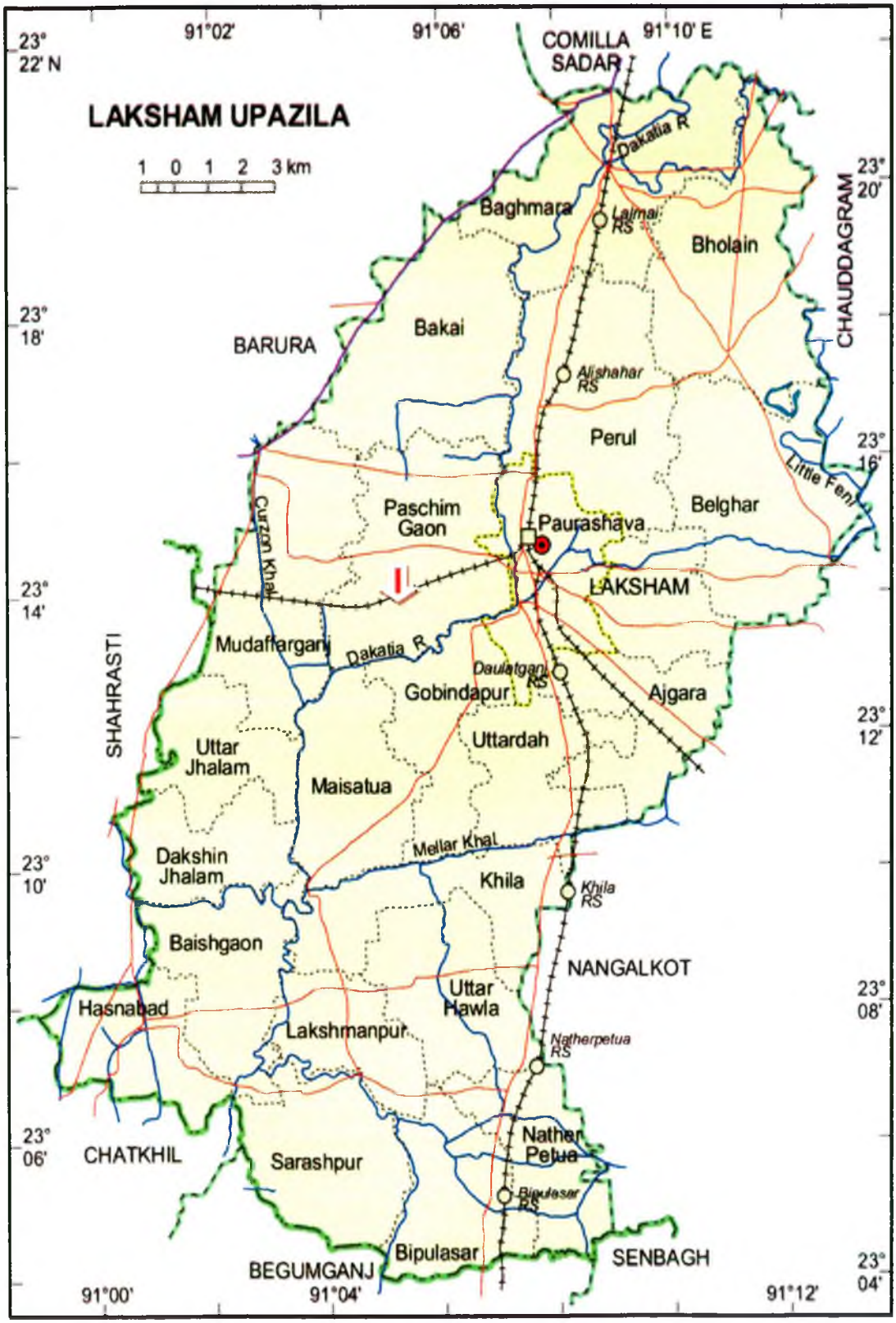
The data for this study have been collected from both Primary and Secondary sources. For Primary sources in depth information have been collected through a combination of quantitative and qualitative methods. The quantitative method included questionnaire survey and the qualitative survey was dependent on Key Informants Interviews (KII), Focus Group Discussion (FGD) and number of case studies. Arsenic victims of the two villages under two arsenic affected districts have been selected for the Primary source. Media coverage on arsenic victims, research reports and articles on both arsenic contaminations are the basis of secondary source of information.

The areas/fields for the empirical study were selected purposively based on the study objectives. Two of the arsenic affected Upazilas of two districts have been selected from the Upazila wise summery results developed by Bangladesh Arsenic Mitigation Water Supply Project (BAMWSP). The Upazilas were selected on the basis of number of arsenicosis patients identified by BAMWSP. It is evident from the data that Laksam of Comilla district is the mostly affected Upazilas, where the total number of people affected is 1791(women 1016 and men 775). The second highest number of patients identified by BAMWSP is 1023 (women 707 and men 316) and they are located in Senbag Upazila of Noakhali district. However, as both Comilla and Noakhali districts are in the same region, another district was selected from the northern region of Bangladesh, e.g. Tala Upazila of Satkhira. The Two of the study villages, mentioned earlier, were selected from the two upazilas based on the study objectives and availability of the respondents. The data were collected through well designed questionnaire for quantitative study (sample survey) and check list for qualitative study (FGD, KII etc.).

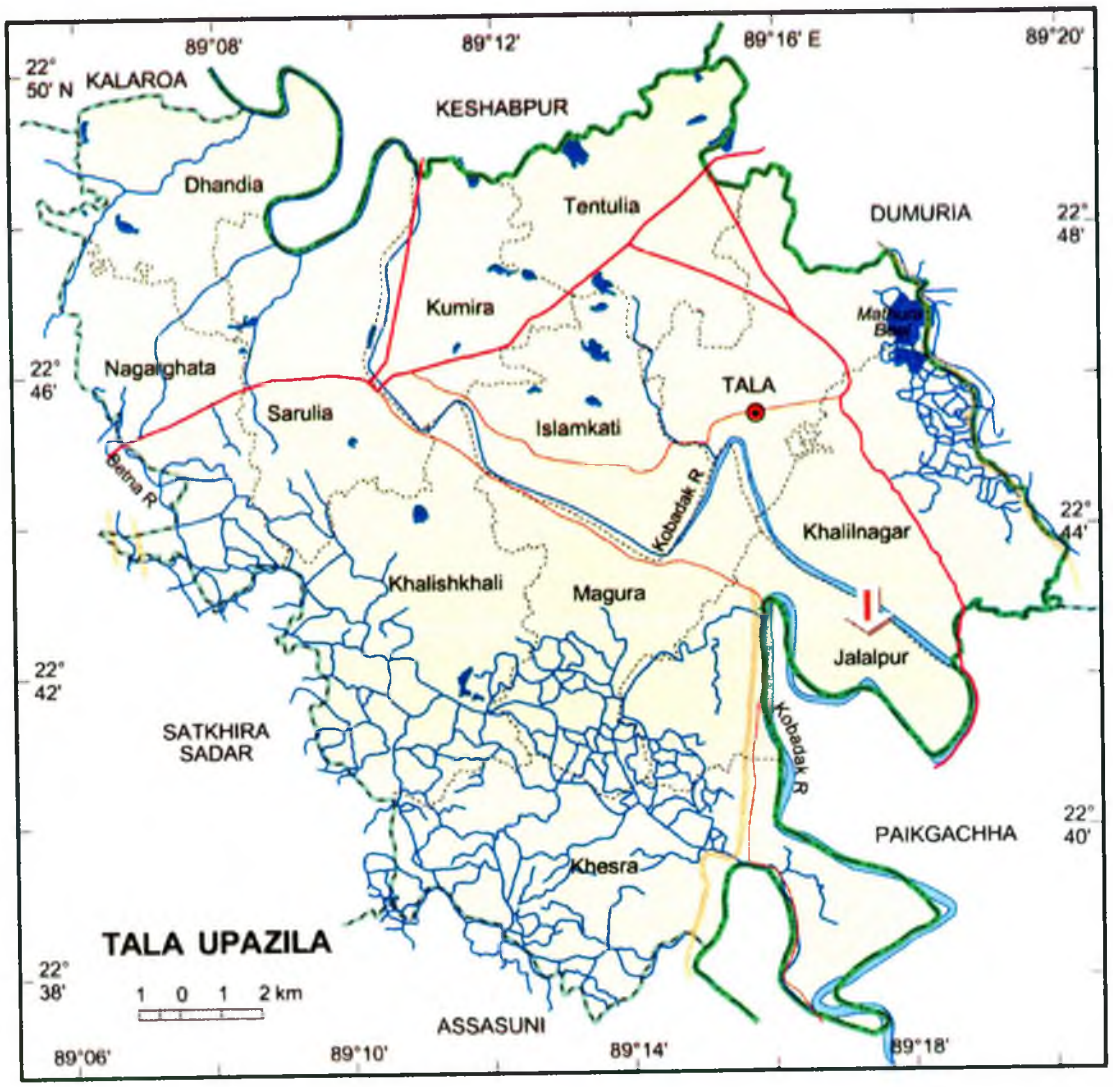
Map-1: Map of Bangladesh

study location Commilla

study location Satkhira



Map-2: Study location Laksham Upazilla



Map-3: Study location TALA Upazilla

2.2 Brief descriptions about study locations (Laksham, Comilla and Tala,Satkhira)

Eruaine is a village under number 3 Kandirpar Union and is 4 Kilometers away from Laksham, Comilla. Compared to the other villages of the same union, the number of the people affected with arsenicosis has increased to a great extent in this village for the last couple of years. Though symptoms of arsenicosis had been exposed ten years ago, it has taken much time for different. govt. and non-govt. organizations [DPHE, UNICEF, Dhaka Community Hospital and Columbia University] to make the people aware of the evil impacts of the disease. Still today, a large number of people of the study area do not know how to take care of the arsenic affected people. Govt. and non-govt. organizations tested almost all the tubewells in the union and found that more than 90 percent tube-wells were arsenic contaminated. According to survey, conducted by Bangladesh Arsenic Mitigation water supply project (BAMWSP) and Dhaka Community Hospital, total number of arsenicosis patients is 7013 at Laksham, which is the largest affected. In the study area alone the number of arsenicosis affected people is 413. It has been informed by the villagers that 11 tube-wells were tested in 1998, of which water of almost all the tube-wells was identified as arsenic-contaminated. According to a field test conducted by BAMWSP and DPHE, in collaboration with Dhaka Community Hospital in 2001, out of 557 tube-wells, 555 contain arsenic and only 2 were arsenic free, whose depth was 250 feet, and the average depth of the rest ones was 75 feet. At that time DPHE set up two deep tube-wells. However, people can not use those tube-wells due to the bad smell of cow dung and long distance and moreover, they contain excessive iron.

It will be appropriate to point out in this connection that South-Wells University had set up in the village a dug well as pilot case. However this is also out of order at present due to some unprecedented happenings taken

place among the villagers regarding the ownership of the land on which the dug-well had been set up. It would not also be irrelevant here to mention that extreme political conflict is prevailing across the village from which villagers have not been able to come out to serve the common interests of the village. As a result it has been observed that most caps of the taps have been stolen, and water supply of the dug well has come to a stand still. There was none to protect the well . Villagers informed that a Professor of California University, U.S.A had given 17 Sono-Filters to the villagers.

Most of the people in the study area earn their livelihoods through agriculture. However, majority people have no land of their own. Most of the people are wage labourers and work in other people's land. Moreover due to flood, the villagers are able to grow crops only once throughout the year. Most of the people of the village are poor with a limited monthly income of taka 3000. However their family expenses are in between taka 3000 and 4000. To meet the additional expenses they have to borrow money or take loan with high interest from the local money lenders and organizations. As they cannot have meals twice a day, it is quite impossible for them to have nutritional food after being affected with arsenicosis. Preventive measures were more necessary in this village. According to the calculation of DPHE, the number of the patients with arsenicosis is 292 but it has increased to 3553 (Pointed out by the representatives of the village), of which 557 have been diagnosed, 14 died and 3 people are in very critical condition.

The first preventive step against arsenicosis was taken by a group of young boys and girls who started making villagers aware of arsenic under the banner of an organization, RAM. Gradually different organizations extended their helping hands to the local people and started to conduct study. However, villagers complained that those people only came to take information from them and leave without doing anything for them.. At present Human power Development Centre, Kushtia, Prajukti Pith and NGO Forum are working at

the village and distributing medicine such as Rex and vitamin E tablets. Apart from the above mentioned organizations some institutions had taken blood and urine from the villagers. However, the villagers do not know what had happened afterwards.

Social Solidarity among the people of Eruaine village has not decreased significantly after the exposition of arsenicosis as more than one people in every family is affected with arsenicosis. Here, dowry is inevitable in marriage which has increased somewhat due to arsenicosis. Symptoms of arsenicosis differ from male to female. For females it is exposed in their sensitive organs which are not revealed before marriage. When it is exposed to the husband after marriage, the bride is considered to be a deceiver. Soma, Saleha, Selina and Moina are the shining examples of the victims of arsenicosis. Such gender dimension of arsenicosis is totally ignored by the organizations working in the locality.

Tala, Satkhira

Jalalpur union stands on the bank of the river Kapotakkho in the south western district of Bangladesh. Krishnakathi and Srimontakathi are the two villages in the Jalalpur union under Tala Upazila. Satkhira has been identified as arsenic affected for a long time and causing environmental damage and human sufferings. Though arsenicosis have not spread all over the villages, it has been very difficult to identify the arsenicosis patients moving door to door. That is why it was not possible to keep the study limited to a single village and for this reason two villages have been selected from the area. The villages have been selected based on the report prepared by the local hospital, which has been known to be taken steps to test the arsenicosis patients. The number of arsenicosis patients identified by the hospital on 30 December 2006 was 101, of which most of the patients live in the selected villages. The villages are 7-8 kilometers away from the Upazila head quarter. The communication system is not good as the roads of the villages are earthen. It

is difficult for any type of vehicle to move in the uneven roads and most people walk to move from one place to another.

Water becomes a big concern when it is arsenic contaminated. It disturbs normal life and becomes difficult for those who live on day laboring. The women of the households who are primarily responsible for procuring drinking water have to struggle more. They have to travel longer distances to collect drinking water. Moreover, as there is no alternative arrangement for getting arsenic free water in that area, finding no other way, women are bound to use pond water for cooking and performing their household chores. Women collect their drinking water from such sources which are not very deep. Recently a few families have started having pond water by boiling for 30-40 minutes, and a small number of families is using Sono-filters in order to purify water. However, women in poor families can not afford to use these measures.

Tube-wells have been tested two times: once by Department of Public Health and Engineering and later by a NGO. Almost all the tube-wells contain arsenic and iron above the tolerate level. Dug wells have been set up but are out of order now due to mis-management. Deep tube-well and pond sono filters are only the two sources of arsenic free water. According to local people as shallow machines are much more used for cultivation in that region, the level of arsenic has broken down and arsenic has increased..

In the study area about 80 percent people are living in poverty and below poverty line. Most of the people in the village live by farming and majority earn only to survive. Two areas of the two villages are seriously affected respectively. But the conditions of patients are very serious. The families are not in a position to properly look after the arsenicosis patients. In many cases the family size is large. Their socio-economic conditions are worse. Most of them do not take meals twice a day and are living with poor health, economic hardship and social insecurity. There is shortage of food and nutrition,

Medicare facilities are inadequate. The weakness of eye sight and slow physical movement are the common features of the arsenicosis patients.

It has been learnt that no step has been taken by the government to reduce this miserable condition. There is only one arsenic free tube-well in the Krishnakathi village which is a little away from the locality. Pond, sono-filters have been set up in few places. Villagers informed that a few months ago Uttaran, a local NGO has taken steps to look after arsenic affected people. However, no program has been taken yet. The condition of people is the same as before. No other initiatives have been taken by any other sources

2.3 Development of study instrument s and tools

A semi-structured questionnaire has been developed ,which has been contextualized by the pilot survey by collecting information through face-to-face interview with the respondents. The questionnaires has been pre-tested and revised on the basis of feedback received from field-testing.Before the main survey, a quick field visit to the selected study area gave an idea about the concentration of dwelling population and their characteristics. This also helped determine the way for approaching the ultimate study samples. The areas/fields for the empirical study were selected purposively based on the study objectives. The questionnaires were checked in the field by the supervisors for any inconsistency and incompleteness. Data entry and cleaning were done under the supervision of the researchers.

The quantitative questionnaires mainly covered the following information of study respondents:

1. Opinions on available mitigation options
2. Socioeconomic and demographic characteristics;
3. Current living conditions and livelihood activities;
4. Household information,
5. Water and Sanitation
6. Health and Hygiene
7. Disaster adaptation

2.4 Data Processing and Analysis

The analysis stage includes most intensive deskwork involving processing, synthesising and analysis of data and presentation in appropriate format for incorporating in the report. Data processing and analysis includes code construction, coders' training, coding, data verification and quality control, data punching, data processing and finally the analysis to facilitate the required output generation.

Computer aided data processing and analysis technique have been employed for which a systematic approach has been needed, where each activity has to be properly identified.

CHAPTER-THREE

Literature Review

CHAPTER-THREE

Literature Review

3.1Arsenic Mitigation Initiatives by Different Organizations in Bangladesh

It has not been possible to find out the exact consensus reason of why arsenic exists in the ground water of Bengal territory in spite of conducting research for the last 30 years. Whether the reason is detected or not, the fact that arsenic contains in the ground water is proved. But no unifying mechanism has been taken yet in mitigating arsenic contamination. GoB and NGOs are engaged individually with their own projects in mitigating arsenic both unsystematically and separately. Donor agencies have left aside the Government Organizations and choosen NGOs. Though DPHEs are associated with managing arsenic mitigation and water supply project but practically the functions of the department are almost inactive for corruption, unskillful and bureaucratic problems. On the other hand, most of the NGOs have no theoretical and practical knowledge

Arsenic Mitigation planning in most NGOs are high ambitious and intricately technology based .Most of them have no required knowledge to establish Arsenic Mitigation Plant such as collecting rain water, harvesting plant, Pond Sono Filter and Arsenic Removal Plant .So a major part of arsenic mitigation project is visibly confined in a written form.

In the process of implementation there are many technical and social faults. In the case of community based arsenic mitigation, there requires large water-works. To set up this waterworks, it is needed help from the local people. It needs 2 lac taka to establish Pond Sono Filter. It is not possible for them to bear such a big amount of money . Though well is cheap and reliable to dig ,NGOs use concrete built ring in digging well which is one of the sources of poisonous chemical PCB. In most areas in the name of testing water,it is

complained that NGOs have collected money from the local people .The poor people who have been failure in providing such money have not been tested water of their tube-wells.

While the situation of accessing safe potable water improved with increasing numbers of tubewells, the discovery of arsenic has challenged the provision of safe drinking water, as people face arsenic poisoning from consuming contaminated water. It is estimated that about 2 million tubewells are showing some level of arsenic contamination that is rendering them unsafe for consumption (Ahmed et al. 2005). As a result, accessing safe water sources has become a critical problem in many arsenic-affected areas.

Tubewell water was not tested for arsenic for years and arsenic was discovered in high quantities only in the 1990s. Arsenic occurs mostly in the shallow aquifers (approximately 10-70 meters below surface), which is where the vast majority of the drinking water tubewells tap into (Paul & De 2000; Alam et al. 2002; WSP 2002; Kinley & Hossain 2003). There is also considerable spatial heterogeneity in arsenic contamination levels across the country, and this variation can occur at small spatial scales (even sub-village scales). Thus, statistics of arsenic being present in 270 out of 464 Upazilas in the country need to be tempered with the fact that the level of arsenic as well as percentage of wells contaminated can vary considerably within each Upazila.

Official attempts at identifying contaminated tubewells have been to screen tubewells and paint contaminated ones red and usable ones green (i.e. below Bangladesh government's standards of 0.05 mg/L of arsenic). Due to the heterogeneity of arsenic inthe aquifer, there is spatial heterogeneity in both the distribution and clustering of red and green wells, as well as in the absolute quantities of arsenic in each well's water. Thus, in relatively low contamination areas, there can be clusters of 100% red wells (with arsenic at ranging from high levels to just above the standard); conversely, there may be all-green tubewell clusters in areas identified to be highly contaminated.

Thus, the scale of analysis and level of detail are important (also identified by Rosenboom 2004).

While identification of tubewells continues, identification of patients with arsenic poisoning is also underway. The official estimates indicate that up to 40,000 patients have already been identified, and such incidences are expected to rise as more patients are screened and identified. Present statistics indicate that there may be escalating cases of cancer from chronic arsenic exposure in the future.

Studies have found that social and economic loss for people in arsenic areas are acute and rapidly worsening (Ahmed 2002; WHO 2000). Poorer households have been found to have higher percentages of arsenicosis cases (Chakraborti et al. 2002; WHO 2000). Many rural areas where arsenic contamination is very acute with large numbers of arsenicosis victims, people have been reported to be shunned or ostracized (e.g. New York Times 1998; Jakariya 2003; NAISU Bulletins). While both men and women are suffering, recent research indicates that arsenic poisoning has led to greater ostracization of afflicted women and girls, whose marriageability has decreased and divorces increased. Social stigmatization is disproportionately felt by women in most arsenic-affected areas (Hanchett et al. 2002; Hanchett 2004; Sultana 2006a). Gendered location thus makes a difference in arsenic contaminated areas, where gender differentiated impacts are being observed.

Women's general lack of resources to deal with the ramifications of the arsenic problem can compound poverty and gender to increase their marginalization and suffering. The link between water, social hardship, and gender thus needs further investigation. Gendered analyses of the arsenic problem will provide information that has hitherto been inadequate in research and mitigation discussions in the country.

Scholars have generally noted that women, particularly marginalized and poor women, bear the brunt of environmental degradation and natural resources crises. Access to knowledge, information, management options,

choice and ownership of natural resources are complicated and vary by location, culture, institutions, and resources (Agarwal 1992; Rocheleau et al. 1996; Jackson 1993; Cleaver 2000). Gender is a critical factor in shaping how people access, control and use natural resources, technologies, and decision-making processes. Thus, the implications of water scarcity and water poisoning for women and men vary across social strata and locations, and need to be analyzed in context (Meinzen-Dick & Zwarteveen 1998; Van Koppen & Mahmud 1996; Jordans & Zwarteveen 1997; Bruns & Meinzen-Dick 2000).

It is also important to note that discourses of 'gender' are often problematically used in water resources management and development literatures to mean only 'women', whereas it should be a comparative study of both men and women in any given context and in relation to other pertinent axes of social differentiation, such as class, caste, age, etc. (Agarwal 1992; Cornwall 2000; Marchand & Parpart 1995; Mohanty 1991).

Increased use of community-based safe water options either will require new forms of village cooperation, or will place new responsibilities on existing local/social institutions. This shift in village life is recognised by mitigation programme planners; and many are trying to facilitate the development of water user groups and other potential management agents.

It is important to understand that, if they perceive a need to do so, Bangladesh rural communities have the capacity to mobilise themselves to resolve water resource management problems with little or no external assistance. Development agencies tend to be pessimistic about this potential, but there is clear evidence that it does exist. A persuasive study was done in the 1990s under the auspices of the Bangladesh Water Development Board's Systems Rehabilitation Project/SRP (Duyne 2004 and 1998). This study analyses a number of cases of large-scale, locally initiated surface water management activities to prevent flood damage, conserve water, improve irrigation, and so

on. More importantly, the study notes that rural people collectively and actively strive to manage their environment. Furthermore, local people are not passive in relation to external interventions in their regions; rather, they try to assess and even manipulate externally (including government) initiated projects in terms of their own perceived needs and interests. Most (if not all) regions have some respected leaders. These may be elected persons or others, who can and will act to protect or advance collective interests, frequent reports of local corruption and so on notwithstanding.

One report on the response to the arsenic problem in Charigram and Singair unions of Singair Upazila, Manikganj District, described a situation in which local people drew upon their past history with the Social Mobilization for Sanitation campaign and mobilised themselves. (Hoque 2000) The national campaign went on from 1988 to 1999 and reached these unions in 1995-97. The two unions had illiteracy rates (indicative of poverty) of 60% and 37% respectively. They had learned from the sanitation campaign how to form local action committees; and did so with apparent effectiveness. Local and Upazila/Thana government and elected officials were actively involved, as were the often-inactive WATSAN committees. Women and men both actively participated.

Overall, community and multi-partner participation in arsenic mitigation was high, as in the social mobilization for sanitation. Volunteer women, social and elected political leaders, schools students, and health workers participated in the planning, promotion and implementation of the activities as members of the UWATSAN (Union level) and VWATSAN (village level) Committees or as their nominated volunteers. The elected Union Parishad Chairmen and women volunteers played the key roles in planning and implementation of the activities. They discussed the impacts, mitigation issues, water supply options and sharing of the costs at courtyard and/or schools meetings. Selected messages were also disseminated through rallies and public announcements (mikings). The Sub-district Administrator (Thana

Nirbahi Officer) facilitated awareness, motivation, planning, coordination and monitoring at sub-district level. He also participated in mass awareness meetings. His involvement also influenced interest in other unions (Hoque 2000:489).

WELL (2002) reports on a programme from Banaripara Upazila, Barisal District, in which government officials, teachers, and others were interviewed long after the sanitation campaign. This study confirms that Social Mobilization for Sanitation did indeed activate people at all levels of government and society to work for sanitation improvements and lends credibility to the Manikganj situation description presented above.

In situations without such a history of self-mobilisation, external agents probably will be needed to help people to develop ways of managing their new community water sources. Facilitating such local group formation, however, is a very labour-intensive and time-consuming activity. It requires staff with appropriate negotiation and communication skills and a carefully managed process of building up trusting mutually respectful relationships with residents. Self-help is the objective, not just compliance with externally imposed ideas. There are wider social development benefits to be derived from this approach beyond the public health benefits. In the Asia Arsenic Network's rural piped supply project in Putkhali Union of Jessore District, for example, the pipeline committee is being encouraged to register with the Social Welfare Department and conduct various social development activities. At least one other local development project, LGED's Small Scale Water Resources Sector Development Project (SSWDRSP), has found that people's interest in single-issue committees or groups is likely to dwindle over time; so the cooperative associations formed under this project are encouraged to promote savings, micro-credit and other popular local improvement efforts.

Where there is a lack of either local leadership or external agencies to facilitate community involvement and participation, mitigation options when provided may still fail

In Bangladesh and West Bengal there are good community mobilisation models to follow, and effective techniques are documented (for example, see Watsan Partnership Project 2000a,b,c and UNICEF, in press). If the implementing agency works with partner organisations, it is of the utmost importance that they be genuinely willing to mix with local people, and that their work be closely monitored and objectively evaluated. Such methods have been followed in a number of programmes with reportedly good results. Benefits of a participatory approach are summed up in a report from the All India Institute of Hygiene and Public Health's Community Based Project to Mitigate Arsenic Pollution in West Bengal (Majumder and Kahali 2003:24):

'Earlier in the arsenic affected village people were contacted by various agencies for various purposes to relieve the people from arsenic problem. As a result people became confused. They could not decide whom to hear and what [was] to be done. In this project, a definite approach had been taken so that the health, technical, socio-cultural and economical aspects could be delivered from a single outlet in an integrated form. This obviously cleared much confusion of the community groups and they got much constructive guidelines on the dos and don'ts to get relief from the arsenic hazards. The benefits of this approach may not be very visible within such a short period but is expected at the end and would prove worthy for any community-based project or programme'.

3.2 Social Stigma of Arsenic Contamination

While addressing the problem of arsenic contamination, emphasis is being put on the identification, mitigation,and supply of safe drinking water. Arsenic is not only a physical but also a social phenomenon; the socialfallout of arsenicosis is enormous. The arsenic hazard has a strong social dimension,

affecting issues such as relationships within the family and the village, as well as the mental health of the sick.

Dr. Mahbuba Nasreen from the Department of Sociology, University of Dhaka, observed the social costs of arsenic contamination in the following forms: social instability, superstition, ostracism, marital problems, discrimination against women, increased poverty, diminished working ability, and death.

People with lesions from arsenic poisoning still suffer social stigma in Bangladesh, although the situation has improved. Ten years ago, many people believed arsenic poisoning was contagious or a curse. Parents were reluctant to let their children play with children suffering arsenic poisoning. Arsenicosis patients were shunned within their villages. For women, the situation was worse and remains an issue. In Bangladesh, a woman's attractiveness is often associated with the pale complexion. This makes it harder, in some cases impossible, for single women suffering from arsenic poisoning to marry. Once married, women face the risk of divorce if they develop arsenicosis skin lesions. This can be a dire situation in Bangladesh's male-dominated society, where unmarried women are more vulnerable to poverty and social exclusion.Lack of proper knowledge about arsenic contamination and unavailability of arsenic safe drinking water as well as proper treatment are creating extreme instability in the social life of the people in the arsenic-prone areas of Bangladesh. Moreover, social conflict over contaminated water contributes to destruction of social harmony and network relationships(Nasreen,2003).

3.3 Arsenic Mitigation Initiatives

The discovery of arsenic contamination in Bangladesh has resulted in an unprecedented response from the government of Bangladesh as well as from non-governmental organizations (NGOs) and development partners. A report from Water Aid Bangladesh (2000) summarizes some thirty-five large scale

projects for arsenic mitigation in Bangladesh.1 These projects have addressed specific issues relating to the arsenic problem. They could not find a single "master" technological solution to the problem, but a number of mitigation options have been developed to face the challenge of arsenic pollution.

Although arsenic in tube well water of Bangladesh was first identified in 1993, the issue became more public following a seminar at the School of Environmental Sciences (SOES), Jadavpur University,Calcutta in 1995.2 Since then, the government of Bangladesh became active in addressing the problem, and donors started pouring funds into projects to find a solution. NGOs and research organizations started conducting arsenic-related studies.

The government organizations working in the arsenic field include the Directorate of Health, Department of Public Health Engineering, National Institute for Preventive and Social Medicine (NIPSOM), Bangladesh Water Development Board (BWDB), Geological Survey of Bangladesh (GSB),and the Bangladesh Atomic Energy Commission.3 Among them, DPHE has a number of arsenic activities at various levels of implementation and is working with a wide variety of development organizations.4 DPHE has conducted, in collaboration with the British Geological Survey (BGS) and Mott MackDonald Limited, the most comprehensive and systematic survey throughout Bangladesh on arsenic. NIPSOM has so far done considerable work both in terms of identifying arsenic-affected patients and analyzing groundwater.5 The University of Dhaka, University of Rajshahi, and the,Bangladesh University of Engineering and Technology (BUET) are conducting studies on arsenic.NGOs are playing a pivotal role in addressing the arsenic menace. Dhaka Community Hospital,BRAC, Grameen Bank, NGO Forum, and BCAS are among the most active NGOs in this field.

Both the government and NGOs receive financial and technical support from international organizations and other development partners like the United Nations Children's Fund (UNICEF),United Nations Development Program

(UNDP), World Bank, World Health Organization (WHO),Department for International Development (DFID) of the UK, and the Swiss Agency for Development and Cooperation (SDC).All these initiatives are making significant contributions to the study of arsenic contamination in general, but lack of collaboration among different organizations is working as a barrier to those addressing the catastrophe.

3.4 Department of Public Health Engineering (DPHE)

Although in 1993 the presence of arsenic in tubewell water was first detected, the magnitude and extent of the problem was not known clearly before 1997. Various agencies and DPHE conducted tests of tubewellwater samples from different districts randomly and a comprehensive test could not be done due to lack of testing facilities in Bangladesh. DPHE with the donor agencies is conducting various survey, study and mitigation activities in the country. A brief on arsenic related projects is as follows;

Under the assistance of UNICEF the testing of arsenic in water sample of tube well water with field kit was started from July 1997 all over the country. Over 50 thousand tests were conducted and in 190 Upazilas presence of arsenic contamination was found. The survey indicated a contamination of 27% tube well among the tested wells. Under the project 170 exploratory drillings were done in arsenic problem areas, where 95% of the tube well having depth> 200m shows no arsenic contamination. Awareness building activities were also done under this project. The cost of the project was Tk 199.59 lac with PA Tk 134.00 lac. The project started on October 1996 and ended on June 2000. (Ahmed MF and Ahmed CF,et,2002)

DPHE-UNICEF action research project in 5 Upazilas : A project was implemented in 5 Upazilas of the affected areas. These are Manikganj, Sonargaon, Kochua, Bera and Jhekargacha. The activities were conducted by engaging 4 NGOs. The four major activities were conducted in these

upazilas. Those are awareness building, testing of tube well water sample and marking with paint the contaminated and uncontaminated tube well. Identification of patient suffering from arsenicosis and providing alternative water supply options particularly the demonstration of them. A total of 105179 tubewells have been tested and an average contamination of 60% was found. Under the project about 1.2 million people have been surveyed for arsenicosis and a total of 744 patients were identified. The project also provided 13,733 safe water options (28 deep tube well, 13 tube well sand filter, 13 dug wells, 266 rainwater harvesting tank, 52 PSF, 4 community type plant and 13357 – Kolshi filter) to the community for action research. The project was implemented as R&D activities and a follow up action program is continuing. Under the follow up programme, apart from the usual mitigation options, Mini piped water supply system is under implementation at Sonargaon Upazila. On the other hand, community based arsenic removal plants have been installed and under installation at Bera Upazila.

DPHE-UNICEF has started a similar program in 15 Upazilas under arsenic affected areas and an investment project for arsenic mitigation in 25 Upazilas will be taken up in the year 2002. A total of 7.5 US $ will be provided by UNICEF for this project. Under this project by November 2001 a total of 221174-tubewell water samples have been tested out ofwhich 70% were found contaminated (Ahmed MF and Ahmed CF,et,2002).

Under the assistance of British DFID, DPHE and British Geological survey conducted a systematic and comprehensive survey in 61 districts (except in 3 hilly districts). About 3500 water samples were collected from field and tested in DPHE laboratories in Bangladesh and BGS laboratory in England. The survey indicated that in 249 Upazilas of 61 districts the problem exists. But the magnitude of the problem is not same in everywhere. The variation of affected tubewell in Upazila varies from 1% to over 90%. The most affected areas lies in south south-eastern part of Bangladesh. In country context about

28% of the tested samples show arsenic concentration above the Bangladesh limit of 50 ppb. The study indicated the deep aquifer in the coastal belt is nearly safe to contamination (0.7% contaminated). The cost of the project was Tk 609.29 lakh with PA Tk 578.35 lakh. The project started on December 1997 and ended on March 2000. The combined survey of DPHEUNICEF- DFID identified 268 Upazila having arsenic problem in 61 districts (excepting 3 hill tracts districts).

DPHE under the assistance of JICA is conducting a study to investigate the deep groundwater and possibility to use it for the mitigation of arsenic problem in three western districts of Bangladesh (Jessore, Jhenaidah & Chuadanga). The study started on May 2000 and will continue up to March 2002. The out come of the project is yet to be finalized. The cost of the project is estimated of Tk 2599.04 lac with PA of Tk 2460.61 lakh. (Ahmed MF and Ahmed CF,et,2002)

DPHE-DANIDA Arsenic Mitigation Pilot Project: A pilot project under DPHE-DANIDA has been taken up in the south-eastern part of Bangladesh. The estimated cost of the project is about Tk 7070.57 lakh . The project is designed for three years and a half (upto June'2004) and will be implemented in two phases. The main components of the project will be Deep tube well, Mini piped water scheme, Household treatment unit. The project has started its activities in the project areas under DANIDA.

DPHE, under GOB-4 project is implementing several alternative water supply options like PSF, Ring well and Deep TW in arsenic affected Upazilas. No shallow tubewells are installed in these affected areas. DPHE under R&D activities conducted the following activities:

- Hydrogeological investigation at Chapai Nawabganj area with the Department of Geology, Dhaka University.
- Surface sounding at Bera Upazila to locate arsenic uncontaminated aquifers.

- Pathway investigation of arsenic contamination in production wells with the Department of Geology, Dhaka University.
- Use of activated alumina for development of household arsenic removal unit with BUET.
- Development of multimedia communication messages of arsenic, which are being used in awareness building activities.
- Random testing of 5 tubewell water samples in each village of arsenic safe 199 Upazilas to confirm the contamination level (Planned for 2002).
- UNICEF finances all the above R&D activities.
  (Ahmed MF and Ahmed CF,et,2002)

3.5 Bangladesh Arsenic Mitigation Water Supply Project(BAMWSP)

BAMWSP initiated a nationwide screening, community development and mitigation program. Screening of tubewells are being conducted in 147 Upazillas and 100 municipalities. Mitigation activities are going on in 35 Upazillas. Major planned activities include strengthening the capacities of local government institutions, establishing rural safe water supply management and providing necessary support to the communalities for building up their capacities in water supply management.

The project has under taken a program to cover 188 Upazillas for screening, community development and mitigation. Through this project, screening, community development and mitigation in 6 Upazillas have been completed. Screening of another 35 Upazillas have been completed, and community development and mitigation program of this component have been completed by June 2002. The screening, community development and emergency mitigation of another 147 Upazillas have been completed by June 2003(Ahmed MF and Ahmed CF,et,2002).

3.6 UNICEF

The WES program has adopted an integrated sanitation, hygiene and water supply demand-driven approach in partnership with other development partners. The program includes support for testing water quality and exploring alternate low-cost safe water technologies. Arsenic mitigation activities of the program includes improving water quality (including arsenic measurement, mitigation and research) to urgently address the problem of arsenic contamination, and the blanket testing of 1,000,000 tube wells in 45 Thanas (1/4 of the area affected), information and awareness campaigns, equipping zonal laboratories for water quality testing, training staff and providing alternative water technologies to affected communities. The program continues to work closely with the World Bank-supported Bangladesh Arsenic Mitigation and Water Supply (BAMWSP) project and with other international agencies and NGOs.

3.7 Bangladesh University of Engineering and Technology (BUET)

Bangladesh University of Engineering and Technology is conducting research in arsenic mitigation and some of the BUET technologies are under extensive field test in different parts of the country. BUET activated alumina unit has been tested in different regions of the country under rapid assessment of arsenic removal technologies conducted in Bangladesh and found very efficient in arsenic removal as a household arsenic removal technology (BAMWSP, DIFID and Water Aid, 2001). The unit has been modified based on the input from social studies conducted under the same assessment. The BUET modified bucket unit based on ferric chloride and potassium permanganate is working successfully for two years in Barura Thana in Comilla districts. The modified BTU has been found very effective in removing arsenic, iron, manganese, phosphate and silica. BUET has manufacture iron-coated sand for arsenic removal and experimental units based on iron-coated sand have been installed in rural areas. The arsenic-cum-iron removal unit designed by BUET is working in different parts of the

country. BUET has installed few experimental pond sand filters in the rural area with some modification in the existing design. BUET is also providing services to entrepreneurs in testing of arsenic removal technologies in laboratory and field conditions.

3.8 NGO Forum for Drinking Water Supply and Sanitation

NGO Forum has so far under taken seven projects and programs on arsenic mitigation. These activities range from installing alternative arsenic safe water sources to establishing an information support unit for NGOs. It is providing training for trainers in 147 Upazilas and 100 municipalities. NGOF has introduced a number of mitigation options including pond sand filters, arsenic removal plants, rainwater harvesters, dug wells, and piped water system.

3.9 BRAC

BRAC, in collaboration with DPHE and UNICEF, has been conducting an action research program on community-based arsenic mitigation in two Upazilas (Jhikorgacha and Sonargaon) since June 1999. The objectives of this project are to assess the technical viability and effectiveness of various alternative safe water options as well as their social acceptance. BRAC also screens tubewells for arsenic contamination, builds awareness among communities, identifies arsenic patients and provides medical care. BRAC has recently started to implement low-cost piped water supply schemes in several villages in collaboration with the Rural Development Academy and local communities. Under these schemes local communities contribute 20% of capital costs and 100% operations and maintenance costs of the projects.

3.10 Dhaka Community Hospital (DCH)

DCH is the pioneer organization in the field of arsenic mitigation in Bangladesh. DCH was one of the first institutions to detect arsenic patients in the country. Since then DCH has conducted arsenic detection and patient identification programs in many parts of Bangladesh. DCH also manages arsenic patients and build public awareness through its various programs.

3.11 Asia Arsenic Network (AAN)

The Asia Arsenic Network carried out a comprehensive project in Samta village of Jessore district. The project had been carried out for three years from March 1997 to February 2000 under promotion of the Toyota Foundation. Its purpose was to investigate the actual conditions and cause behind the arsenic contamination of groundwater, and take measures in coordination with local researches and residents. In April 2000, AAN started its "Mobile Arsenic Center (MAC)" activities. MAC is a comprehensive approach by a team of professionals in the medical, chemical, water supply engineering and awareness education fields. At the present moment, AAN conducted MAC programs in thirteen villages of Jessore, Jhenidah, Satkhira, Meherpur and Chuadanga.

3.12 Grameen Bank

In October 1997, Grameen Bank has started an arsenic mitigation pilot project with assistance of UNICEF and Department of Public Health Engineering (DPHE). The program was implemented in Kochua upazilla of Chandpur district. The first phase of the project was started in 20th August 1999 in three unions. In December 1999, the project area was extended into 12 unions. The main objective of the project includes screening of tubewells, awareness and capacity building of the community, and community-based solutions for arsenic contaminated areas.

3.13 PROSHIKA

PROSHIKA Manobik Unnayan Kendra is a national NGO primarily involved for human development in the country. For almost three years PROSHIKA has been involved in supplying safe water in arsenic affected areas through treatment of surface and arsenic contaminated waters. PROSHIKA has installed a large number of community and household based water treatment units in Bangladesh.

PROSHIKA has undertaken a project in collaboration with Canada Water Purifier Limited to manufacture as well as widely distribute a filter called "Bishuddha" in Bangladesh. Since inception in November 2000 more than 20,000 filters have been manufactured and more than 15,000 filters have been sold to NGOs, Government and others.

PROSHIKA has been pioneered the production of a kind of surface water treatment plant called 'Nirapad' in collaboration with a Belgium farm,'Altech'. The first plant was experimentally set up in Tungipara Upazila under Gopalganj district. Later, 1 in Monla, 2 in Manikgonj, 1 in Gopalgonj, 1 in Mathbaria, 1 in Rampal and 1 in Pirojpur have been installed. It has a production capacity of around 1200 litters per hour and can supply drinking water to 2000 consumers in arsenic affected areas.PROSHIKA has installed continuous groundwater arsenic removal plants based on *AdsorpAs*® (Granular - ferric Hydroxide), a technology developed by M/s Harbauer GmbH, Germany in co-operation with Technical University of Berlin. *AdsorpAs*® based units have been set up by PROSHIKA in different areas – 2 in Chapainababganj, 1 in Bhanga, 2 in Mirsharai, 3 in Faridganj, 1 in Raipur and 2 in Horirampur. PROSHIKA has also installed similar sorptive media based arsenic removal plants developed by ADHIACON, Environment Protection Engineers, India in Saturia, Ghior, Manikgonj Sadar, under Manikgonj District. These arsenic removal plants are running with full satisfaction of the local people. (Ahmed MF and Ahmed CF,et,2002)

3.14 Aqua Consultants and Associates Ltd.

AQUA Consultants and Associates Ltd. is a private consulting firm providing services to the WSS sector. AQUA under the assignment from DPHE designed and implemented a number of urban water supply programs where arsenic removal plants were constructed. Most of these constructions were carried out in the later part of 1990s and completed in 2001. Plants are located in six different district towns and were originally designed as iron removal plants. Since iron removal plants also work as arsenic removal plant and arsenic was found to be present in groundwater in those urban towns, the units were then termed as iron-arsenic removal plants. The plants provided arsenic safe water to 6 urban centers where both arsenic and iron are present in groundwater. The plants are relatively expensive and there is no provision for safe disposal of sludge. (Ahmed MF and Ahmed CF,et,2002)

3.15 Bangladesh Engineering and Technological Services Limited (BETS)

Bangladesh Engineering and Technological Services Limited (BETS) is a private consulting firm providing services to the WSS sector. BETS was associated with the 'Rapid Assessment of Household Level Arsenic Mitigation Techniques' as local counterpart to WS Atkins International Limited during September 2000 to March 2001. Currently BETS is conducting a study on "Groundwater Development of Deep Aquifers for Safe Drinking Water Supply to Arsenic Affected Areas in Western Bangladesh" started in June 2000. (Ahmed MF and Ahmed CF,et,2002)

CHAPTER –FOUR

Findings of the Study

CHAPTER –FOUR

Findings of the Study

Socio-economic information of arsenic affected people

Table-1 Occupation of the respondents

Occupation	Laksham		Tala		Total
	Male	female	Male	Female	
Student	1 (4.0%)	2 (8.0%)	0 (.0%)	1 (4.0%)	4 (4.0%)
Housework	0 (0.0%)	21 (84.0%)	0 (0%)	24 (96.0%)	45 (45.0%)
Paid job	2 (8.0%)	2 (8.0%)	2 (8.0%)	0 (0.0%)	6 (6.0%)
Business	3 (12.0%)	0 (0.0%)	3 (12.0%)	0 (0.0%)	6 (6.0%)
Farmer	5 (20.0%)	0 (0.0%)	14 (56.0%)	0 (0.0%)	19 (19%)
Day labour	6 (24.0%)	0 (0.0%)	1 (4.0%)	0 (0.0%)	7 (7.0%)
Kabiraji	1 (4.0%)	0 (0.0%)	3 (12.0%)	0 (0.0%)	4 (4.0%)
Rickshaw puller	3 (12.0%)	0 (0.0%)	1 (4.0%)	0 (0.0%)	4 (4.0%)
Shop keeper	4 (16.0%)	0 (0.0%)	1 (4.0%)	0 (0.0%)	5 (5.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source:Field study

In the study areas respondents are engaged in different occupations such as business,agriculture,day-labouring,kabiraji rickshaw pulling and shop-keeping. Women are mostly involved in household work (45%).Table 1 shows that women do not have participation in service, business, farming, day-labouring, kabiraji, rickshaw-pulling and shop-keeping, whereas men are quite fairly involved in the above mentioned occupations. Of all the occupations men are engaged in various occupations with a higher percentage in day labouring (24%) in Laksham, but in farming (14%) in Tala, whereas women are mainly engaged in household activities (84% and 96%) in both areas. Due to economic crisis, now most people earn from more than one source of income to maintain their livelihoods.It must be mentioned here that respondents of both the study locations belong to poorer categories.

Table-2: Education of the respondents

Education	Laksham		Tala		Total
	Male	female	Male	Female	
Illiterate	8 (32.0%)	7 (28.0%)	8 (32.0%)	9 (36.0%)	32 (32.0%)
Primary	10 (40.0%)	7 (28.0%)	9 (36.0%)	9 (36.0%)	35 (35.0%)
Secondary	4 (16.0%)	3 (12.0%)	3 (12.0%)	2 (8.0%)	12 (12.0%)
S.S.C	1 (4.0%)	3 (12.0%)	4 (12.0%)	5 (20.0%)	13 (13.0%)
H.S.C	1 (4.0%)	1 (4.0%)	1 (4.0%)	0 (0.0%)	3 (3.0%)
Graduate	1 (4.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.0%)
Can sign only	0 (0.0%)	4 (16.0%)	0 (0.0%)	0 (0.0%)	4 (4.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source: Field study

Education creates opportunities for both men and women.Attempting to achieve the EFA goal, the Government of Bangladesh is committed to create opportunities that are inclusive and uniform for all its citizens. But the survey results (Table-2) show that there is still discrimination in this regard between men and women in the study areas. In Laksham, the percentage of illiterate population is 32 and 28 among men and women respectively and in Tala there is having 32 and 36 percent illiterate among men and women. The table 2 shows that irrespective of men and women , the highest achievement in education has been made only at the primary level. The percentage of having SSC and HSC degree is lower among the study population and only 1 of the respondents has completed graduation. In Laksham. w 16 percent of women can sign their names.

Table- 3: Marital status of the respondents

Marital Status	Laksham		Tala		Total
	Male	female	Male	Female	
Unmarried	9 (36.0%)	2 (4.0%)	1 (4.0%)	1 (4.0%)	13 (13.0%)
Married	16 (64.0%)	20 (80.0%)	24 (96.0%)	23 (92.0%)	83 (83.0%)
Widow	0 (0.0%)	1 (4.0%)	0 (0.0%)	1 (4.0%)	2 (2.0%)
Separate	0 (0.0%)	2 (8.0%)	0 (0.0%)	0 (0.0%)	2 (2.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source: Field study

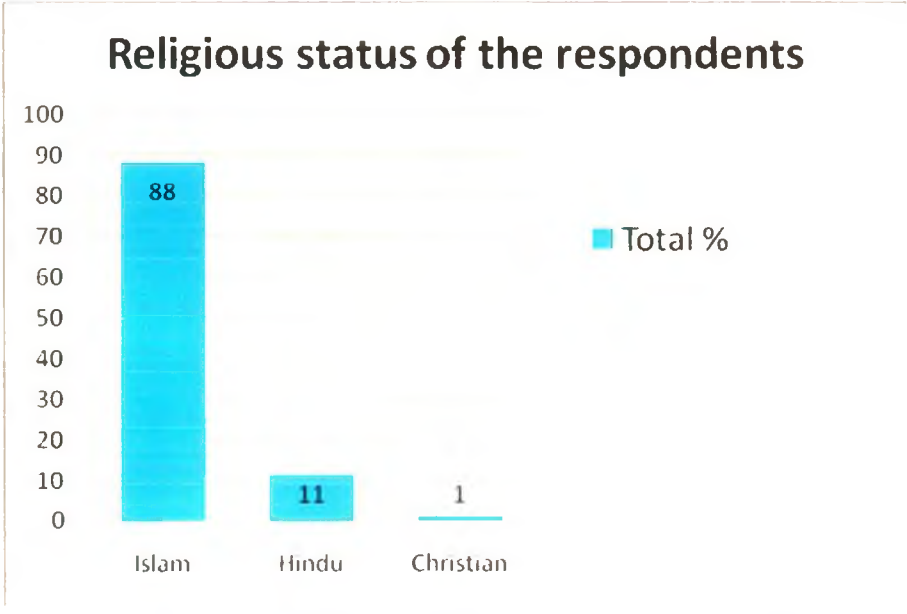
Respondents' marital status has been shown in table 3. Almost all the respondents (male and female) of the study population are married. But more married women are affected with arsenicosis than married men. It is evident

that in the table 3, the percentage of unmarried men are higher in Laksham (36%) than Tala (4%). Though there is no difference between men and women in this regard in Tala, 36 percent men and 4 percent of women are still unmarried. But 4 percent women are widow in both areas and unmarried in both areas are 13 percent and the married are 83 percent.

Table 4: Religious status of the respondents

Religious status of the respondents	Laksham		Tala		Total
	Male	Female	Male	Female	
Islam	24 (96.0%)	25 (100.0%)	17 (68.0%)	22 (88.0%)	88 (88.0%)
Hindu	1 (4.0%)	0 (0.0%)	8 (32.0%)	2 (8.0%)	11 (11.0%)
Christian	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.0%)	1 (1.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source: Field study

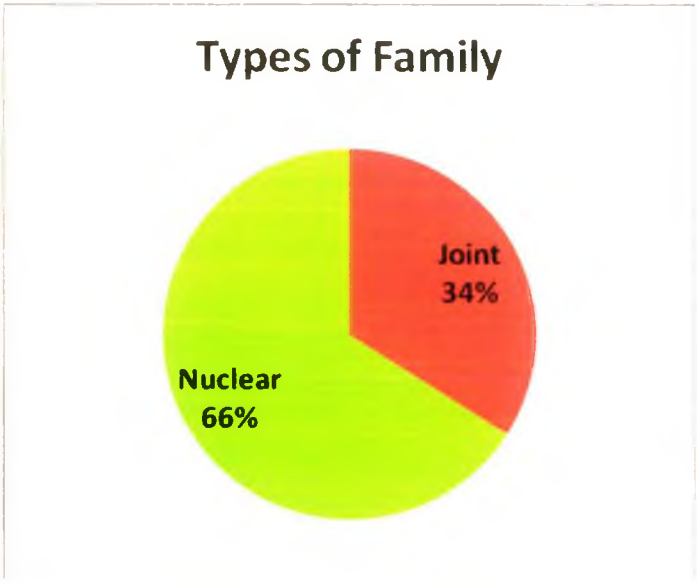


Most of the people in Bangladesh belong to two major religions :Islam and Hindu. It is also true for the study areas, Since 96 percent men and all women are Muslim. On the other hand, the picture is little different in Tala where 68 percent men belong to Islam and 88 percent women are Muslims. Total percentage of Muslim respondents in the study areas is 88. The percentage of Hindu and Christian is only 11 percent respectively, which is insignificant as compared to Muslim.

Table 5: Types of Family

Types of family	Laksham		Tala		Total
	Frequency	Percent	Frequency	Percent	
Joint	17	34.0	17	34.0	34 (34.0%)
Nuclear	33	66.0	33	66.0	66 (66.0%)
Total	50	100.0	50	100.0	100 (100.0%)

Source: Field study



Joint family is breaking down due to industrialization and urbanization which have had profound impact in the remote areas of Bangladesh.Poverty is also mentioned as a cause for increasing number of nuclear family. It is found that sons are leaving their parents' house after getting married and forming a separate family of their own. From table 5, it appears that the percentage of joint family is 34 whereas nuclear family is 66 in both the areas. The latter fact is quite astonishing in the tradition of Bangladesh.

Table 6: Social status of the respondents

Who helps	Laksham		Tala		Total
	Frequency	Percent	Frequency	Percent	
Destitute	8	16.0	5	10.0	13 (13.0%)
Landless	31	62.0	16	32.0	47 (47.0%)
small farmer	9	18.0	18	36.0	27 (27.0%)
middle farmer	1	2.0	11	22.0	12 (12.0%)
Rich farmer	1	2.0	0	0.0	1 (1.0%)
Total	50	100.0	50	100.0	100 (100.0%)

Source: Field study

There is no society in the world where social stratification does not exist. It depends on the mode of production by which society is regulated. As the village social structure is based on land system, social stratification has been built up on the basis of land system. The study area is divided in to many strata, which we have identified as destitute (Destitute refers to those who do not have any land of their own for using or for cultivating, landless (Landless are those who have only homestead land), small farmers, middle farmers and rich farmers. They are categorized according to their socio- economic structure. Most of the respondents belong to poor category (destitute 13%,and landless 47%).Only 12 % belong to middle farmer category.

Table 7: Ostracism faced by respondents

Marital status	Laksham				Tala				Total
	Male		Female		Male		Female		
	Yes	No	Yes	No	Yes	No	Yes	No	
Unmarried	2 (8%)	7 (28%)	1 (4%)	0 (0%)	2 (8%)	7 (28%)	1 (4%)	1 (4%)	21 (21.0%)
Married	1 (4%)	15 (60%)	17 (68%)	6 (24%)	1 (4%)	15 (60%)	5 (20%)	17 (68%)	76 (76.0%)
Widow	0 (0%)	0 (0%)	1 (4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (4%)	2 (2.0%)
Total	25 (100.0%)		25 (100.0%)		25 (100.0%)		25 (100.0%)		100(100.0%)

Source: Field study

Superstition is prevailing in our society, especially much more in rural areas. That is not exception in case of arsenicosis. Affected people are barred from coming out from their houses. The adults are not allowed to move freely at markets or working places. Neighbors do not even allow the arsenic patients

to use the water of their tube-wells. People don't want to mix with an arsenicosis patient.Twenty five women and only six men said "yes" to the question of whether they become ostracised or not.The married women are more vulnerable to such ostracism than others(in both the areas).Twenty two married women(88%) reported that they faced ostracism,whereas only 8 percent married men said that they face such problems.Four percent of widow and 8 percent unmarried women also reported for such ostracism.About 67 percent do not understand whether they are untouchables or not.One of the respondents mentioned`we dont understand". Superstition is more apparent in Tala than Laksham.This is because people in Tala was not made aware as of laksham due to the disadvantaged location and lack of Govt and other bodies' initiatives From this, it is understood that people's thinking has developed to some extent and it is also changing.

Table 8: People visiting to the patient's house

Visiting people	Laksham		Tala		Total
	Male	Female	Male	Female	
Yes	25 (100.0%)	18 (72.0%)	20 (80.0%)	17 (68.0%)	80 (80.0%)
No	0 (0.0%)	7 (28.0%)	5 (20.0%)	8 (32.0%)	20 (20.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source: Field study

Although most of the arsenic affected people said that relatives come to visit them,20 percent women and men reported that their relatives do not want to keep relationships with them. They opined that "nobody wants to come in contact with arsenic affected people." The villagers do not allow the arsenic affected to enjoy many opportunities which society provides. Even a man does not have the right to enter the village tea stall. Relatives look down upon the arsenicosis patient and do not visit the patients' homes as before. Usually those who come to visit are also affected with arsenicosis.

Table 9: Problem related to dowry

Increasing dowry problem	Laksham		Tala		Total
	Male	Female	Male	Female	
Yes	17 (68.0%)	18 (72.0%)	13 (52.0%)	13 (52.0%)	61 (61.0%)
No	8 (32.0%)	6 (24.0%)	12 (48.0%)	11 (44.0%)	37 (37.0%)
Dont know	0 (0.0%)	1 (4.0%)	0 (0.0%)	1 (4.0%)	2 (2.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

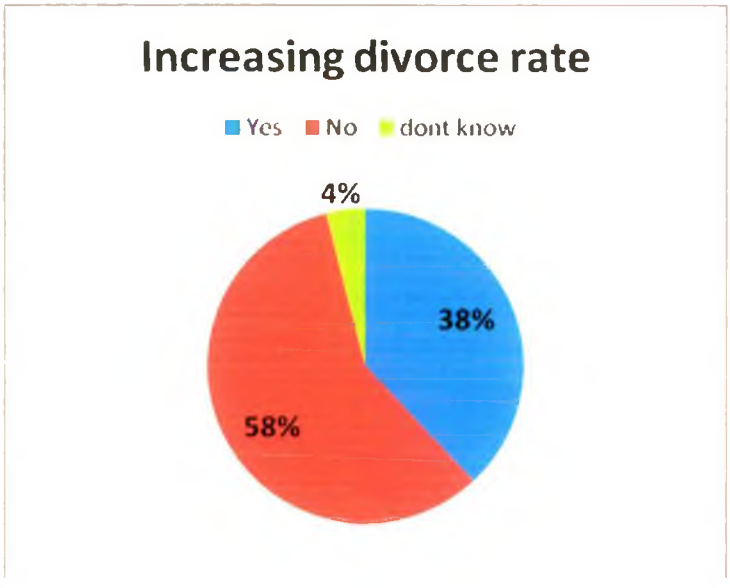
Source: Field study

Dowry is inevitable during marriage in the study areas. Almost all the marriages take place by taking dowry.Majority(61%) of the study participants reported that the problem of taking dowry has increased in the locality.However all are related to arsenicosis but to other causes as well.

Table 10: Increasing divorce rate

Increasing divorce rate	Laksham		Tala		Total
	Male	female	Male	female	
Yes	13 (52.0%)	14 (56.0%)	5 (20.0%)	6 (24.0%)	38 (38.0%)
No	11 (44.0%)	10 (40.0%)	19 (76.0%)	18 (72.0%)	58 (58.0%)
Dont know	1 (4.0%)	1 (4.0%)	1 (4.0%)	1 (4.0%)	4 (4.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source: Field study



Bangladesh like other south asian countries is a patriarchal one where women's opinions are not given much importance in marriage. At the time of marriage bride is scrutinized. It is also true for the arsenicosis patients.Even in the case of marriage between two arsenicosis affected couple, bride is

cosiderded inferior than groom. From table 10 it appears that 38 percent male and female respondents in both areas reported that rate of divorce has increased as a result of arsenicosis. Here, in Tala region the rate of divorce is higher. Divorce is a great social problem and differs between cultures and zones.

Table 11: Rate of polygamy in the locality

Increasing polygamy	Laksham		Tala		Total
	Male	Female	Male	female	
Yes	9 (36.0%)	11 (44.0%)	6 (24.0%)	9 (36.0%)	35 (35.0%)
No	16 (64.0%)	13 (52.0%)	19 (76.0%)	15 (70.0%)	63 (63.0%)
Dont know	0 (0.0%)	1 (4.0%)	0 (0.0%)	1 (4.0%)	2 (0.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

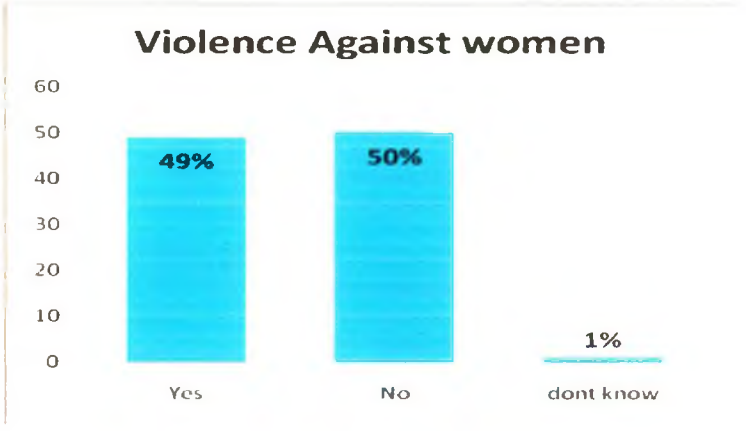
Source:Field study

Polygamy is a strong threat for women. The practice is deeply harmful to a wifes' security because it can lead to the husband's complete abandonment of her and their children (Narayan 2002:132).Although it is in law, in most cases, the husband does not take permission from his existing wife to remarry .In the study area, 36 percent male and 44 percent female in Laksham think that polygamy has increased. However most(63%) of the male and female respondents believe that polygamy has not risen only because of arsenicosis.They opineds that it is a practice in the locality due to availability of bridegroom;s poverty and others. The rate of polygamy is higher in Tala as per the opinions of the respondents.

Table 12: violence against women

Increasing women violence	Laksham		Tala		Total
	Male	female	Male	female	
Yes	16 (64.0%)	15 (60.0%)	10 (40.0%)	8 (32.0%)	49 (49.0%)
No	9 (36.0%)	10 (40.0%)	15 (60.0%)	16 (64.0%)	50 (50.0%)
Dont know	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.0%)	1 (1.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source:Field study



Violence against women is now a great social problem in our country.It is evident that gender violence has increased due to arsenicosis. Husbands exploit their wives in various ways. Treatment of other members of husband's is also worst with her. She is physically and mentally harassed as all look her down.About 49 percent male and female in both areas think that women are exploited .

Table 13: Source of information received as affected by arsenicosis

Knowing status about arsenicosis	Laksham		Tala		Total
	Male	Female	Male	Female	
From doctor	14 (56.0%)	12 (48.0%)	10 (40.0%)	16 (64.0%)	52 (52.0%)
Seeing black/white spot	4 (15.0%)	8 (32.0%)	10 (40.0%)	1 (4.0%)	23 (23.0%)
From NGO	4 (16.0%)	4 (16.0%)	0 (0.0%)	0 (0.0%)	8 (8.0%)
DCH/DPHE	3 (12.0%)	1 (4.0%)	5 (20.0%)	8 (32.0%)	17 (17.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source: Field study

The participants reported that they recieved information on arsenicosis from doctors, NGOs and DPHE. Despite their relentless efforts, many people have

not been able to identify themselves whether they are affected with arsenicosis or not. Most respondents (52%) reported that they have learnt about the disease when they fall sick and visited to local doctors .About 23 percent informed that they already observed other arsenic affected people and thus seeing the spot they recognize themselves aa attacked by arsenicosis.Another 17 percent respondents learnt about arsenicosis from Dhaka community Hospital and DPHE.About 8 percent heard from local NGOs.

Table 14: Attitude towards male affected by arsenicosis

Attitude towards male	Laksham		Tala		Total
	Male	Female	Male	Female	
Positive attitude	20 (80.0%)	18 (72.0%)	13 (52.0%)	11 (44.0%)	62 (62.0%)
Negative attitude	1 (4.0%)	0 (0.0%)	7 (28.0%)	1 (4.0%)	9 (9.0%)
Dont know	4 (16.0%)	7 (28.0%)	5 (20.0%)	13 (52.0%)	29 (29.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100(100.0%)

Source:Field study

Social attitudes towards arsenicosis patients differ from place to place. In some places a man with arsenicosis may be treated badly but are not avoided at all.Sixty two respondents reported that in both areas they have positive attitude towards men affected by arsenicosis of which respondents of Laksham have much more positive attitudes towards male than Tala. But negative attitude towards men affected with arsenicosis is more in Tala than in Laksham (61%).

Table: 15 Attitude towards women affected by arsenicosis

Attitude	Laksham		Tala		Total
	Male	Female	Male	female	
Positive attitude	1 (4.0%)	6 (24.0%)	11 (44.0%)	0 (0.0%)	18 (18.0%)
Negative attitude	20 (80.0%)	12 (48.0%)	9 (36.0%)	12 (48.0%)	53 (53.0%)
Dont know	4 (16.0%)	7 (28.0%)	5 (20.0%)	13 (52.0%)	29 (29.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100(100.0%)

Source: Field study

In the patriarchal society women are given lower status compared to their male counterparts. Under this circumstance, if women are affected with arsenicosis, naturally they become more vulnerable. In the study areas

only18 percent male and female have given their opinion that women get positive attitudes from society but 53 percent responded that women with arsenicosis face more problems than men. Negative attitude towards women is much more revealed in Laksham than Tala.

Table 16: Social problems faced by arsenic affected women

Social problems	Laksham		Tala		Total
	Frequency	Percent	Frequency	Percent	
Negligence	17	68.0	10	40.0	27 (54.0%)
Marriage problem	0	0.0	1	4.0	1 (2.0%)
Being ostracized	1	4.	6	24.0	7 (14.0%)
Don't know	7	28.0	8	32.0	15 (30.0%)
Total	25	100.0	25	100.0	50 (100.0%)

Source: Field study

It has been learnt from the respondents that Unmarried young girls and their family members/guardians face more difficulties than others.This is because arranging marriage for the affected girls become difficult.To marry them off guardians often need to hide the information to the groom's family and pay higher rate of dowry to the groom's family. In some cases young women remain unmarried who are severely affected with arsenicosis . Nobody wants to come in contact with arsenic affected women.. Neighbors do not even allow arsenic affected women to use the water of their tube-wells.About 54 percent women in both the areas reported that they feel neglected in the society as they are suffering from arsenicosis.

Table 17: Respondent's opinion regarding initiatives taken by Govt. to prevent arenicosis

Initiatives to prevent arsenicosis	Laksham		Tala		Total
	Male	female	Male	female	
Yes	1 (4.0%)	11 (44.0%)	12 (48.0%)	14 (56.0%)	38 (38.0%)
No	24 (96.0%)	13 (52.0%)	13 (52.0%)	7 (28.0%)	57 (57.0%)
Don't know	0 (0.0%)	1 (4.0%)	0 (0.0%)	4 (16.0%)	5 (5.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source: Field study

Majority (57%) respondents reported that Government has not taken any step to prevent arsenicosis.However,some (38%) believed that govt has taken

littlebit initiatives such as marking the arsenic affected tubewells only. About 5 percent of whom all are women(4% in laksham and 16 % percent in Tala) does not have any knowledge about any initiatives taken by govt.This indicates women's less access to information.

Table 18: Social problems faced by arsenic affected women (Multiple Responses in Laksham and Tala)

Types	Percent (%)
Decreasing marriage rate of female	42
Excessive demand for dowry	43
Divorce	27
Aviated from own land	3
Exclusion	5
Seem to be course	21
Increasing suicide rat	7
Increasing avoidance	28
Increasing polygamy rat	18
Increasing women violence	34

Source: Field study

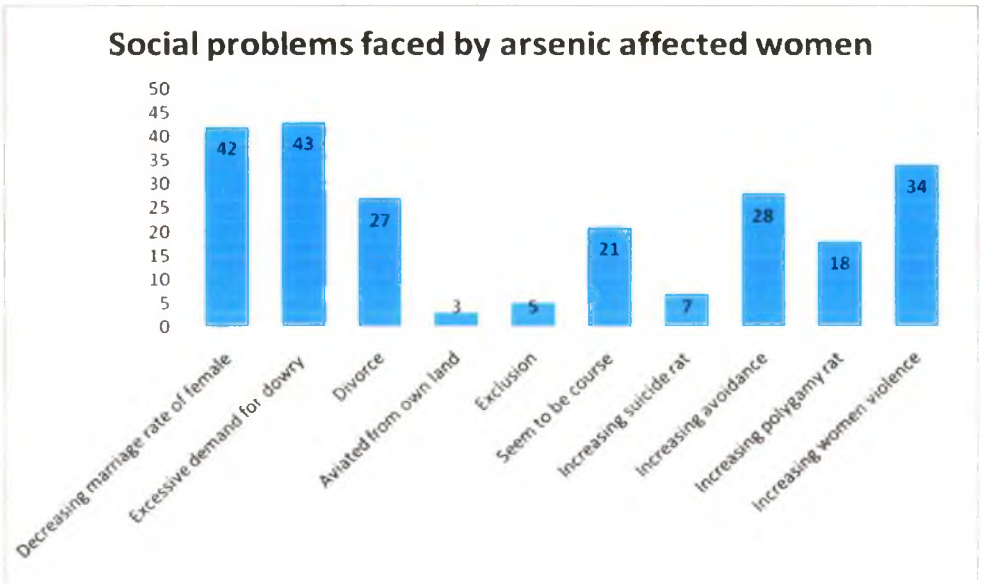


Table 18 indicates that women reported about different social problems occur due to arsenicosis. It has been informed by women that decreasing marriage rate of female is excessive demand for dowry and divorce,eviction from own land,seem to be cursed by society,increasing suicide rate,increasing avoidance by close relatives and neighbors and increasing violence against

women become prevalent. Women are facing such types of problems due to their gender identity. It has also been learnt that men do not have to face such crisis in their locality

Table 19: Source of expenditure of the respondent

Source	Laksham		Tala		Total
	Male	Female	Male	Female	
Own savings	5 (21.7%)	6 (30.0%)	6 (28.6%)	4 (18.2%)	21 (24.70%)
Taking loan from land lord	1 (4.3%)	2 (10.0%)	3 (14.3%)	3 (13.6%)	9 (10.58%)
Taking loan with interest	10 (43.5%)	4 (20.0%)	3(14.3%)	5 (22.7%)	22 (25.88%)
Selling own property	6 (26.1%)	5 (25.0%)	7(33.3%)	7 (4.9%)	25 (29.41%)
Selling live stock	1 (4.3%)	3 (15.0%)	2 (9.5%)	2 (9.5%)	8 (9.41%)
Total	23(100.0%)	20(100.0%)	21(100.0%)	21(100.0%)	85(100.0%)

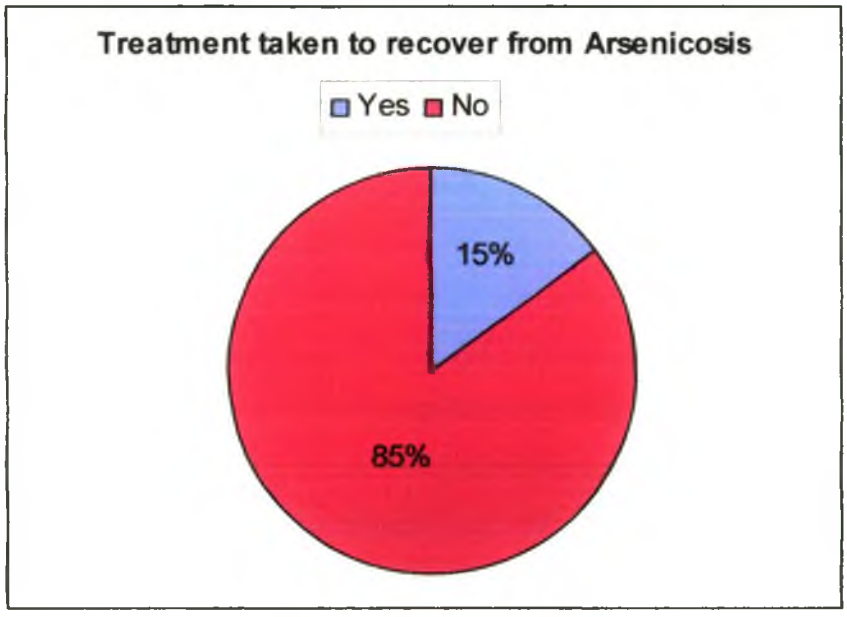
Source:Field study

Data shows that 30 percent women in laksham and 18.2 percent women in Tala spent money for the treatment of arsenicosis from their own savings. In case of taking loan from landlord more (14%) men in Tala responded positively. On the other hand, women in both areas have borrowed money with interest more than men. This may be the reason that women are members of different cooperatives and can borrow money. However, men have sold property more than women, as women do not possess property as of men. Women have sold livestock much more than men. As these are the only asset a woman often has access. This became clear from the table that poor people became more vulnerable due to the impact of arsenicosis.as a result of this disease; they often have to sell their only asset. Women become more dependent on men and others when they need to sell their very own asset such as livestocks of milking cow

Table 20: Treatment taken to recover from arsenicosis

Treatment taken	Laksham		Tala		Total
	Male	Female	Male	Female	
Yes	22 (88.0%)	20 (80.0%)	21 (84.0%)	22 (88.0%)	85 (85.0%)
No	3 (12.0%)	5 (20.0%)	4 (16.0%)	3 (12.0%)	15 (15.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source:Field study



Generally rural people are indifferent about their health and have less access to health facilities. It is also true in case of arsenicosis. There are two ways to prevent arsenic related health problems – to stop drinking arsenic contaminated water and to take nutritious food. But most of the people do not know about it and do not take necessary steps against it. They think that they will be cured naturally without taking medicine. However this picture is somehow reverse in the study area,where 88 percent men and 80 percent women among the respondents have consulted physician in Laksham whereas 84 percent men and 88 percent women have sought advice from physician in Tala.However,differences can be found in the context of gender. It is apparent that the percentage of consulting physician for male is more than that of women. Social discrimination is easy to identity in this connection.About 15 percent of women(8) and men (7) interviewed reported that they do not take any treatment to become cured from arsenicosis.

Table-21: Types of treatment taken

Types of treatment	Laksham		Tala		Total
	Male	Female	Male	Female	
Homeopathy	3 (13.6%)	0 (0.0%)	5 (23.8%)	4 (18.2%)	12 (14.11%)
Modern Medicine	18 (81.8%)	20 (100.0%)	13 (61.9%)	18 (81.8%)	69 (81.18%)
All kinds of treatment	1 (4.5%)	0 (0.0%)	3 (14.3%)	0 (0.0%)	4 (4.71%)
Total	22 (100.0%)	20(100.0%)	21(100.0%)	22(100.0%)	85(100.0%)

Source:Field study

The arsenicosis patient takes all types of treatment such as Modern Medicine (alopathy) homeopathy, kabiraji etc. But where people can not eat twice a day, it goes beyond their ability to take medicine to become cured from arsenicosis. It is found in the study areas that almost all the patients have been suffering from arsenicosis over the last 10 - 15 years. Some of the patients are taking treatment from the very beginning. But the result that they get is insufficient.It is interesting to note that More male patient takes homeopathy treatment than female. After all, male gets the opportunity of taking different kinds of medicine than female. For homeopathy men use their own money but women recieved alopathic treatment from different organizations.Men also recieve these support but mentioned about homeopathy as they get it regularly. Different organizations are taking care of arsenicosis patients and giving vitamin 'E tablet' and 'Rex syrup' (multivitamin syrup) to the women on a priority basis in the study areas. However the respondents are not satisfied with the treatment they recieved.as they think that the supply is irregular.However people also buy medicine using their own resource.

Table -22: Satisfaction of treatment provided

Satisfaction of the given treatment	Laksham		Tala		Total
	Male	Female	Male	female	
Yes	4 (19.0%)	6 (30.0%)	8 (0.0%)	6 (38.1%)	24 (28.57%)
No	17 (81.0%)	14 (70.0%)	13 (0.0%)	16 (61.9%)	60 (71.43%)
Total	21 (100.0%)	20 (100.0%)	21 (100.0%)	22 (100.0%)	84 (100.0%)

Source:Field study

From the above table,32 it appears that most of the respondents are not satisfied with the kinds of alopathy treatment they recieve . Table 14 shows that 71.43 percent respondents are dissatisfied with the treatment they are provided. Here it is also apparent that people of Laksham are more dissatisfied than Tala.

Table 23: Social category of the respondents by expenditure behind arsenicosis
(in Laksham Commilla)

Social status of the respondent	Expenditure behind arsenicosis				Total
	0-5000 Tk	5000-10000 Tk	10000-15000 Tk	15000+ tk	
Destitute	4 17.4	1 10.0	1 16.7	1 25.0	7 16.3
Landless	14 60.9	6 60.0	3 50.0	2 50.0	25 58.1
Small farmer	4 17.4	3 30.0	2 33.3	0 0.0	9 20.9
Middle farmer	0 0.0	0 0.0	0 0.0	1 25.0	1 2.3
Rich farmer	1 4.3	0 0.0	0 0.0	0 0.0	1 2.3
Total	23 100.0	10 100.0	6 100.0	4 100.0	43 100.0

Source: Field study

As we have seen earlier thatpeople affected by arsenicosis are mostly belonging tothe poorer category.Being affected by arsenicosis they have to take treatment with whateverresources they have.Respondents reported that they have spent a lot of money in getting treatment.Those who have spent 0-5000 and 1500+ taka are landless being at the top of the list.it is interesting to note middle farmers and rich farmers have spent the fewest for the treatment

of arsenicosis.Small farmers and landless people have spent much more than the other ones. this may be the reason that poorer people can not afford to take other measures to become cured or cope with arsenicosis,which includes taking nutritious food etc as of middle of rich farmers.as a result they became more sick and have to depend more on medicine.

Table-24: Social status of the respondents by expenditure behind arsenicosis

(Tala, Satkhira)

Social status of the respondent				Total
	0-5000 Tk	5000-10000 Tk	15000+ tk	
Destitute	4 (11.4)	0 (0.0)	0 (0.0)	4 (9.3)
Landless	14 (40.0)	1(16.7)	0 (0.0)	15 (34.9)
Small farmer	12 (34.3)	1(16.7)	1(50.0)	14(32.6)
Middle farmer	5(14.3)	4(66.7)	1(50.0)	10(23.3)
Total	35(100.0)	6(100.0)	2(100.0)	43(100.0)

Source: Field study

Information related to Arsenic

Table 25: Tubewells tested to check the presence of arsenicosis

Tested tube well	Laksham		Tala		Total
	Male	Female	Male	female	
Yes	22 (88.0%)	21 (84.0%)	18 (72.0%)	19 (36.0%)	80 (80.0%)
No	2 (8.0%)	2 (8.0%)	2 (8.0%)	4 (16.0%)	10 (10.0%)
Don't know	1 (4.0%)	2 (8.0%)	5 (20.0%)	2 (8.0%)	10 (10.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source:Field study

Table 26: Arsenic contaminated tube well used by the neighbors of respondents

Tube well used by the neighbor	Laksham		Tala		Total
	Frequency	Percent	Frequency	Percent	
Yes	41	82.0	32	64.0	73 (73.0%)
No	6	12.0	6	12.0	12 (12.0%)
Don't know	3	6.0	12	24.0	15 (15.0%)
Total	50	100.0	50	100.0	100 (100.0%)

Source:Field study

Different national and international organizations have tested tube-wells across the country, of which DPHE. Occupation and Environmental Health Department, Environmental Engineering Department and UNICEF, DFID etc

are worth- mentioning. But people have not been aware of the dangerous effect of this fatal disease as expected. In the study area of Laksham 88 percent man and 84 percent woman are aware of testing their tube-wells it means that consciousness has developed to a large extent among the men and women in the above areas. But in Tala only 36 percent women are aware of testing their tube-wells, which reflects that women have less access to information in this area. However, only 10 percent men and women in both areas report that their tube-wells have not been tested; the remaining 10 percent do not know anything about it. Besides they have no clear idea about which organization has tested their tube-wells. It is found from the data that 73 percent people of which 82 percent in Laksham and 64 percent in Tala report that their neighbors use the tube-wells containing arsenic. Fifteen percent men and women in both areas do not think so. Naturally it is found that women use tube-well more than men. It may be pointed out in this connection that men rather than women should be more aware of the fact that they have been affected with arsenicosis. But in reality, women are less aware due to their less acces to information and lower socio-economic status.

Table 27: Time of the year when people suffer most from arsenicosis

Arsenicosis ridden time	Laksham		Tala		Total
	Male	Female	Male	female	
Winter season	13 (52.0%)	7 (28.0%)	17 (68.0%)	9 (36.0%)	46 (46.0%)
Summer season	6 (24.0%)	6 (24.0%)	5 (20.0%)	6 (24.0%)	23 (23.0%)
All season	5 (20.0%)	7 (28.0%)	1 (4.0%)	5 (20.0%)	18 (18.0%)
Rainy season	1 (4.0%)	1 (4.0%)	2 (8.0%)	4 (16.0%)	8 (8.0%)
Don't know	0 (0.0%)	4 (16.0%)	0 (0.0%)	1 (4.0%)	5 (5.0%)
Total	25(100.0%)	25(100.0%)	25(100.0%)	25(100.0%)	100(100.0%)

Source:Field study

Arsenicosis breaks out any time of the year and timing of falling sick varies from person to person. In the study we find that 46 percent respondents think that they suffer most in winter season and 23 percent suffer during summer season.Eighteen percent reported that they suffer throughout the season. Only 5 percent patients say that they are not sure about the particular month when its effect is extreme.

Table 28: Collection of drinking water by Sex of the respondent

Collection drinking water	Laksham		Tala		Total
	Male	Female	Male	Female	
Respondent self	0 (0.0%)	19 (28.0%)	1 (4.0%)	24 (96.0%)	44 (44.0%)
Husband	0 (0.0%)	1 (4.0%)	0 (0.0%)	0 (24.0%)	1 (1.0%)
Wife	18 (72.0%)	0 (0.0%)	24(96.0%)	0 (20.0%)	42 (42.0%)
Daughter	4 (16.0%)	4 (16.0%)	0(8.0%)	1 (4.0%)	9 (9.0%)
Mother	2 (8.0%)	1 (4.0%)	0 (0.0%)	0 (0.0%)	3 (3.0%)
Sister	1 (4.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (1.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source:Field study

Collecting water is a gender responsive task for women in Bangladesh.Under no circumstance, a man will collect water.This is also true in the context of the study area.Where both women and men reported that women (wife,daughter,mother and respondent women themselves)are the water collectors in their homes

Table29: Problems of collecting pure water due to arsenic containing in different tube wells

Satisfaction of the given treatment	Laksham		Tala		Total
	Male	Female	Male	Female	
Yes	20 (80.0%)	21 (84.0%)	16 (64.0%)	16 (64.0%)	73 (73.0%)
No	4 (16.0%)	3 (12.0%)	7 (28.0%)	9 (34.0%)	26 (26.0%)
Don't know	1 (4.0%)	1 (4.0%)	2 (8.0%)	0 (0.0)	4 (4.0%)
Total	50 (100.%)	100 (100.0%)	50 (100.0%)	100 (100.0%)	100(100.0%)

Source:Field study

Most of the tube-wells of the study areas are contaminated with excessive arsenic. Villagers are facing various kinds of problems which they have not felt before. Women in many households have to walk a long way and have bitter experience in collecting pure drinking water. It is found in the study that 73 percent respondents in both areas of which 80 percent men and 84 percent women in Laksham have told us about the bitter experiences of women in collecting pure water.Only 26 percent claim that they have not faced any problem. It appears from the table that the problem is more in Laksham than Tala.The rest 4 percent in both study areas can not realise the

problem. Finding no other way they are taking water or using the pond as an alternative solution.

Table 30: Economic problems faced by the respondents

Facing socio-economic problem	Laksham		Tala		Total
	Male	Female	Male	female	
Yes	19 (76.0%)	17 (68.0%)	13 (52.0%)	13 (52.0%)	62 (62.0%)
No	6 (24.0%)	8 (32.0%)	11 (44.0%)	3 (12.0%)	28 (28.0%)
Dont know	0 (0.0%)	0 (0.0%)	1 (4.0%)	9 (36.0%)	10 (10.0%)
Total	25 (100.0%)	25(100.0%)	25(100.0%)	25(100.0%)	100(100.0%)

Source:Field study

Arsenicosis has had bad impact on the economy of the helpless people across the country. For the treatment of arsenicosis people have to spend a lot of money which results into deterioration of the socio-economic condition of the poor. Even most of the people have no abilities to spend money for pure drinking water. The affected poor people have begun to be poorer and the weak to become weaker. Affected people have not only become untouchable – they even lose their job in the shops. As a result they become unable to contribute to family and society. Arsenicosis has had bad impact on the socio-economically helpless people across the country. 62 percent male and female have reported that they have fallen in to great economic crisis. 28 percent men and women in both areas do not face any problems and 10 percent do not feel it a problem. It is found that male is more loser than the female.

Table 31: Family relationship before arsenicosis

Family relationship	Laksham		Tala		Total
	Male	Female	Male	Female	
Balanced relationship	24(96.0%)	25(100.0%)	20 (80.0%)	23 (92.0%)	89 (89.0%)
Imbalanced relationship	1(4.0%)	0(0.0%)	0(0.0%)	0(0.0%)	1(1.0%)
Don't Know	0(0.0%)	0 (0.0%)	5(20.0%)	2(8.0%)	10(10.0%)
Total	25(100.0%)	25(100.0%)	25 (100.0%)	25(100.0%)	100(100.0%)

Source:Field study

It appears from the table that there has been much more balanced relationship in case of female than male. It is found in the study that only 1 percent imbalanced relationship is prevailing for male whereas no imbalanced relationship for female.

Table 32: Family relationship after arsenicosis

Family relationship	Laksham		Tala		Total
	Male	female	Male	Female	
Balanced relationship	9 (36.0%)	4 (16.0%)	9 (80.0%)	4 (92.0%)	26 (26.0%)
Imbalanced relationship	16 (64.0%)	21 (84.0%)	11 (0.0%)	19 (0.0%)	65 (65.0%)
Dont Know	0 (0.0%)	0 (0.0%)	5 (20.0%)	2 (8.0%)	7 (7.0%)
Total	25(100.0%)	25(100.0%)	25(100.0%)	25 (100.0%)	100 (100.0%)

Source:Field study

But the situation has been changed after being identified with arsenicosis. Balanced relationship is being regained in case of male rather than female. It is found in the Table 21 that the extent of imbalanced relationship has increased, i.e. 84 percent in both areas.

Table 33: Participation of Arsenicosis patients in social activities

participation in social activities	Laksham		Tala		Total
	Male	Female	Male	Female	
Yes	17 (68.0%)	18 (72.0%)	24 (96.0%)	23 (92.0%)	82 (82.0%)
No	8 (32.0%)	7 (24.0%)	1 (4.0%)	2 (8.0%)	18 (18.0%)
Total	50 (100%)	100 (100.0%)	50 (100.0%)	100 (100.0%)	100 (100.0%)

Source:Field study

Arsenicosis patients are sociallylooked down . It is observed in many cases that they are unable to participate in different socio-cultural activities. They are not even invited. However, in the study areas we have observed a different situation. The people concerned don't feel such types of problems because almost in every family there are more than 2 arsenicosis patients. Thus it has become a common problem for them to all. Eighty Two percent in both areas have reported that they have not faced any problems in taking part in the socio-cultural functions. On the other hand 18 percent respondents of which 30 percent are in Laksham have faced such problem. This does not mean that they have not been asked but their physical weakness and inferiority complex are the reasons behind their non-participation.

Table 34: Problems faced in school

problem faced in school	Laksham		Tala		Total
	Male	Female	Male	Female	
Yes	2 (8.0%)	5 (20.0%)	4 (16.0%)	6 (24.0%)	17 (17.0%)
No	23 (92.0%)	20 (80.0%)	21 (84.0%)	18 (72.0%)	83 (83.0%)
Total	50 (100.%)	100 (100.0%)	50 (100.0%)	100 (100.0%)	100 (100.0%)

Source:Field study

The answer to a question like whether they feel any problems for their school/college going sons, daughters and relatives 17 percent respondents in both areas say that they face problem and 83 percent don't face any problem. Those who face problems are hated by others or they are avoided. But none has stopped learning due to arsincosis. We have pointed out earlier that this is considered as a common problem.

Table 35: Is arsenic contagious

Is arsenic contagious	Laksham		Tala		Total
	Male	Female	Male	Female	
Yes	11 (44.0%)	8 (32.0%)	10 (40.0%)	6 (24.0%)	35 (35.0%)
No	12 (48.0%)	16 (64.0%)	15 (60.0%)	15 (60.0%)	58 (58.0%)
Don't know	2 (8.0%)	1 (4.0%)	0 (0.0%)	4 (16.0%)	7 (7.0%)
Total	25(100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source:Field study

Different opinions are found in different areas about arsenicosis. As most of the people in rural areas are illiterate the situation has given a rise to misinterpretation and misconception about arsenicosis. Some think that it is the result of sin; some believes that it is contaminated by virus. We have found in the study that more male consider it contagious than female. About 35 percent male and female in both areas consider it contagious where 7 percent male and female do not know what it is. Many people maintain safe distance from the arsenic affected people as they think that the disease look like leprosy or any deadly disease.

Table 36: Difference of sourcing water before being affected

Difference	Laksham		Tala		Total
	Male	female	Male	female	
Yes	10 (40.0%)	9 (36.0%)	15 (60.0%)	19 (76.0%)	53 (53.0%)
No	15 (60.0%)	16 (64.0%)	10 (40.0%)	6 (24.0%)	47 (47.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source:Field study

It has been observed in the study areas that the alternative source of pure drinking water is very limited. Government has not taken any step. Some NGOs have arranged pure drinking water which is very insufficient in terms of need. When the arsenicosis patients are asked whether they take water from the same sources before being affected with arsenicosis, 54 percent respondents in both areas have said 'yes' and 46 percent people of which 62 are in Laksham say 'no'. It is apparent from this statistics that they are taking water containing arsenic. Those who look for pure drinking water into their neighbour's house face different kinds of problems. Neighbours scold and criticise them with rough language. We have shown in the above table that 54 percent respondents have been able to collect water from their neighbour's tube-wells and the rest has to fetch water from other sources in the study areas.

Table 37: Women facing problems in performing household activities

Difference	Laksham		Tala		Total
	Female		Female		
	Yes	No	Yes	No	
Unmarried	1 (4.0%)	1(4.0%)	1(4.0%)	0 (0.0%)	3 (3.0%)
Married	22 (88.0%)	0 (0.0%)	17 (68.0%)	6 (24.0%)	95 (95.0%)
Widow	1 (4.0%)	0 (0.0%)	1 (4.0%)	0 (0.0%)	2 (2.0%)
Total	25 (100.0%)		25 (100.0%)		100 (100.0%)

Source:Field study

Arsenicosis patients face many problems. They become weak physically, feel giddy and their hands and legs become tremble. In a word, they can not do their work willingly, women become weak in performing their household activities. About 54 percent respondents in both areas are affected with various problems, whereas only nearly 3 percent can not realize the problem

Table 38: Persons provided support to the arsenic affected

who helps	Laksham		Tala		Total
	male	female	Male	Female	
Daughter	4 (16.0%)	11 (44.0%)	3 (12.0%)	8 (32.0%)	26 (26.0%)
Son	1 (4.0%)	0 (0.0%)	10 (40.0%)	4 (24.0%)	15 (15.0%)
Wife	7 (28.0%)	0 (0.0%)	2 (8.0%)	0 (0.0%)	9 (9.0%)
Neighbor	1 (4.0%)	0 (0.0%)	9 (36.0%)	10 (40.0%)	20(20.0%)
None	11 (4.0%)	13 (52.0%)	1 (4.0%)	1 (4.0%)	26 (26.0%)
Own	1 (4.0%)	1 (4.0%)	0 (0.0%)	2 (8.0%)	4 (4.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source:Field study

Who provide support to the arsenicosis patients? In response to this question we have noticed that the family members suich as daughters, sons, wife, neighbours generally come forward to help them. But the percentage of people unwilling to help is quite high. It should be mentioned that daughters and neighbors who are eager to help constitute only 2 percent.

Table 39: Marriage related Problems faced by women

	Sex of the respondent		Total
	Male	Female	
Yes	19 76.0	15 60.0	34 68.0
No	6 24.0	9 36.0	15 30.0
Don't know	0 0.0	1 4.0	1 2.0
Total	25 100.0	25 100.0	50 100.0

Source:Field study

It is very difficult to marry off a girl affected by arsenicosis . Scabious are scattered all over hands and lastly to go to face.Even she is married husband does't like her and exploit her in many ways. In our research we have found that 76 percent male and 60 percent female think that it is a great problem, 4 percent women consider it very normal.

Table 40: Facing problem of food security

Facing problem	Laksham		Tala		Total
	Male	female	Male	female	
Yes	19 (76.0%)	21 (84.0%)	19 (76.0%)	20 (80.0%)	79 (79.0%)
No	5 (20.0%)	3 (12.0%)	6 (24.0%)	2 (8.0%)	16 (16.0%)
Don't know	1 (4.0%)	1 (4.0%)	0 (0.0%)	3 (12.0%)	5 (5.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source:Field study

People in the study village are very poor and are unable to take food twice a day. They used to take food the similar type of food before being affected with arsenicosis. There has not been any significant difference. Women are the worst sufferers because they are more malnourished than men, so are less able to deal with arsenic that invades their bodies. Respondents did not name any new food items for the arsenicosis patients. Generally vegetables,lentil and vitamin E containing food are suitable for them. In the study areas, we have found that 79 percent people suffer from food crisis.

Table 41: Impact of arsenicosis in conjugal life

Impact of arsenic problem in conjugal life	Laksham		Tala		Total
	Male	Female	Male	Female	
Yes	9 (34.0%)	10 (40.0%)	9 (36.0%)	12 (48.0%)	40 (40.0%)
No	16 (64.0%)	14 (56.0%)	12 (48.0%)	11 (44.0%)	53 (53.0%)
Don't know	0 (0.0%)	1 (4.0%)	4 (16.0%)	2 (8.0%)	7 (7.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source: Field study

Table 42: Types of conjugal problems faced by arsenicosis patients

Types of conjugal problem after arsenicosis	Laksham		Tala		Total
	Male	female	Male	female	
Physical	3 (27.3%)	3 (30.0%)	8 (80.0%)	8 (53.3%)	22 (47.83%)
Mental	8 (72.7%)	3 (30.0%)	2 (20.0%)	6 (40.0%)	19 (41.30%)
Divorce	0 (0.0%)	2 (20.0%)	0 (0.0%)	0 (0.0%)	2 (4.35%)
Separation	0 (0.0%)	2 (20.0%)	0 (0.0%)	0 (0.0%)	2 (4.35%)
Dowry	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (6.7%)	1 (2.17%)
Total	11 (100.0%)	10 (100.0%)	10 (100.0%)	15 (100.0%)	46 (100.0%)

Source:Field study

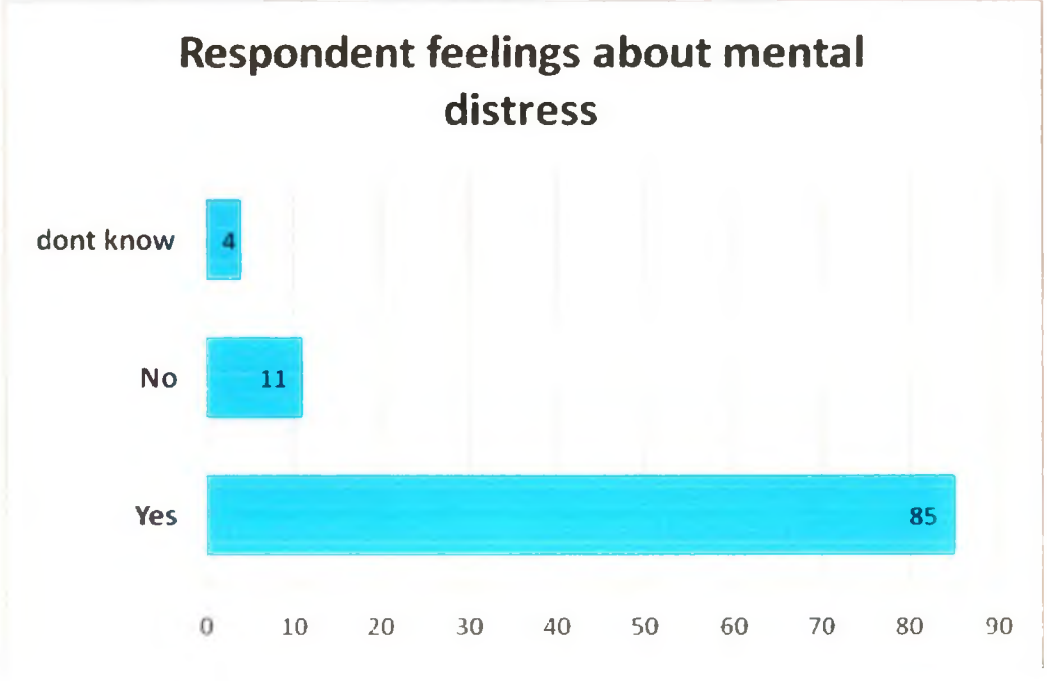
The impact of arsenicosis is extreme in conjugal life. Symptoms of arsenicosis are not exhibited in their internal organs before marriage. When it comes to exhibit after marriage, there arises chaos between husband and wife.

In this connection, women are more vulnerable than men. Members of her inlaw's family starts to behave rude to her. A woman has to bear everything silently. It may turn sometimes into divorce. We have found in our research that 47 percent man and woman in both areas are tortured physically and 41 percent mentally. It is apparent that man and woman in Tala are most tortured physically than Laksham,The percentage of divorce and separation are slightly higher in Laksham.

Table 43: Respondents' feelings about mental distress

Respondent feelings about mental distress	Laksham		Tala		Total
	Male	female	Male	female	
Yes	23 (0.0%)	23 (0.0%)	20 (80.0%)	19 (76.0%)	85 (85.0%)
No	1 (0.0%)	2 (0.0%)	5 (20.0%)	3 (12.0%)	11 (11.0%)
Dont know	1 (0.0%)	0 (0.0%)	0 (0.0%)	3 (12.0%)	4 (4.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source:Field study



Arsenicosis patients suffer from frustration all the time. From Table 62 it appears that 92 percent male and 92 percent female have suffered from mental depression; 4 percent male respondents can not realize it. Not only women suffer from mental agony but they consider themselves to be cursed. From Table 63 it is found that 60 percent male and 4 percent female can not consider themselves to be cursed.

Table 44: Respondents' feelings about family burden

Respondent feelings about family burden	Laksham		Tala		Total
	Male	female	Male	female	
Yes	15 (60.0%)	13 (52.0%)	11 (44.0%)	14 (56.0%)	53 (53.0%)
No	10 (40.0%)	10 (40.0%)	14 (56.0%)	8 (32.0%)	42 (42.0%)
Don't know	0 (0.0%)	2 (8.0%)	0 (0.0%)	3 (12.0%)	5 (5.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source:Field study

Arsenicosis patients often consider themselves burden on family. In the study 60 percent male and 52 percent female consider themselves burden. About 8 and 12 percent female in both areas are not aware of it. This is also true to social burden- almost all the same result is evident here. Whereas 44 percent male and 56 percent female in Tala feel the same problem. Here people of Laksham are very depressed and feel more estranged to themselves.

Table 45: Respondents' feelings about occurring environmental pollution

Respondent feelings about occurring environmental pollution	Laksham		Tala		Total
	Male	female	Male	female	
Yes	11 (44.0%)	13 (52.0%)	15 (60.0%)	12 (48.0%)	51 (51.0%)
No	9 (36.0%)	9 (36.0%)	10 (40.0%)	10 (40.0%)	38 (38.0%)
Don't know	5 (20.0%)	3 (12.0%)	0 (0.0%)	3 (12.0%)	11 (11.0%)
Total	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	100 (100.0%)

Source:Field study

In our study area women rather than men think that arsenic pollutes environment.About 20 percent male does not think about the negative impact on the environment. Total 5 percent male and female in both areas believe that arsenic pollutes environment.

Table 46: Recommendations provided by the respondents

Recommendation of respondent	Laksham		Tala		Total
	Male	female	Male	female	
Taking medicine	5 (20.0%)	3 (12.0%)	2 (8.0%)	1 (4.0%)	11 (11.0%)
Drinking arsenic free water	7 (28.0%)	7 (28.0%)	12 (48.0%)	4 (16.0%)	30 (30.0%)
Increasing public awareness	1 (4.0%)	1 (4.0%)	3 (12.0%)	6 (24.0%)	11 (11.0%)
to set up arsenic free/deep tube well	6 (24.0%)	5 (20.0%)	3 (12.0%)	2 (8.0%)	16 (16.0%)
to use sono filter	4 (16.0%)	9 (36.0%)	0 (0.0%)	0 (0.0%)	13 (13.0%)
Don't know	1 (4.0%)	0 (0.0%)	0 (0.0%)	7 (28.0%)	8 (8.0%)
taking nutritious foods	1 (4.0%)	0 (0.0%)	1 (4.0%)	0 (0.0%)	2 (2.0%)
Taking initiative by the Govt.	0 (0.0%)	0 (0.0%)	4 (16.0%)	5 (20.0%)	9 (9.0%)
Total	25 (100.0%)	25 (100.0%)	25(100.0%)	25 (100.0%)	100(100.0%)

Source:Field study

It is very necessary to stop the use of arsenic contaminated water and change the ways of water fetching. People should have access to safe water. participation of local influential people and of women in decision making should be ensured. Besides arsenicosis patients have many demands. 11 percent male and female of the respondents in both areas want medicine, though it comes to use very little. Equal percent male and female (28%) in Laksham demand arsenic free drinking water. 24 and 20 percent male and female advise to set up arsenic-free tube-well. 4 and 9 percent want sono-filter.

Opinion of Key Informants (Laksham)

Chairman of Union Parishad,DPHE engineer and women member of Union parishad of laksham have given valuable information to us regarding the problems of arsenicosis. Key informants have pointed out different issues from their memories. One of the respondents has said that he came to know about it in 1992.Later a survey was conducted in 2001 and he became more informed and aware of this fatal disease since then.another participants informed about arsenic in 1998 and the rest in 2003.

According to the key informants the percentage of population affected by arsenicosisvaried based on location.According to key informants,the average percentage of the affected women is 44 percent and the average percentage of men is 30 %.They think that women are more vulnerable and prone to arsenicosis for many reasons.The women UP members opined that "women do not get nutricious food,compelled to use water from arsenic affected tubewells and do not get proper treatment when sick.Despite their sickness they have to do all the domestic activities most of which required water".The key informants also opined that men take nutricious and more food than women;get opportunities of using water from different sources as they spend time outside and go to doctors with their own money.Men work in the field and their activities are less related to water than womenBesides,"Men's physical resistance to disease are much stronger than women,"one of the key informants commented.

The key informants have mentioned several reasons of existing arsenic in the underground water in their locality.These are :excessive withdrawal of underground water and much presence of gas ,Besides, there are also chemical substances and high use of pesticides behind the arsenic contamination.

Almost all the informants have pointed out that tubewells in their localities have been tested three times.DCH,NGO Forum,NSU and Bangladesh Arsenic

Water Mitigation Supply Project are among the organizations which have tested tubewells.

The key informants mentioned the following steps for providing arsenic free water:deep tubewells by DPHE,filter tubewells by DCH,117 sono filter have been combinedly given by UNICEF and Govt.One of the key informants opined that it is the best step to give a sono filter to every family so that they they can take arsenic free water.However another person has suggested the deep tube well as the best.However one believes that no step has been succesful because of a problem related to management.

The key informants think that the steps so far taken are inadequate and effective has to be taken collectively as soon as possible.Besides another person commented that "where we needed 11 hundred and 15 deep-tube wells,there we have been provided only 120 in 2007-2008.This can easily give a picture of insufficient step ".While asked about the reason for the high number of arsenicosis patient in their localityies the informants reported that no measures was taken and deep tube wells have not been succesful.All the people are taking arsenic containing water from those tube wells in the localities which are full of iron and arsenic.They think that the impact of arsenicosis on women and men are enormous.Men are becoming unemployed and thus poverty is being constant companion to their families.Women are socially disregarded due to arsenicosis and as a eresult exploitation is growing.

In response to the question of treatment that arsenicosis patients take in general,the key informants reported that ,generally they are taking vitamin E containing medicine.Another person says that "people do not get any treatment as they are poor.It is a publicity that they given multivitamin tablets"

The lack of treatment facility is the most important reason for which the situation is degrading day by day. Women are deprived more than men to get treatment .The key informants opined that women in the locality usually do

not go to doctor but when symptoms of arsenicosis become more visible they had to take medicine.

The key informants opined that they do not get the latest information of arsenic by any source. They suggested the following in getting information: the organizations which will work have to submit the written information to the representative of the working area. If all the people are made aware of this disease, getting information will be easier. If there are special persons to supervise the arsenic related information, it will be more easily available.it is necessary to hold frequent meeting at the grassroot level and to provide allowances to the participants in that meeting.Arranging cultural functions for mental recreation will also be useful.To increase and ensure social awareness media(Radio,TV,Newapaper)Poster and leaflet can be used.They also suggested for announcement by local publicity organizations.

Checklist in Tala

Key informants in Tala included chairman of UP,engineer of DPHE and women members of Union Parishad.The key informants informed that they are familial with arsenicosis since 1997. They guess that the rate of arsenicosis patients is about 20 percent men and about 34 percent women.

In explaining the causes of percentage of women being high high,one of the key informants said that "actually,arsenicosis is a water borne disease,women stay at home more than men and use one specific source of water ,they are highly affected"

Key informants explained that the reasons for existing arsenic contamination in ground water .They also mentioned that because of excessive use of shallow machine ,the level of arsenic ,that is from 100 feet 350,has been broken and the amount of arsenic has increased in the tubewells water.They opined that 90 percent tubewells have beeen set up in that level.

Key informants reported that tube wells have been tested two times by DPHE.They also reported that two steps have been taken so far :(a)Installing Deep tubewell and (b) Pond sono-filter.They thought that of the two steps

pond sono filter set up by a NGO is very effective because there is scope of maintaining these filters.

One of the key informants says that whatever steps is taken is not enough because compared to population these steps are insufficient. as there is no well arrangement of arsenic free drinking water for the poor ,they use arsenic containing water resulting arsenicosis patients very high.

Key informants reported that doctors suggest people to take vitamins, nutritious food and vegetables. but only suggestions do not help poor as they can not afford to buy these medicines or food. In case of getting treatment they have opined that expenses are less for women than for men.

Key informants recommended that pond sono filter should be set up by government in densely populated places, so that many people have access to arsenic free drinking water. They informed that neither they nor people are satisfied with the information related to arsenicosis provided. They think that it is possible to get information if additional people are recruited and they supervise everything properly.

FGD In Laksham

In the focus group discussion held with men all (08) affected by arsenicosis,in Euraine village,Laksham,Commilla are mainly farmers and some have been involved in non farm activities.

Almost all of the participants were literate and attentded primary to secondary schools.The participants thought arsenicosis is one kind of poison which gradually attack human bodies .One of the participants mentioned that this is a disease which kills people.The rest of the participants agreed on this point that this disease is spread from water and also from the food cooked by contaminated water and through vegetables.

The participants informed that at first symptoms of arsenicosis is found in the hands ,then spread to chest and mixed with blood.Blood becomes black and

if it is tested by computer, black and white signs appear on the screen.They informed that in the primary stage,the patients become tired,lose weight and feel vomitted and headache.The patient also becomes restless.(Black spots are found in the white part of eyes.This is called melanosis.In this circumstance,if the patient continues taking water containing arsenic,it turns in to Liko.And this condition prevails up to a month or one year and it turns out to be Keratosis.If the patient takes high power anti-biotic,he may be affected with Gangrin by Bacteria.It is evident from the discussion of the participants that they have clear knowledge about the disease .This may be because in Laksham many NGOs and GO initiatives regarding the news of arsenicosis are apparently visible.

Participants say that preventive arsenicosis is only possible if arsenic free drinking water is taken.If fever and dehydration occur,health becomes more fragile.arsenicosis hampers preventive power.it is mainly spread by water.Unconciousness of the disease is also common.

Many problems faced by by the respondents ,patients can not work,when work the patient feel burnt in body and dehydration commences,feels pains all ovr the body.It increases in winter and decreases in summer.The patient can not sit for a long time for doing written work.here the problem he faces is that he is an arsenicosis patient.So he/she has little energy and he will not give hundred percent service.

The participants mentioned that there are many problems of sources of water People have to go under much hardship in collecting pure drinking water. There are many problems for setting up dug-well. The first problem is to choose the place. The other problem to form the committee. The so-called gentlemen in society consider it problematic. Many think that the company is taking away this land forever. As a result he/she does not want to give the land right in written. Though the land problem is solved, ownership of land becomes another issue. The landowner claims ownership on land. "The rich do not want to contribute to the village" one of the participants opined. We

came to know from the participants present in focus group discussion that there are near about 3553 patients of which 555 are diagnosed and 14 people died in 2003-2007.At present three people are about to die .

It has been learnt that young people have tried their best to make the villagers more aware of arsenic by their voluntary services. When they go to chairman/member, they show interest but forget later on. Different organizations come and work a few days and go away. As a result patients are losing their faith on them.

The participants mentioned that 80 percent people have no land of their own, and 20 percent are little bit solvent. No organization has arranged food nor given any list of patients. About only 5 percent people in the village can take meat once a month and 10 percent take fishes once a month,7 percent take egg in a month,2 percent take milk and 20 percent take vegetables in a month. Under such economic hardship how the arsenicosis affected people can take nutritious food? The participants asked.

FGD Laksham (Women)

A total of 10 arsenic affected women participated in the FGD.The women are also aware of the disease through various sources but can afford little to prevent arsenicosis.

1. Ideas about arsenic: The participants in the FGD think arsenic is one kind of poison, and arsenicosis disease takes place due to this poison. No body can escape this disease and it takes much time to recover. The participants think that if any one takes 3 liter water containing arsenic per day,40 years later, he may be affected with arsenicosis, they also say that arsenic is a mineral substance.

Most of the participants agreed on this point that arsenicosis but not arsenic is a disease. This disease is water borne one. Those who have less physical resistance power are affected with arsenicosis within three months.

2. Symptoms of arsenicosis: Firstly hands and legs become hard .Spots are seen in breast and back.Boils are found in palms of hands and legs and the

complexion becomes black. eyes become red. When arsenicosis affects liver, then legs and feet become vaccum.For example they have pointed out about a 10 year old boy in the neighboring village, who have affected with arsenicosis in that fashion.

The participants reported that more than 90 percent tube-well are contaminated with arsenic. Only two tube-wells are deep and the rest are not deep well. As a result people of this region are much more affected by arsenicosis.

Women reported that they heard that as most of the people in this region live by farming and withdraw huge water and thus make tubewells contaminated with arsenic.

The participants have opined that women are more affected by arsenicosis than men because, women always take arsenic containing water .Men go out and take water from outside.But women bring and use water from the same tube-well as they always stay at home.Women also mentioned that women are much affected with arsenicosis because they take less nutritious food than men. As a result their resistance power remains low. Besides blood circulation occurs at the time of period(menustration).

It has been discussed that most of the tube-wells in the village are tested. In 2001,Govt(BAMWSP)tested all the tube wells in the village. (The participants reported that 2058 tube-wells were tested in their village, of which 1853 tube-wells were contaminated with arsenic). Besides, another organization has(DCH) tested tube-wells (in 1995). The participants say that there is relevance about the information provided by these two organizations .

At present (NGO,NGO Forum,Foreighners Projukti, Columbia-Chicago University, VEST, DFID, CIDA, BAMWSP) and (Govt DPHE) are working together. The participants reported that NGO Forum give Rex syrup and established ring-well. But they get the small facilities from that well. People can not take water from this ring well as it is containing high amount of iron.

Projukti Pit is making people aware and giving four types of filters with arsenic-free water with the financial support of UNICEF. These filters are (1) Sono filter (2) Alkame Filter (3) RID F (4) SIDCO plant.

It may be pointed out here that these filters are very costly and go beyond the purchasing capacity of poor .Women opined that a university(columbia-Chicago University)are providing medicine (sarenium) to the people. But the participants think that this is nothing but drug test. When will this medicine bring advantage to the affected people, no one knows.

The participants reporterd that medicine, awareness and taking arsenic free drinking water may solve theis arsenicosis problem. They also reported that lot of vegetable have to be consumed. They think that medicine has not yet been invented to cure arsenicosis patients.

Women reported that Gender violence and dowry have increased due to the impacts of arsenic contamination. The patients opined that even the rikshawpuller demand 80,000 taka as dowry from a girl's family. Besides, marriage problems are increasing, divorce and polygamy have increased.

The participants shared their that Sahera Begum is leading a bitter life in her parents homes for the last 2 years. As she has been affected by arsenicosis,her husband left her and does not want to take her back.

To increase awareness of arsenicosis women have recommended the following (I) Propagate that arsenic is not contagious (2) Use media (3) Make people aware through community meeting (4) arrange film shows.

FGD Tala (Women)
Location: Primary school of Krishnakati village, Tala.

All the participants(8) in the FGD were married and involved in domestic activities. During the FGD women described their personal experiences related to arsenicosis. In their opinions they don't have physical strengths any more. Their hand and legs becoming hard. They feel pains in legs and body. They feel suffocated and headache. They feel also hungry but can not take meal. They feel that their legs have gone to sleep. They can not fetch water as

pitchers seem heavy to them. They are unable to bend face and walk with bare feet.They face visual and hearing problems.

They opined that women are more vulnerable to arsenicos. Their body becomes weak after giving birth to a chIld. Breast feeding makes mothers weaker. Besides there is food problem. Women eat less food than men and their children have to do work much more than men.

Some of the participants said that they were bound to go to Dhaka for treatment. Doctors were also confused to diagnose the disease. "Due to economic crisis, we do not take good food, how will it be possible to take treatment?" Many of them have already turned in to poverty for arsenicosis. Whatever information they have received, they have jumped on it to become cured from arsenocosis. In cases of treatment men get much more benefited than women because men can go to market and able to buy medicine. This is not possible for women to go and buy their own medicine.

The women reported that in the study location of Tala there is only one arsenic free tube well, which is far from the village. Women have to go a long way to fetch water. But it is not possible for them to go there always. Finding no other way they are compelled to take arsenic contaminated water.

Physical features become different after becoming affected by arsenicosis. As a result either no one wants to marry an arsenic affected girl or demanded dowry . The problem is not solved only after marriage. Different types of problems appear and after marriage dowry remains to be continued. Wives do not get love from their husband rather hatred and negligence become obvious for them. The participants have given some recommendations:

I. Make people aware of the severity of arsenicosis. 2. Periodic follow up of patients is important

3.Increase people's access to safe water, regular monitoring of water quality, participation of local influential people, participation of women in decision making and provide comprehensive information to the community.

CHAPTER-FIVE

Case Studies of arsenic affected male and female of the study area

CHAPTER-FIVE

Case Studies of arsenic affected male and Female of the study areas

Case Study – 1

Feroza (18) a girl of Krishnakati village has been exposed to arsenocosis 7 years ago. Her complexion has been changed. After 2/3 days of her marriage her disease was exposed to the members of her husband's family.Since then they started to behave rude. They thought that if they allow this girl into their family, all the members might be affected with arsenicosis. They began to exploit her both physically and mentally and planned to make her husband send abroad. The younger brother of her husband insisted his brother to divorce Feroza. But her husband disagreed to this proposal. Three days have passed in this way and she had to return to her parents house. It should be pointed out that no one in her inlaw's family had seen her before marriage except her husband. A few days later a proposal was sent from her in-laws' home that Feroza would be accepted by then if 5 bigha land or 2 laks taka are provided to them. However her mother-in-law and brother-in-law did not accept and threatened that they would commit suicide if she is returned. In this connection Feroza's family have filed a case in the police station.

Case Study – 2

Sobeda is a girl of 17 years of age, with an innocent face. Her family is trying to arrange for her marriage for the last 2-3 years. However, as her complexion has been changed due to arsenicosis, she was refused by many. Some claim a big amount of money as dowry. One man asked for one hundred and fifty thousand(150000) taka a 1½ lakh and one wanted a concrete house. As Sobeda is from a poor family and mainly depends on her father's income,it is not possible for her father to arrange her marriage by giving large amount of money as dowry. As a result Sobeda always suffers

from mental agony and she considers herself to be cursed. She does not want to show her face to her parents. She asks why does Allah gave her this curse?

Case Study-3

Sabina Begum (28) has been suffering from arsenicosis since 1987. She was married to Nasir Islam in 1997, when she was a mere child.

At first, black spots are found in her breast and spread gradually all over the body. Then nobody knew that this was arsenicosis, she took medicine for skin disease but was not cured, rather disease increased. So Sabina stopped taking medicine.

Nasir knew about the disease but he agreed to marry Sabina in exchange of dowry money to go abroad.Within one month of their marriage,Nasir went overseas and returned four years later.After the returning of her husband Sabina was tortured and threatened by her husband. Sabina's father gave 1.50 lac taka as dowry earlier and her husband demanded another 1.50 lac taka. Otherwise he threatened to remarry.Besides, her inlaws persuaded him that as Sabina is affected by arsenicosis, she might also give birth a child affected with arsenicosis. Thus they continue to insist him to remarry.

Sabina wanted a child but she heard that she not be able to become pregnant as she was to become cured from arsenicosis. Within seven years of her married life,Sabina spent only one month with her husband. As her father was unable to pay dowry,she was divorced. Her husband remarried and left Bangladesh for working abroad.

Sabina reported that she is drinking pond-water after boiling. She has spent 20,000-30,000 taka for medicine but did not get any benefit. NGOs are providing her Rex syrup and multivitamin tablet which she thinks does not work. Now she is counting days for eternal rest.

Case Study-4

Julekha (27) was divorced within three years after her marriage due to the pressure of black spots in different part of her body. She was married to Mohsin Mia in 1997 and gave birth to a girl child on 15 June, 1999.When the girls is an year old her husband abandoned Julekha and her daughter.Later he sent her divorce letter. Julekha is now completely dependent on her father,who is a farmer.

Julekha reported that, of the 10 members in her family 7 people are affected with arsenicosis along with her father. She informed that her father is not able to spend any money on treating them.Julekha always thinks of herself as a burden on the family.

Unrully boys in the village often tease her and raise questions. about her characters, Besides Julekha is not able to get nutritious food. She takes only the left over food in the family.

Later on Julekha was appointed as a teacher at a kindergarten School for 800 taka per month. However her salary is too poor to support her and her child.

Julekha faces many problems in doing household activities after she has been affected with arsenicosis. She can not work in the sun and feel exhausted She faces visual problems and vomiting tendency.

Now Julekha is taking pond water by boiling. She reported that all the arsenic-free tubewels in the village are occupied by rich people. Common people can not use them and they face bitter experiences in collecting water.

Case Study-5

Nurul Huq (30) was affected with arsenicosis when he was a student of class three.He lives in a joint family consisting ten members.Almost all of his family members are suffering from arsenicosis.Nurul thinks that he has been taking arsenic contaminated water since his birth. Different research

organizations visited their villages and tested tubewells about 4 to 5 years ago.While the researchers reported that he had been affected by arsenicosis due to taking water from tube-wells water. He gave up drinking tube-well water. Nurul informed that since then their family use pond water in cooking, agriculture field and bathing.For drinking they use water from Sono Filter. He also started taking medicine for the last 4 years but still facing many problems due to this disease.

Nurul is disappointed as 60 percent people in the village are affected with arsenicosis and 7 to 8 people already died including his mother.Despite taking modern medicine,no one has become fully cured and drinking Sono filter water Nurul's wholebody is affected by the disease. He has spent 10000 taka for his treatment but has not become cured. At present Nurul is taking medicine provided by the Columbia and Chicago University project.However,he believes that this medicine is also experimental. Drug test is their main target.

Nurul completed graduation but does not feel like to work. He has broken down mentally .He requested Government to appoint a govt doctor who will be able to treat arsenicosis.

Case Study-6

Anwara (35) is the wife of Togor, a tube-well mechanic. The couple has two daughters. She first came to know about the disease[arsenicosis] five years ago. At present , there are white and black spots in some parts of her body. She always feels weak and does not feel taste in any kind of food. She also feels other physical problems due to this disease. When Anwara's husband and mother-in-law came to know about her disease, they did not take it easily. Since then they started to behave very rudely with her. She started to loose her husband's love and affection and was told to go to her father's home.

Her husband told that it is impossible for him to continue conjugal life with a woman carrying such an intolerable disease. At first Anwara tried her best to make her husband convinced and sacrificed a lot but nothing worked. At last she tried to hang herself but was not successful . Meanwhile, her husband remarried without divorcing or taking her consent .At present he is living with his second wife in town. He Rarely sends money for his two daughters back in the village. Despite sickness Anwara works in a cigarette factory to feed her two children. However, she is still living in her husband's home only for her two daughters.

Case Study-7

Aziz Ullah (52), an inhabitant of Auspara of Laksham in Comilla. He hails from a poor family and did not get scope to become educated . He is suffering from arsenicosis for last eighteen years. At the beginning, he relied on Homeopathy medicines without knowing the actual disease. In 1998, he first came to know that there is excessive arsenic in the water of their tubewell. The doctor suggested not to take the water from the tubewell but he did not listen to it. Ultimately he is suffering from the fatal disease . He doesn't get enough nutritious food. He can only afford nutritious food twice a year – during two big Eid festivals when people help him. He is physically very weak. Having fever is his major problem at present. His condition is deteriorating day by day.

Although at present, he drinks water from `Sonofilter', it is not helping him much as he used to drink tubewell water containing arsenic since long. His wife uses pond water for cooking. He is socially ignored because of the disease. He is not allowed to take part in any occasion in the village arranged by individual or community. Even he can not drink tea in the tea-stall with others as he did before. Others do not want to use the tea cup that he uses. They don't sit with him in the same bench. Local govt. representatives (Chairman, Members) also ignore him. They never asked about his economic and physical conditions.

Case Study – 8

Kader (32)[village doctor] is a young energetic man. Fourteen years ago he first noticed some symptoms of the disease in his body. But he didn't know actually what the disease was. At that time he used to drink water from their home tubewell. In 1999, he first came to know about the poisonous element, arsenic, and it's presence in tubewell water. – He knew it from newspapers. later he knew details about the disease, its impact and treatment from activities of different NGOs . He has the same physical problems which other sufferers have – rashes, spots, lack of nutrition etc. But as he is more aware than others, he is gradually felling better.

Like others he is also facing some social problems. Many of the villagers think that there is poisonous and dangerous 'black cobra' in his home. The symptoms of the disease in his body have come from the breath of the cobra. So none of his neighbours visit his home. Most of the people in the village neglect him. He even does not get invitation to any social occasion. Everybody asks him about the spots of his body. So, he never uncovers his body in front of others .

Case Study – 9

Nazma Akter (12), a young girl is educated up to class five. She used to drink water from their home tubewell which was arsenic-affected. She has been suffering from this disease since she was eight years old. The economic condition of her family is not good. All the members of her family are suffering from arsenicosis.All of them are passing miserable lives. They can not manage rich food. She thinks that lack of nutritious food is making their condition worse. Her skin is a bit dry and there is spot everywhere. She is so ill that she can not even walk normally.

Nazma's family is known as the arsenicosis family' in the village. They are socially deprived of their rights. Classmates stopped talking to Nazma when

she used to go to school. They did not take her to play with them . They made bad comments about her spots in the body and about her disease. Feeling isolated she was compelled to give up her study. At that time she was a student of class five. Her relatives also make adverse comments about her disease. Her family is worried about her marriage. No one adores or shows affection to her which they did before. All these make Nazmza emotionally affected . The young girl is counting the rest of the days of life.

Case Study – 10

Nur Banu (30) got married ten years ago. Before two-three years of her marriage, she was affected by this disease. Her in law's family accepted her as their daughter-in-law as they received large amount of money as dowry . Nur Banu's father did not get any bride groom for her from their own status and paid the dowry to the poor family according to their demand. This was only to get Nur Banu married off. At the beginning, members of her husband's family were kept detached from her. She had a separate room to live in. They did it so that they could live a arsenicosis-free life .At the earlier days her husband was sympathetic to Nur Banu but later he has also started to neglect her. He turned to be violent against her and told her to go to her father's home frequently .This time she had two daughters, and thus did not leave her husband's home. She always considers herself as a burden in the family. She has been working in others homes to feed her children. She is willing to send her children to the school but is unable to do it because of the poor economic condition and her husband's unwillingness.

Case Study-11

Fulzan Begum (57) was very beautiful before her husband had gone to overseas . He returned home after seven years and found Fulzan with spots in her body and face. Within a few days her husband started to see another girl of the village .She always prayed Allah to remove all the spots from her body . She took boiled water from pond as suggested by NGO people .But

she failed to attract her husband to her. She was forced and tortured to leave her husband's home. Neighbours started to look down upon her.

She wants that all the people in the villages use safe drinking water. She informs that she has sold cows for her treatment She came to Dhaka with her son and take treatment at the Dhaka Community Hospital for 21 days.She arranged money for her treatment by selling property inherited from her parents . She is aware of the disease and continuously fights with it. She uses arsenic free water for drinking and even for cooking. She makes her neighbors aware about arsenicosis

Case Study-12

Fawzia (33) is a girl in the village of Euraine. . Black spots were found in her whole body when she was 15 years old. Her father took her to many doctors and Kabiraj and has spent more than one lakh taka. However her condition remained almost the same.

In this circumstances, she was married at the age of 18 to a very poor man who was a vendor . He was informed about her disease. Still he agreed to marry her against handsome amount of dowry. He needed the money as he won the DV lottery to go to USA. Fawzia realized that her husband does not have any attraction to her but to her father's property to go abroad Her realization became practical when she received divorce letter immediate after her husband went to abroad . Fawzia is still receiving support from her father for treatment. She keeps her busy in looking after family poultry farm. She feels guilty always that because of her disease her father had to pay huge price, especially sending her husband to overseas.

CHAPTER-SIX

Discussions

CHAPTER-SIX

Discussions

The following section has been developed based on the recommendations provided by different research along with the findings of the present study.

6.1 The Need for a Concerted Effort

As has been previously mentioned, the discovery of arsenic in groundwater in Bangladesh prompted an unprecedented response from the government of Bangladesh, international aid agencies, NGOs, and other development partners. Consequently, a number of mitigation options have already been developed. But it is observed that there is a lack of coordination among different agencies that is hampering the efforts to address this crisis.

The government of Bangladesh should play central role in this regard. It must have a concrete policy with separate but compatible short- and long-term programs to mitigate arsenic contamination. This will enable all concerned authorities to undertake a coordinated action plan to implement arsenic mitigation plans. The government should coordinate all stakeholder activities in the sector.

Most importantly, all efforts in combating the arsenic menace should be implemented through active involvement of the local community, local government institutions, and local administrations. Local government institutions should be given sufficient arsenic mitigation resources in recognition of their key role in ensuring provision of arsenic-safe water to the people.

6.2Determine the Extent and Gravity of the Arsenic Crisis

The high degree of spatial variability of arsenic contamination of groundwater in Bangladesh compels the country to undertake, as a programming priority, the mammoth task of field testing of wells to

determine the level of arsenic. Without testing it is difficult to judge the real scale of the problem at the national level and thus it is difficult to design a rational program strategy.

6.3 Inform Affected People As Well As Other Concerned Authorities

The arsenic mitigation strategy should integrate, as a crucial element, a comprehensive and participatory information program that will enable the people to understand the grave consequences of drinking arsenic contaminated water, to make them aware of the desirability of switching to safe water supply options, and to stress immediate actions that can be taken by affected communities. Clear, simple, and consistent information will help avoid confusion and panic within the affected communities.

6.4 Prioritize Reductions in Arsenic Intake: Increase the Number of People with Access to Safe Water

It is imperative to provide the affected communities, particularly where 70 percent or more of the tubewells are arsenic contaminated, with water at reduced levels of arsenic on an emergency basis. In order to curb occurrences of arsenicosis, the focus should be on providing water with low arsenic contamination even if the national standards are not met immediately.

6.5 Provide Emergency Medical Advice and Treatment to the Affected People

Villages with high levels of arsenic in water should be provided with proper medical care on an emergency basis. Health workers need to be trained on case detection. Moreover, for an effective and proper clinical diagnosis of arsenicosis cases, high quality laboratories for epidemiological and diagnostic investigation, as well as an International Center for Arsenic Mitigation, should be established in Bangladesh.

Below are some of the specific recommendations

1. Raising public awareness to a level that people are motivated to change drinking and cooking water sources;
2. Difficulties of identifying safe, affordable, and convenient alternative water options;
3. Guiding people in self-help activities;
4. The shift from household-based tube well use to community-based water sources;
5. The ambiguous position of the Union Parishad in arsenic mitigation programmes and the need for more decentralization of service provision, including water quality management;
6. Developing a comprehensive, multi-faceted approach to the arsenic problem and forming systems in which medical, social development, and technical services are well coordinated;
7. Including women and the poor in local-level planning processes; making these processes fully participatory;
8. Weaknesses in staff training; and
9. Economic, social, and health problems of arsenicosis patients.
10. More information is needed on the general relationship between arsenicosis risk and dietary habits and general nutrition
11. Further analysis is needed on the subject of the differing arsenic-related social and health concerns in the broad context of male-female status and relationships.
12. Gender differences among poor, middle class, and rich people affected by arsenicosis should be studied separately.
13. The attitudes of both men and women toward women's illnesses and health care service utilisation should be investigated.

CHAPTER-SEVEN
Conclusion

CHAPTER-SEVEN
Conclusion

The development of a mitigation strategy for the arsenic contamination of groundwater in Bangladesh should consider all relevant factors and variables, but the strategy must focus clearly on water. In the case of arsenic in drinking water as a major health hazard for the people of Bangladesh, water is the principal cause and water management is the only cure. Although mitigation options are guided by similar considerations for both the industrialized and the developing countries, the latter face additional constraints on financing as well as on technical and administrative capacity.

It has been argued in the study that arsenic contamination in Bangladesh ground water is a widely recognized fact that is keeping millions of people in sufferings. There are some social consequences related to arsenicosis such as social instability, superstition, ostracism, increase of poverty, disrupt social network and marital ties and cause death. There is a gender variation in the way women and men cope with arsenicosis. Sociological research is very much relevant to identify what attempts should be made to grasp the different issues relating to arsenicosis, such as the problems, coping with the wounds, gender based differential impact of arsenicosis of the survivors. It has been argued by the research that women are the major victims of arsenicosis due to their lower status than men in society. Thus attention should be given to special group such as women and children. Programmes on arsenicosis management will be most effective if they are backed by strong policy support and guidance. This paper lends to support to policies that a sociological perspective is necessary to involve arsenicosis survivors in planning, that considers their disadvantageous position, especially of poor men and of women and gives priority to them.

In rural Bangladesh, domestic water collection and management is predominantly undertaken by women and girls, who spend considerable

amount of time and energy under various conditions on a daily basis to collect drinking water for their families . It is rare for men to participate in domestic water collection. Certain notions of masculinity and femininity are associated with who does what types of tasks with water: men predominantly undertake irrigation and agricultural water management, while women generally are responsible for domestic water issues.

The problem of arsenic in Bangladesh is a new phenomenon and experts have only recently studied the causes, nature, and prevention of the problem. Until recently, awareness of arsenic was very low. The general population was largely unaware of the danger of drinking arsenic-contaminated water. A 1998 National Media Survey found that only 14 percent of households knew of the arsenic poisoning of groundwater. Since arsenic in water is odorless, colorless, and nearly tasteless even at dangerous levels, people do not realize that they are drinking poison in their water. The absence of appropriate safe sources of water has made the situation even more complicated. It is now urgent to redefine the concept of safe water so that people are able to understand that consuming arsenic-contaminated water has serious health and economic implications,

There are no available medical options that can either block or cure arsenicosis. Medical interventions are limited to alleviating the effects of symptoms and treating diseases, such as cancer, that can ultimately result from arsenic exposure. The only way to prevent arsenicosis in the first place is to ensure that arsenic ingestion does not occur. The first and most important step in the treatment of arsenicosis, when it does occur, is also to eliminate or reduce arsenic exposure. For Bangladesh, where water is the principal source of arsenic, efforts to reduce arsenic intake should concentrate on the provision of arsenic-free water.

ANNEXURE-1

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ANNEXURE-2

Questionnaire

1. PERSONAL INFORMATION OF ARSENIC AFFECTED PEOPLE.

1.1 Name of the respondent : .....

Address : .....

Village : .....

Post Office : .....

Police Station : .....

District : .....

1.2 Sex

☐ Male ☐ Female

1.3 Age (Approximate): .....

1.4 Occupation: .....

1.5 Educational Qualification: .....

1.6 Marital Status : .....

1.7 Religion:

☐ Muslim ☐ Christian ☐ Buddhism ☐ Hindu

1.8 Type of Family:

☐ Joint ☐ Nuclear

1.9 Members of the family: .....

1.10 Information of the members:

.....

.....

.....

2. PHYSICAL INFORMATION (INDIVIDUAL AND HOUSEHOLD)

2.1 Source of water used by the family

Source purpose	Not deep well	Deep tube-well	Pond	Well	Canal	Swamp	River	Other
Drinking								
Cooking								
Agriculture								
Bath								
Other								

2.2 Who fetches water for your family?

☐ Respondent ☐ Husband/wife ☐ Son/Daughter ☐ Other

2.3 For Arsenicosis patients

a. Whether the tube-well is tested by engineer?
b. Do the neighbours use the tube-well?
c. If yes, are the users affected with arsenic?
d. If yes, how many?

2.4 If tested, by which organization?

☐ Public ☐ Private

2.5 Distance of the source of water used. .....

2.6 How many days have you/your family members been affected with arsenicosis. .....

2.7 Have you taken treatment for the recover of arsenicosis?

☐ Yes ☐ No

2.8 If yes, what types of treatment?

☐ Homeopathy ☐ Alopathy ☐ Ayurvedic

☐ Euorcise ☐ Other

2.9 How many days? .....

2.10 Are you satisfied at this treatment?

☐ Yes ☐ No

2.11 If yes, how? .....

If, No, Why ? .....

2.12 If not taken treatment, why

☐ Ignorance ☐ Financial problem ☐ Lack of nearby hospital

☐ Not to feel necessary ☐ None got cured from treatment

☐ Other

2.13 Was there any problems arisen in the villages in collecting pure drinking water due to arsenic containing in water of different tube-wells?

☐ Yes ☐ No

2.14 If yes, what kind of problem

☐ Female/lass ☐ Male/lad

2.15 What strategies have you taken in facing this problem.

☐ Personal ☐ Family ☐ Community ☐ Public ☐ Private

2.16 What kinds of food do the arsenicosis patients have to take?

.....

2.17 How do you come to know about taking such types of foods?

.....

2.18 Give food menu of everyday meal of your family.

Food	Before being affected		After being affected	
	Male	Female	Male	Female
Morning				
Noon				
Night				

3. SOCIO CULTURAL INFORMATION:

3.1 Is anyone else affected in your locality?

☐ Yes ☐ No

3.2 If yes, how many? .....

3.3 Did anybody die of arsenicosis?

☐ Yes ☐ No

If yes, how many? .....

3.4 Do you face any problems socially after being affected with arsenicosis?

☐ Yes ☐ No

If yes, how?

☐ Marriage problem for the girls ☐ More dowry demand

☐ Divorce Displaced from land

3.5 Social relationship of the arsenicosis patients-

Mutual relationship in the family
☐ before arsenicosis

☐ Balanced relation
☐ Imbalanced relation

Mutual relationship outside
☐ After arsenicosis

☐ Balanced relation
☐ Imbalanced relation

3.6 Can you take part in different ceremonies and development activities?

☐ Yes ☐ No

3.7 If yes, why? .....

3.8 Is anyone going to college face problem?

☐ Yes ☐ No

3.9 If yes, what kind of problem?

☐ Looked down upon ☐ Hate ☐ Avoid
☐ Not co-operate in education ☐ Other

3.10 If yes, how many?

☐ Boys ☐ Girls

3.11 Do you have any girl going to be married in your family?

☐ Yes ☐ No

3.12 If yes, is any hindarance to her marriage due to arsenicosis?

☐ Yes ☐ No

3.13 If yes, what types of problems?

.....

3.14 Do you think that arsenic is contagious?

☐ Yes ☐ No

3.14 Is the source of water different from before and after being affected with arsenicosis?

☐ Yes ☐ No

3.15 Do the neighbour give permission to use their tube-wells?

☐ Yes ☐ No

3.16 Do the people in the society consider you to be untouchable?

☐ Yes ☐ No

3.17 (If the respondent is women) Do you feel any problems in doing household work?

☐ Yes ☐ No

3.18 If yes, what kinds of problems?

Types of work you could do before being affected	*Types of work you could do after being affected*
.....	.....
.....	.....

3.19 What time of the year the problem became severe?

.....

3.20 Does anybody help in your work?

☐ Son ☐ Daughter ☐ Others

3.21 Do people come to visit to your family as before?

☐ Yes ☐ No

3.22 Do they meet you?

☐ Yes ☐ No

3.23 If yes, how?

.....

3.24 Has dowry increased in your society due to arsenicosis?

☐ Yes ☐ No

3.25 If yes, how? .....

3.26 Has divorce increased?

☐ Yes ☐ No

3.27 If yes, how? .....

3.28 Has polygamy increased?

☐ Yes ☐ No

3.29. Has gender violence increased?

☐ Yes ☐ No

3.30 If yes, give example. .....

3.31 Do you face any problem at the time of marriage of the girls with arsenicosis?

☐ Yes ☐ No

3.32 If yes, how? .....

4. ECONOMIC INFORMATION

4.1 Do you need additional people to work in your household?

☐ Yes ☐ No

4.2 Do you give him/her salary?

☐ Yes ☐ No

4.3 Approximate household monthly expenditure of the family.

.....

4.4 Approximate monthly household income

.....

4.5 Amount of land-

☐ Cultivable ..... ☐ Household land ..... ☐ Others .....

4.6 How much money have you spent for treatment.

☐ below 1000 ☐ 1000-3000 ☐ 3000-5000
☐ 5000-10000 ☐ above 10000

4.7 What is the source of this additional income?

☐ Own money ☐ Borrow ☐ Interest ☐ Land dondage

☐ Selling the property of father's house ☐ house bondage

☐ Selling property (own) ☐ Selling domestic animal ☐ Others

4.8 Do you face any problems in managing these ?

☐ Yes ☐ No

4.9 Have your household expenditure been increased due to increasing expense for treatment?

☐ Yes ☐ No

4.10 Do you face problems in maintaining food-standard?

☐ Yes ☐ No

4.11 Do you consider yourself to be economically affected?

☐ Yes ☐ No

4.12 Do you feel any problems in your working palce?

☐ Yes ☐ No

4.13 If yes, what kinds of problem.

.....

4.14 Do you blame it for physical weakness?

☐ Yes ☐ No

4.15 Are you unemployed because of being affected?

☐ Yes ☐ No

5. INFORMATION ON ARSENIC AFFECTED WOMEN

5.1 ☐ Married ☐ Unmarried ☐ Divorced ☐ Separated ☐ Widow

5.2 How did you come to know that you were affected with arsenicosis?

.....

5.3 How many days/months/years later did your arsenicosis exhibit?

☐ Before marriage ☐ After marriage

5.4 How long later after marriage?

.....

5.5 Did it have impact on your conjugal life?

☐ Yes ☐ No

5.6 If yes, what types?

☐ Physical ☐ Mental ☐ Divorce ☐ Dowry ☐ Separated ☐ Others

5.13 Does your husband go to other women after being affected?

☐ Yes ☐ No

5.8 If a man and a woman is affected with arsenicosis, do you see difference of attitudes towards them?

☐ Yes ☐ No

5.9 What kinds of problem have you faced after being affected with arsenicosis?

☐ Social.....

☐ Family .....

5.10 How old you face these problems?

.....

5.11 What kinds of treatment have you taken after falling ill?

☐ Alopathy ☐ Ayurbedic ☐ Homeopathy ☐ Other

5.12 Do you see any different in case of treatment for man in your family?

5.13 Have you sold any property of your own for coming round from arsenicosis?

☐ Ornaments ☐ Chicken/ducks ☐ Cow ☐ Trees ☐ Furniture

6. OTHER INFORMATION

6.1 How did you get the information of arsenicosis containing in water? Do you think this information is enough?

.....

6.2 Do you feel any mental pressure after being affected with arsenicosis?

☐ Yes ☐ No

6.3 If yes, what kinds of pressure.

.....

6.4 Do you consider yourself to be cursed?

☐ Yes ☐ No

6.5 Do you think yourself to be burden for the society?

☐ Yes ☐ No

6.6 Do you think that arsenic is polluting environment?

☐ Yes ☐ No

6.7 Is any step taken for removing arsenic in your village?

☐ Yes ☐ No

6.8 If yes, what kinds of-

.....

6.9 Do you believe that people should be aware more of arsenic?

☐ Yes ☐ No

6.10 What kinds of steps should be taken according to you?

.....

.....

An abandoned water Pump

An arsenic free tube-well

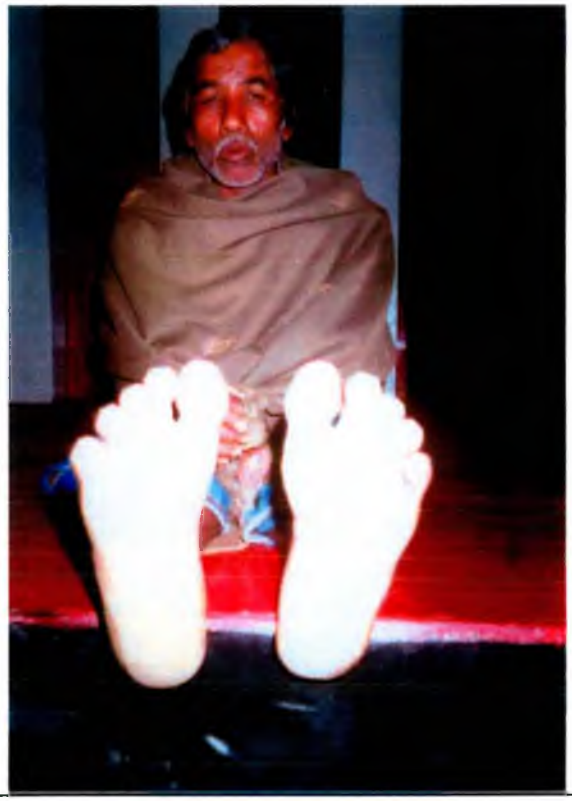
Arsenicosis affected in back

Arsenicosis patient showing symptoms in chest

A woman showing her palms affected by arsenicosis

An arsenicosis patient showing his hands affected with arsenicosi

Arsenicosis under the feet



Arsenicosis under the feet

Group Discussion with women affected by arsenicosis