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Bangladesh, Water and Sanitation

Tackling Bangladesh's Sanitation Crisis

In Bangladesh, a country spanning a feeble 57,320 square miles, live more than 162 million people, making the nation the world's most densely populated. Approximately 63.7% of these people call the rural backwaters of Bangladesh their home. This country, located to the north of the Bay of Bengal in South Asia is prone to many natural disasters such as cyclones, tsunamis, and earthquakes. The severe damage contributed by these disasters in addition to poor hygiene and sanitation, lack of financial resources, and inadequate health care has had a large impact on the nation, particularly on the rural population (CIA 2021). In 2010, approximately 60 percent of the population had access to adequate sanitation facilities but community projects and government initiatives have led to the greater accessibility of sanitation facilities (Hedrick). While such efforts have resulted in improvement, the changes remain inadequate.

Given its location and climate, Bangladesh does not have issues pertaining to the scarcity of water. In fact, 97% of the population has access to water. However, only 40% of the population has access to water that is safe for consumption (Hedrick). With primarily saline surface waters, the population tends to rely on groundwater for consumption. Throughout history, however, Bangladesh has faced multiple surges of arsenic poisoning due to the concentration of the element in its groundwater. In fact, a study done in 2000 showed that 40-61% of the population had a chance of consuming water contaminated with arsenic. Although the government has invested in constructing pipe systems and drilling deeper wells, 40 million people in the nation drink water containing unsafe levels of arsenic. Due to this, chronic exposure to arsenic is responsible for 6% of the deaths in the country (World Bank, 2018).

Furthermore, according to the World Bank, 41% of Bangladesh's improved water, coming from pipe systems and other technology, is contaminated with *E. coli*, a bacteria known to cause diarrhea. The study showed that "E. coli bacteria was present in 80 percent of private piped-water taps sampled across the country, a similar rate to water retrieved from ponds" (World Bank, 2018). Recent studies done at Washington University School of Medicine show that recurrent diarrheal infections caused by *E. coli* can lead to severe nutritional and developmental problems for children such as malnutrition, stunted growth, and cognitive deficits. According to Sereen Juma, World Bank's Acting Country Director in Bangladesh, "More than one-third of children under five [in Bangladesh] are stunted, limiting their ability to grow and learn," and as a contributor to such developmental issues, if not controlled *E. coli* in water could take an even greater toll on Bangladeshi children and the nation's future (Bhandari 2020).

While open defecation no longer remains a persistent sanitation hazard in Bangladesh due to the improvement of sanitation facilities and increasing awareness, the lack of access to proper sanitation remains an issue in numerous areas of the country. Only 55.9% of the population has access to sanitation, with larger percentages of people suffering from this issue in urban slums. The country also suffers from a lack of conventional, well-maintained sewer systems. In fact, in Dhaka, the capital city, only 1 in 5 people are served by a sewer network. This creates lapses in the safe disposal of feces with only 2 in 5 households hygienically disposing of child faeces (UNICEF). Similar to the consumption of unsafe water, this too can lead to diseases hindering child growth.

Like areas across the world, a disparity exists between different socioeconomic classes when it comes to proper hygiene and sanitation. Only 24% of school toilets in Bangladesh are functional and clean with a large majority of these being situated in middle-class to upper-class areas. Of the schools providing sanitation facilities for children, “Only 22 percent of schools have separate toilet facilities for girls, as most facilities continue to deny girls their right to privacy and dignity,” (UNICEF). In addition to limiting opportunities for girls due to gender bias, the country also fails to provide sufficient facilities accessible to the disabled. Overall, not only does Bangladesh need to address the lack of sanitation facilities throughout the nation, but also tackle the biases and discrimination hindering certain groups from receiving access to proper sanitation.

With a 3.05 to 10,000 physician to population ratio (WHO Global Health Workforce Alliance), Bangladesh’s shortage of doctors takes a toll on the entire population, particularly leaving a significant impact on the nation’s majority rural population, suffering from severely restricted access to proper sanitation and health care. Sepsis results from infection and in 2017, contributed to 20% of global deaths. It is more prevalent in areas with poor hygiene practices. According to the WHO, the main way to prevent the onset of sepsis is by preventing microbial transmission and infection. One of the simplest ways to do this is by washing one’s hands. However, in Bangladesh, it is not a common practice with only 59.1 percent of the population consistently washing their hands with soap in water. Similar to the other trends, handwashing is more common in Bangladesh’s urban areas as there is greater awareness and access to information there (WHO). This reinforces the vitality to educate the population, particularly those residing in isolated areas of the country, to prevent one of the deadliest tolls of poor hygiene practices - sepsis.

It can clearly be seen that poor hygiene and sanitation can have a variety of detrimental impacts on the population. Fortunately, some measures can be put in place in order to improve these persistent problems in Bangladesh. These measures would address three main areas where improvement is vital: water quality, sanitation facilities, and safe hygiene practices.

The high level of arsenic concentration continues to be a major problem in Bangladesh. First and foremost, raising awareness is the first step to embark on solving the problem. Many people in rural areas are unaware of the dangers of consuming contaminated water. Arsenic is not something that can be removed by boiling, and hence, the main solution is the installation of filtration systems. Pure Aqua is one of the companies that manufacture water filtration systems that utilize Reverse Osmosis to clean contaminated water. Currently, their main clients in Bangladesh include the commercial sector. Public Health Departments in Bangladesh should work together with companies like Pure Aqua to introduce water filtration systems in rural Bangladesh, urban slums, and other areas of the country with limited access to clean water (Pure Aqua). Not only will this provide clean water to the citizens of Bangladesh, but it will also benefit the economy by creating jobs and making use of Bangladeshi Resources. For any community improvement project, the community’s support is critical and the economic opportunities the construction of reverse osmosis plants would provide, would encourage more citizens to lend their support. Furthermore, this would also result in greater community engagement and understanding of water sanitation issues - if citizens are involved and employed to help build the reverse osmosis plants, they will simultaneously be educated about the sanitation crisis, help raise awareness, and amend their day-to-day schedule to lead healthier lifestyles. In addition to arsenic contamination, the presence of microbes in water is also a major issue. The majority of private piped-water taps are contaminated with e. Coli which can cause diarrheal diseases that stunt growth in children. It is important for Bangladeshi NGOs and for organizations like WHO and UNICEF to discuss the benefits of boiling water and the harms of consuming contaminated water. Furthermore, the departments testing the tap water must do so

on a monthly basis and let residents know whether or not their water is contaminated with e. Coli and/or other microbes. While physical measures need to be taken to decontaminate both water infiltrated with arsenic and microbes, the first step to solving these issues is raising public awareness, so that more and more people work to devise and encourage a more long term solution.

When it comes to sanitation facilities, the main improvements need to focus on maintaining toilets and fixing the sewage systems. Although the majority of schools have toilets, most are poorly maintained and/or nonfunctional. Furthermore, discriminatory biases prevent certain groups from having access to clean sanitation facilities. A small portion of schools provide girls with access to bathrooms. In order to solve this issue, nonprofit organizations focused on empowering girls and women should reach out to villages and discuss the benefits of educating girls and allowing them to be heavily involved in the workforce. Without changing people's mentality, it would be impossible to embark on projects that would improve the quality of life and accessibility to resources of prejudiced groups. Following this, the government could work with private companies to build more and more sanitation facilities around the nation. However, this doesn't simply solve the problem - proper wastewater management systems are necessary for the safe maintenance of these facilities. Currently, there is only one sewage plant in the entire country based in Dhaka, serving approximately $\frac{1}{3}$ of the city. In other localities around the nation, people either rely on septic tanks or latrines. Because of this, a majority of the population does not practice the safe disposal of faeces. A paper published on Pubmed discusses cost-efficient wastewater management. The methods discussed include The Chemical Enhanced Primary Treatment process and Upflow Anaerobic Sludge Blanket Technology. While the CEPT utilizes coagulants to clump solids together, causing them to settle quickly, the UASB is essentially an anaerobe digester. These technologies are the most cost-effective, and hence, the government should work to install CEPT and UASB plants throughout the 64 districts of the nation (Jordao, 2004). Similar to the reverse osmosis plant, this too would create economic opportunities within Bangladesh and raise awareness in communities. Thus, this would be a major step towards increasing access to proper sanitation facilities.

Lastly, there are certain hygiene practices that residents need to be educated about in Bangladesh. For instance, it is crucial to educate people about the values of washing their hands with soap and water. This is one of the simplest measures that could lead to a drastic decrease in the deaths resulting from microbial infections. In some off-grid villages which are extremely isolated, residents may not even have access to soap. The government and community service organizations need to identify these areas and distribute sanitary products there. While encouraging hygienic habits such as handwashing, it is also important to help people identify which habits of theirs are unsafe so that they refrain from practicing them in the future. Employing citizens to facilitate the installation of new technologies educates one portion of the public who can raise awareness in their family and friend circles. However, this is not enough as the majority of the nation needs to be educated in order to bring about significant change. In Bangladesh's rural villages, communities often adopt a hierarchical structure where there is one individual who the entire village looks up to as a leader. In order to educate individuals in villages, first educating the figures village people look up to, and then allowing them to convey the information to the rest of the village residents would be extremely effective. In short, training the trainer is the way to go. For example, NGOs could organize events in villages where they collaborate with village leaders and bring in health professionals to educate the rural population about sanitary practices through live demos, posters, videos, and handouts. Given the faith villagers have in their leaders, it is evident that involving the leaders in the educational initiatives would most effectively increase sanitation awareness throughout Bangladesh. Once again, it can be seen that involving the general population, particularly those in isolated areas, would play a major role in alleviating issues pertaining to sanitation and hygiene in Bangladesh.

Bangladesh, with one of the fastest-growing GDP rates in the world, is one of the emerging global economies. It is the home of more than 162 million people each with their own deep cultural roots entwined in the fertile lands. Unfortunately, amidst all this economic success and cultural richness, there is a massive underlying sanitation and health crisis. It is vital to take action, not only because it can hinder the nation's growth, but because it is important to establish access to clean water and sanitation as an universal right for all people.

Works Cited

- "Bangladesh." Central Intelligence Agency, Central Intelligence Agency, 22 Jan. 2021, www.cia.gov/the-world-factbook/countries/bangladesh/.
- "Bangladesh: Access to Clean Water Will Reduce Poverty Faster." *World Bank*, 11 Oct. 2018, www.worldbank.org/en/news/press-release/2018/10/11/bangladesh-access-to-clean-water-will-reduce-poverty-faster.
- Bhandari, Tamara. "How Repeat Diarrhea Could Lead to Nutritional Problems." *Futurity*, 14 Dec. 2020, www.futurity.org/diarrhea-nutritional-problems-e-coli-2486262-2/. Study by Washington University School of Medicine, St. Louis.
- Hedrick, Saima. "Water In Crisis - Spotlight Bangladesh." *The Water Project*, <https://thewaterproject.org/water-crisis/water-in-crisis-bangladesh>.
- Jordão, E P, and I Volschan. "Cost-effective solutions for sewage treatment in developing countries--the case of Brazil." *Water science and technology : a journal of the International Association on Water Pollution Research* vol. 50,7 (2004): 237-42.
- "Poverty: Bangladesh." *Asian Development Bank*, Asian Development Bank, 16 Dec. 2020, www.adb.org/countries/bangladesh/poverty.
- "Reverse Osmosis & Water Treatment in Bangladesh." *Pure Aqua*, pureaqua.com/reverse-osmosis-water-treatment-in-bangladesh/.
- "Safer Sanitation and Hygiene." *UNICEF Bangladesh*, www.unicef.org/bangladesh/en/better-access-safe-drinking-water/safer-sanitation-and-hygiene#:~:text=Access%20to%20sanitation%20remains%20moderate,said%20the%202013%20MICS%20survey.
- "Sepsis." *World Health Organization*, World Health Organization, www.who.int/news-room/fact-sheets/detail/sepsis.
- WHO, Global Health Workforce Alliance. *Bangladesh*. 16 Apr. 2012, www.who.int/workforcealliance/countries/bgd/en/.