Assessment of effects of arsenic pollution on health in rural Bengal and development and implementation of sustainable technology solution.

A Collaborative Research Project by

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Introduction

- Arsenic contamination in groundwater is rapidly becoming an environmental disaster in West Bengal.
- Millions of persons in nine districts are drinking groundwater with arsenic concentrations far above acceptable levels.
Introduction

• Many people have already been diagnosed with poisoning symptoms
• However, much of the at-risk population has not yet been assessed for arsenic-related health problems
• The affected people do not have alternative sources of safe water
Introduction

• Till today the only intervention for chronic arsenicosis is to stop consumption of arsenic contaminated water

• This calls for technological options to remove arsenic from contaminated water in affected localities for immediate relief and to minimize the agony of arsenic victims
Objectives

• To assess the level of arsenic contamination in drinking water
• To assess the effect of arsenic on health through clinical tests
• Community participation and awareness generation
• Design and development of sustainable technology solution
• Installation and implementation of the technology solution through people’s participation
## Project Activities

- Data Collection and Selection of Study Area
- Meeting with the Community People
- Collection and testing of Water Samples
- Awareness generation on Arsenic Pollution
- Checking of Health Conditions
- Identification of Appropriate Technology Solution
- Community Meeting and Implementation of the Solution
- Participation of the People
- Health Checking and Assessment of Improvements
- Workshops
**Progress**

**Data Collection and Selection of Study Area**

Nadia is one of the worst arsenic affected districts of West Bengal. Ranaghat Block-II is one of the severely affected blocks of Nadia.

During field survey, a number of villages including Debagram, Eruli, Baliadanga, Sarishadanga, Kharer Math, Lakshmipur, Chinapukur and Mollaberia were visited. Most of the people living here are very poor farmers and are not aware of arsenic contamination in their tube wells.
Study Area

Mollabari, Ranaghat Block-II, Nadia District, West Bengal
Study Area

Mollabari, Ranaghat Block-II, Nadia District, West Bengal

Nadia District, West Bengal

Ranaghat Block –II, Nadia District, West Bengal
Study Area

Mollabari, Ranaghat Block-II, Nadia District, West Bengal

Demography

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
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</thead>
<tbody>
<tr>
<td>Families</td>
<td>80</td>
</tr>
<tr>
<td>Male</td>
<td>166</td>
</tr>
<tr>
<td>Female</td>
<td>183</td>
</tr>
<tr>
<td>Male Child</td>
<td>13</td>
</tr>
<tr>
<td>Female Child</td>
<td>20</td>
</tr>
<tr>
<td>Literate Male</td>
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</tr>
<tr>
<td>Literate Female</td>
<td>90</td>
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<tr>
<td>Working Male</td>
<td>91</td>
</tr>
<tr>
<td>Working Female</td>
<td>16</td>
</tr>
</tbody>
</table>

Source: www.nadia.gov.in
Progress

Meeting with the Community People

A number of community meetings were held during April to June 2012 to discuss about the arsenic contamination in the tube wells of the area, its harmful effects and possible remedies. This was essential as the presence of arsenic in water and also its effect on health can not be detected by a common person.
Progress

Collection and testing of Water Samples

Water samples were collected from the tubewells of Mollaberia, Eruli and neighbouring areas. These were tested at the Environmental Engg. Lab of BESU. In all samples cases arsenic concentration is found to be much higher than the permissible level of 10 ppb.

<table>
<thead>
<tr>
<th>Village</th>
<th>Arsenic (ppb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mollaberia</td>
<td>104</td>
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<tr>
<td>Debagram</td>
<td>55</td>
</tr>
<tr>
<td>Kharer Math</td>
<td>90</td>
</tr>
<tr>
<td>Sarishadanga</td>
<td>60</td>
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<tr>
<td>Baliadanga</td>
<td>55</td>
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<tr>
<td>Chinapukur</td>
<td>70</td>
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</tbody>
</table>

Arsenic Contaminated Tubewell

Sample Test Results
Awareness generation on Arsenic Pollution

Awareness camps were organized in June-July 2012 with audio-visual aids in Mollaberia to inform the community people about the consequences of regular consumption of arsenic contaminated water through drinking and cooking. Local volunteers and panchayat took active part in organizing this event.
Progress

Checking of Health Conditions

Health check-up camp was organized in March 2013 in Mollaberia Primary School. More than a hundred people were clinically checked and about twelve of them were found to have symptoms of mild arsenicosis. They were prescribed for medicines. Samples of nail and hair also collected for testing.

Dr. Kunal Mazumder, member, BESU team examining the people of Mollaberia
Progress

Identification of Appropriate Technology Solution

Both BESU and QUB have expertise in developing technology solutions for mitigating arsenic pollution in groundwater. BESU has developed successful ex-situ solution and QUB has developed in-situ arsenic removal techniques. After visiting the site and considering the available infrastructure there, it was decided to install the AMAL community arsenic filter developed by BESU.
Progress

Community Meeting and Implementation of the Solution

A meeting with the local panchayat and school authority was organized in June 2013 and it was decided to install the filter unit to be attached with the tubewell of the school. This will be accessible by most of the families living nearby. The unit was installed on 22nd June 2013 in presence of BESU and QUB members. It was inaugurated by the Vice-Chancellor, BESU.

Installation of the AMAL Community Filter
Progress

Participation of the People

A water committee was formed comprising seven members from the community to look after the unit installed for regular operation and maintenance, and for collection of a small amount of subscription money from the families that will be used for the maintenance of the unit.
Progress Outreach

Exchanges

BESU: Prof. Kalyan Kumar Bhar and Prof. Chanchal Majumder visited QUB in July 2012 and in July 2013. Detailed discussions were made on the progress of the project, study area and particularly the technology solution to be adopted for the study area concerned.

QUB: Prof. Bhaskar Sengupta visited BESU in November 2012 and in June 2013. He visited the study area, attended a community meeting, and also participated in the installation of the filter unit at the site.
Progress Outreach

Publication

Two papers are in the process of preparation, relating the health aspect of the arsenic contamination problem as experienced in this project, and efficacy and sustainability of the installed solution. We are waiting for the second round of health check-up, more data on improvements in health conditions and performance of the filter.

Media Coverage

Being a remote place, getting the media to cover the events happening at the site is somewhat difficult, as experienced by the team. However, it is expected that the workshop to be held in December 2013 at BESU will have good coverage by the media.
Future Activities

Health Checking and Assessment of Improvements

Installation of the filter unit was done on 22nd June 2013. Currently more than 400 people are benefitted by the arsenic safe water from the unit. To assess the health benefit of it, medical camps will be organized in November 2013 and in April 2014. Patients will be clinically checked and samples will be collected for medical testing.

Workshop

A workshop will be organized on 14th December 2013 at BESU. Members of QUB, experts from other Institutes, NGOs and people from the study area will be present and exchange their knowledge, expertise and experience about the success of this project.
Future Activities

Visit

BESU members will visit QUB in April/May 2014 to discuss on the overall progress of the work, future course of actions of the partnership, and joint publications.
Success Indicators

**Awareness**

People of the study area and also the neighbouring area are now well aware about the presence of arsenic in their tube wells and its harmful effects on their health, particularly on their children.

**Risk Reduction**

More than 400 people are now using the arsenic safe water from the unit and thus are safe from arsenic exposure, which is very critical. People of the community have verbally reported regarding improvement in their health condition.
Success Indicators

Partnership

Experience from this project helped BESU and QUB enriching their expertise on developing sustainable technology solution and modes and practices of implementing the same at site. It also helped them to prepare for future projects together which are in pipeline.
Sustainability

Community Participation

Basic objective of this project will remained fulfilled so long the community people get arsenic safe water. It requires the proper maintenance and operation of the unit, after the UKIERI funding finishes. For this-

- A water committee is formed comprising seven persons from the community
- The committee is collecting a small amount as monthly subscription from each family and depositing in the bank
- A person from the committee is trained by the BESU members for regular operation and maintenance of the unit, who is paid from the money collected
- They are maintaining a routine schedule for collection of water from the unit, so that every family gets safe water
Best Practices

Working on Joint Bi-lateral Projects

BESU and QUB are working together for long. We have successfully completed the prestigious DelPHE project prior to this UKIERI project. We also have signed an MOU for partnership.

Both the teams have expertise in developing solutions for mitigation of arsenic hazard. We met many times and exchanged research findings and experiences in implementing the solutions. This made both of us well aware about the capabilities of each other.

This mutual understanding subsequently helped to a great extent in executing this bi-lateral UKIERI project.
Acknowledgements

Our UKIERI project is running successfully and most importantly more than 400 people are now getting arsenic safe water. This project is able to save so many people from the life-threatening arsenicosis.

We like to acknowledge the generous funding from UKIERI and the constant support and help of British Council.

We also like to acknowledge the spontaneous help, co-operation and participation of the people of Mullaberia, in implementing this project successfully.
Thank You