Save Me from Arsenic Poisoning (Bangladesh)
Lafayette College
Thafhim Siddiqua'13 and Taneesha Tate-Robinson'13

A Chinese proverb says "give a man a fish and he eats for a day, teach a man to fish and he can feed himself for life." This proverb has significant meaning to us and to our project. After extensive research and a summer-long trip to Bangladesh, we have created a project that will greatly benefit one of the many villages in Bangladesh. After working hard on a semester-long research paper, we (Taneesha) discovered that there is no countrywide initiative to combat arsenic infected groundwater. This is problematic because most villagers receive little or no education on arsenic and its effects let alone assistance with combating arsenic poisoning. While in Bangladesh this past summer, we (Thafhim) gathered data, interviewed villagers and spoke with officials from the Impact foundation to further understand the effects arsenic poisoning has on humans. We discovered that almost half of the Bangladeshi population drinks arsenic poisoned water. With these alarming discoveries, we want to address the areas of Bangladesh that have not been properly attended to, mainly the villages without access to arsenic-free drinking water and whose villagers are unable to obtain clean water due to lack of financial means. The villages we plan to help are among the poorest villages in Bangladesh.

Effect of Arsenic:

Bangladesh is grappling with the largest mass poisoning of a population in history due to groundwater, used for drinking, that has been contaminated with naturally occurring inorganic arsenic. It is estimated that of the 125 million inhabitants of Bangladesh between 35 million and 77 million are at risk of drinking contaminated water.[1]

Although the cause of arsenic contamination in groundwater is not clear, its effects on people are well known. The sudden increase in arsenic related diseases have panicked the local population. Those with arsenic poisoning suffer enormous social stigma in Bangladesh. Many people there believe arsenic poisoning is contagious or a curse. Parents are reluctant to let their children play with children suffering arsenic poisoning and patients can be shunned within their villages. For women, the situation is worse. In Bangladesh, a woman's attractiveness lies in her beauty which is often judged by her 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. Women are also less likely to receive early diagnosis or treatment.

Arsenic not only causes social damage but it also causes enormous physical damage. The data collected by NGOs and private organizations reveal that a large numbers of individuals in Bangladesh are suffering from melanosis, leuco-melanosis, keratosis, hyperkeratosis, dorsum, non-petting oedema, gangrene and skin cancer. Melanosis (93.5%) and keratosis (68.3%) are the most common presentations among arsenic affected people. Patients of Leucomelanosis (39.1%) and hyper-keratosis (37.6%) have been found in many cases. Few cases of skin cancer (0.8%) have also been identified among the patients seriously affected by the arsenicals (arsenite and arsenate).[2]

Objective and Vision

Our objective is to educate the villagers on common misconceptions about arsenic as well as to train them on how to detect symptoms of arsenic poisoning. We plan to educate about 100 families including men, women and children on proper treatment of arsenic poisoning as well as which tube wells are safe to drink out of. We will achieve this by testing tube wells, training villagers, providing books and pamphlets and performing a puppet show for the children and adults who cannot read. Throughout our project, we will work with a non-governmental organization in Bangladesh called Grameen Development Society (GDS) to ensure we have the resources needed to complete our project. GDS has chosen a village in Barisal, Bangladesh that will greatly benefit from our project. GDS will continue the training upon our departure at the end of the summer. The project will take a community-based approach to ensure local participation and utilization of knowledge. A community-based approach is often used by NGOs on arsenic related projects. This approach creates a committee of villagers whose job is to maintain and act upon the knowledge they were taught. The village chairperson usually chairs the committee. We will work alongside GDS to train and educate the committee of villagers on arsenic poisoning and its effects. A community-based approach gives villagers a significant role in the project, which gives them more incentive to continue obtaining arsenic-free water and educating themselves on arsenic and its effects.

Process:

Timeline: The project will be 8 weeks long, from June 1 to August 1, 2012. In order for us to gather an accurate account of community

[1] "Arsenic Mitigation in Bangladesh." UNICEF, October 2009. November 20th, 2010 http://www.unicef.org/bangladesh/Arsenic.pdf

[2] SOES & DCH, "Summary of 239 Days Field Survey from August 1995 to February 2000 and February 2005 to June 2010", Groundwater Arsenic Contamination in Bangladesh, A Survey Report Conducted by the School of Environmental Studies, Jadavpur University, Calcutta, India and Dhaka Community Hospital, Dhaka, Bangladesh, 2010.

functions, we plan to live in the village, with the villagers (if they allow it), for the first two weeks of our trip. During those two weeks we will be testing their tube wells to make sure the villagers are drinking out of arsenic-free tube wells. The remainder of the trip will focus on the education aspect, including reducing the social stigma that comes with arsenic poisoning, by introducing the villagers to medical professionals and people who have been cured from arsenic poisoning. During this time we will be educating villagers on arsenic and training the villagers on how to detect symptoms of arsenic poisoning.

Preliminary Work: Before we go to Bangladesh, we will work with Professors Kney and Greenleaf from the Lafayette Civil & Environmental Engineering department to ensure we are using proper techniques to test water and promote project sustainability. Professor Greenleaf has implemented sustainability assessments in different parts of West Bengal, India, which has a similar arsenic problem to Bangladesh. With his assistance, we will be able to successfully conduct this project due to his expertise. In preparation for our trip, we will start making pamphlets and picture books to use for educational purposes. We will also prepare educational videos for those who cannot read or write. We are in constant communication with our NGO partner, the Grameen Development Society. GDS will arrange the village location where the project will take place.

Project:

Technical: As part of the project, we will determine if the village we select has the materials and the resources to sustain the removal system that will be installed in the future. We will also be exploring what materials in Bangladesh we can use to build the arsenic removal system. During this time we will also determine which system of arsenic removal is economically feasible for the village.

Educational: The main focus of our project is the social and educational aspect. The educational part is very important because we will be giving the villagers the ability to detect severe and mild cases of arsenic. The training will raise awareness of the tube wells that contain arsenic. We will begin this part of the project by determining if the villagers are aware of arsenic symptoms, and determining which methods are needed to educate them. We will do this by interviewing and observing the villagers. If they have been exposed to arsenic for a long period of time, we will be able to see its physical effects. We will provide the villagers with education guides on how to detect arsenic in themselves and others. We will supply books on different diseases and on arsenic to GDS, which has a library that can be accessed by the villagers. The books will supplement our training sessions. We will be holding educational sessions on arsenic to teach the villagers about different resources they will be able to utilize. We will hold a puppet show that will engage the children and others in the village as an additional means to educate the community about arsenic poisoning.

Future Impacts and Conclusion: At the end of this project, we expect to have a well-trained village in Barisal, Bangladesh that will be able to identify individuals with arsenicosis and have a committee able to improve arsenic problems in the village. The committee will be educated and trained on arsenic awareness. We hope to impact at least 100 families in the village with our education training. Specifically, we hope to address their misconceptions about women with arsenicosis. We also will have developed a stronger relationship with the villagers and GDS. By educating the village, we hope to prevent cases of severe illness and even death due to untreated cases of arsenicosis and their prior inability to obtain safe drinking water. In the future, we plan to work with Professors Kney and Greenleaf in the installation of a permanent Arsenic Removal system, doing so with the continued assistance of the village committee and GDS. If this project goes well, we would like for this to be a yearly project that can be implemented by other Lafayette College students after we have graduated.

Our primary goal is to create an arsenic-free water source for the villages. Clean water is a fundamental right for all people. With this provided, the residents of the villages will be subject to less arsenicosis and will have greater freedom to focus on education, agricultural pursuits, and other endeavors that will protect and enhance their culture.

Personnel:

The Team

Taneesha Tate-Robinson is a junior majoring in International Affairs with a minor in Asian Studies at Lafayette College. She did extensive research on NGO and Bangladeshi government involvement in Arsenic poisoning. In January 2012, she spent three weeks in Madagascar teaching high school students about the US college application process and helping them with their English.

Thafhim Siddiqua was born in Bangladesh. She is a junior majoring in Civil and Environmental Engineering at Lafayette College. This past summer she went to Bangladesh to experience the arsenic poisoning first hand. She was able to document the devastating effects of arsenic poisoning on the villagers.

Advisors

Arthur Kney, Associate Professor and Head of Civil and Environmental Engineering Department
John Greenleaf, Assistant Professor of Civil and Environmental Engineering Department

Our GDS Contact

Zahid Khan, Executive Director of Grameen Development Society