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Bangladesh, Factor 9: Water and Sanitation

Water & Sanitation: Increasing access to safe, potable water supplies, toilets and pit latrines, and education on proper sanitation/hygiene and food preparation techniques to reduce the transmission of food and water-borne disease

Although Bangladesh is surrounded by an ample amount of water, more than 60% of the nation's population is subject to unsafe drinking water (Hedrick). Impoverished conditions are rooted deep and extensively in the nation, with an estimated 31.5% of individuals living below the national poverty line (The World). Bangladesh is extremely susceptible to flooding due to the regular occurrences of cyclones, flash floods, storm surges, and tornadoes, leaving the poorly developed nation in near shambles. Most of the country is dominated by the fertile Ganges-Brahmaputra delta. The Ganges delta is formed by the confluence of the Ganges, Brahmaputra, and Meghna rivers and their respective tributaries, eventually flowing into the Bay of Bengal. The alluvial soil deposited by the rivers when they overflow their banks has created some of the most fertile plains in the world. Bangladesh has 57 trans-boundary rivers, making water issues politically complicated to resolve – in most cases as the lower riparian state to India. The northeast and southeast are home to evergreen hill ranges. Most parts of Bangladesh are less than 12 m (39.4 ft) above sea level. Also, 17% of the country is covered by forests and 12% is covered by hill systems.

In nearly all Bangladeshi households, one set of parents, typically a mother and father, is common. The patriarch is known to hold the most influence over the entire household, and makes most household decisions. It is common for the mother of the house to stay home and attend to household matters, which commonly include cooking and cleaning (Bangladesh – Youth). Rice is viewed as the chief staple in the Bangladeshi diet, with approximately two-thirds of the overall quotidian diet consisting of rice and rice-based products. In addition, a small portion of leafy vegetables and the occasional morsel of fish is apparent in the diet. However, the small amount of nutrients that resides in the vegetables is simply washed away as a result of ample and poor quality water. The average rural Bangladeshi diet also does not meet the-minimum nutritional requirement, as only 129 grams of combined fruits and vegetables are consumed daily; this being exceptionally substandard when compared to the required 400 grams, recommended by the World Health Organization. This is in large part due to the improper usage of farming land, and the lack of necessary tools to help manage acreage. Social standards and gender inequality play a role in poor intake of nutritional food for women. It is customary, especially in rural areas, for the male of the household to receive the largest and finest meal, often leaving women and children suffering from malnutrition (Bhattacharjee).

The Primary Education Compulsory Act passed in 1990 allows for all students in Bangladesh to receive a free education until the fifth grade. As a result, Bangladesh possesses one of the largest primary education systems in the world, with over 16.4 million children ages 6-10 participating. While this has proven to yield tremendous benefits for young children, there is still a multiplicity of difficulties that occurs post fifth grade. In fact, only 55% of children end up completing the fifth grade, in large part due to high dropout rates, poor educators, and children who start working. Along with this, access to health care for most Bangladeshi civilians can be challenging. Although the nation has met an improved standard for health care, many families, especially those located in the rural parts of Bangladesh, tend to suffer when attempting to find health care due to their low income status.

Bangladesh boasts some of the most fertile land in the world, and is the source of employment for 63% of the nation's population. Due to the vast increase in population, most farms tend to be small in size (generally a few acres), and thrive off three main production areas - rice, grown for domestic consumption primarily, along with tea and jute (a sturdy vegetable fiber, typically wielded into strong thread) contributing largely to the agricultural exports industry. Rice is the most farmed item in the nation, coming in as the fourth largest provider in the world. However, the production is extremely dependent on the country's weather (Bangladesh - Agriculture). During monsoon and typhoon seasons, rice and other agricultural productions fluctuate, and as a result, Bangladesh has been forced in the past to rely on international aid to meet the local requirement.

Farmers endure several hardships when it comes to generating nutrient-rich food in large quantities. The largest issue for the lack of sufficient food is due to the mass increase in population. Other-contributing factors are the lack of proper farm machinery/technology, and the poor usage of the available land. Between the years 2000-2010, the amount of arable land has decreased by 7.3% (Devnath). This has been caused primarily by poor weather conditions, which continue to serve as an insurmountable hurdle in crop productivity. The increase of global temperatures has depleted the amount of rainfall by approximately 50.5 millimeters from 1900-2009. Since agriculture is highly dependent on several external factors, there is no source of steady income for most rural farmers in Bangladesh as flooding is the largest source that causes agricultural deprivation. As a result of mass flooding, many Bangladeshi citizens are forced to migrate into cities in order to attain income (Yee). Unfortunately this leads to overcrowding, and jobs become increasingly sparse. More than 36% of the rural population lives in poverty, with several in extreme poverty (Rural). About 16.3% of agriculture contributes to the nation's Gross Domestic Product (GDP), with the average Bangladeshi farmer grossing about 36,000 takas per year (US \$462).

Poor connections to food markets and vendors also serve as a barrier in agricultural productivity (Toward). A few contributing factors are the fact that farmers are unaware of the food market forces, therefore having little knowledge of what their produce should be correctly priced at. Transportation of produce as well as storage can lead to inflated prices of the products themselves, causing farmers to be at the lower end of the pay scale (Bangladeshi Agro). The issue is not only rooted first in production, but also in distribution. About 15% of food distribution is handled by the government of Bangladesh using a ration system; which solely reaches around a quarter of the population. As a result, most depend on the open market system to sell their produce. In a 1973 study, it was reported that an average of 156 takas (\$2) per day is required in order to meet minimum nutrition levels. However it was concluded that an estimated 79% of rural farmers and civilians did not meet this criteria, thereby leaving many people malnourished and deprived of basic nutrients (The World). Current standards have changed from those in 1973, and 156 takas (\$2) is no longer enough to meet the proper nutritional level.

About 97% of the Bangladeshi population uses groundwater for consumption and agricultural practices. However, this is a major problem as more than 85 million individuals are at risk of Arsenic poisoning from drinking water and crops. Typically, arsenic seeps into the soil causing immediate toxicant, and this disallows for 85-90% of rice to be classified as organic (Hossain). This makes it extremely difficult for rural families to grow a decent standard of produce for both domestic and external markets. For families, availability of clean water is perhaps the largest challenge to combat, as more than 60 million are consuming unsafe drinking water brimming with manganese, nickel, uranium, lead, zinc, and several other toxic elements that exceed the health guidelines for potable water, as per the World Health Organization (Frisbie). For many families, the main source of water comes from tube wells, and they are often shared among villages. This method is often unhygienic, and causes bacteria to infect the water for all users of the well. Additionally, farmers lack the proper education when it comes to using efficient methods to farm, and studies have shown that the higher the education level a farmer holds, the better the agricultural output (Sultana). However, even if the farmer himself/herself does not have access to

education and/or is not literate, being embedded in a literate household can boost the farmer's intelligence with added proficiency in a process known as "second hand" learning.

The use of unsanitary water continues to remain as an extremely pressing issue, as 27.9 million people lack access to clean water. With this, a staggering 74.8 million people do not possess proper sanitation services, and as a result, only 16% of rural families have access to latrines. Poor sanitation contributes to the estimated death of 100,000 children per year from diarrhea, and these can be attributed to malnutrition and low socio-economic status ("Bangladesh"). As of 21st century, there have, however, been considerable efforts for improvement in water quality and sanitation. The government of Bangladesh issued national sanitation campaigns between the years 2003-2006, and made it a goal to provide 100% widespread sanitation services, and halt nonrestrictive defecation in rural areas by the year 2010, as the practice was poor for crops, health, and the environment. In 2009, 54.3% of rural folk had improved their overall proper latrine use, and many ceased defecating near water sources. The government installed latrines in most homes, and subsequently 89.5% individuals owned or shared a latrine. However, the remaining 10.5% of people did not receive these amenities as they resided mainly in rural areas and came from the lowest economic background (Kullman).

Education regarding proper hygiene has improved over the years with the installment of community hygiene promoters. Young men and women are trained to inform their neighbors and villages about the benefits of quality hygiene, proper waste disposal, and better economic and health standards. However the same cannot be said for food borne illnesses, as outbreaks continue to be recurrent, causing a lack of consumer confidence in food, and health in general. Both natural and antiquated agricultural practices are the source of various illnesses. Lack of hand-washing with soap and clean water is an example of how diarrheal pathogens can infect and multiply food, resulting in high mortality rates, especially among children.

It is safe to say that overall trends for creating potable water and sanitation services have been positive since the last millennium. In spite of this, however, there is still a multiplicity of things that can be executed in order to achieve higher water and sanitation standards. If Bangladeshi farmers and civilians were properly educated on the necessity of employing good hygiene and proper methods of food preparation, it would save money, effort, and health problems. Further, deaths would be prevented especially in children, and fewer would have to suffer from waterborne diseases that could be avoided simply by using a latrine.

The two largest outside factors obstructing sterile water and quality sanitation can be ascribed to climate volatility, and the mass increase in population over the last few decades. With more than one third of the nation's total population living approximately within 62 miles from a shoreline, many are extremely susceptible to coastal flooding due to the rise in sea level. Additionally, those living closest to the sea are the first to be affected when the deadly cyclones strike annually. Often times, effects of cyclones and river flooding are not predicted, and are measured by rural farmers by the gradual increase in water level (Belt). Therefore, many do not have time to protect their crops, especially the rice paddy fields, and hundreds of crops are destroyed as a result of the lethal weather patterns. Contaminated water is one thing, but the soaring levels of salinity is another issue altogether. Rice paddies typically use 5 inches of water to submerge the seeds, so with the over flooding, the seeds diminish in growth potential. The water is typically rich in nutrients from the ground, but the salt from the sea destroys the crop instantly. Bangladeshis typically endure heavy, persistent rainfall from June through October. This time frame is known as 'the monsoon season', and during that period, nearly one third of the country is under water.

With Bangladesh occupying one of the top positions for large populations, the nation has struggled to feed the mouths of each citizen. Similar to a supply and demand set-up, the country lacks a steady agricultural production and consumption model, partly caused by unpredictable fluctuating weather

patterns, and therefore cannot plan to provide enough food for everyone. Post independence of Bangladesh in 1971, the number of individuals has increased from 71 million to 160.4 million - the population growing annually at an estimated rate of 1.6%. The evidence of the overcrowding is starkly visible in the country's capital city, Dhaka, with sleeping children and homeless adults lining the pavement of every street.

Thankfully, there are multiplicities of steps that can be taken in order to address the respective issues. Embedded in Bangladeshi rural soil are ancient practices; not using proper forms of human waste disposal is one of them. Toilets, even if shared among a few families, would significantly reduce infected crops, infant mortality, and the number of diarrheal-associated deaths. Besides, it would help produce clean water easier, and improve the overall hygiene of Bangladesh. Because toilet installation can sometimes be costly, a cheaper alternative exists. Pit latrines are the simplest and most economical solution to address the issue of open defecation. It functions almost the same as a proper toilet, and solves the same issue. With this, sanitation practices employed immediately after latrine use, such as the washing of hands with soap and water will instill a healthy habit, and can be applied diurnally to prevent the spread of bacteria and diseases, as well as to improve food preparation. Funding for this solution would likely be executed by Bangladesh's government, as well as assistance from international organizations such as the United Nations.

Being an agriculturally driven nation, Bangladesh is in dire need of improved agricultural technology. Rice milling equipment, power tillers, drum seeders, and threshers are among just the few types of machinery needed to properly enhance Bangladeshi farms and sub-sectors. This will increase food production standards, as well as implement better food quality. By investing in more productive machinery, the rate of food production will increase rapidly. Millennium Development Goals report has indicated that poverty has declined at a rate of 2.47% since 1991-1992, however not enough of this reduction is linked to 'hunger-poverty'. By enacting agricultural apparatuses, both hunger and poverty rates will decrease (Millennium).

Education is an imperative fundamental. It is important for children in particular to be educated from an early age. Therefore, they will grow to eventually understand the importance of healthy practices and proper sanitation. Even if the farmer or citizen is elderly, educators would be able to teach the importance of safe practices, and highlight issues especially for farmers, and secure agricultural ways to produce nutrient-rich food. By imparting this type of knowledge, the quality of food will vastly improve, and income levels for individual families as well as the entire agricultural industry will improve. With more high quality food being produced in larger amounts, the unit price for produce would get lower, allowing people with a smaller income to buy enough nutrient-rich food. This method would be best suited for execution by various community-based organizations, such as NGOs. With the inclusion of all segments of the community, nutritional education would be able to reach all sectors of people; women, farmers, and school children. Women, who tend to do most of the food cooking and preparation, would be able to reform their prior habits and reduce the sum of nutrients lost due to poor preparation practices, and thereby enlighten others as to what a wholesome meal should look like. Women will also be the key into reversing some mainstream gender roles and practices. Organizations, both local and foreign, would supply the necessary educators to provide training and spread knowledge to local civilians. Additionally, members of the Bangladeshi community possess the ability to spread knowledge around their communities and enlighten their relatives, friends and children in the process. The national government would be in charge of promoting sanitation/hygiene campaigns, funding infrastructure development and seeking grants from international organizations.

No one can control the weather, especially with the frequent occurrences of cyclones and heavy rainfall. However, there are measures that can be taken in order to dwindle the amount of destroyed land and crops. Flooding is a result of severe weather patterns, but this does not have to completely destroy farm

systems necessarily. Floating farms have increased their popularity in recent years, and can be used as an effective measure to save crops. They are typically constructed from both local and recycled materials. Bamboo rails are an example, and they are used to hoist fish from nets. Vegetables are raised in plastic containers filled with soil. With this practice, it is possible to earn an annual income of over 132,293 Takas (\$1,700), a substantial amount of money, especially for rural farmers (Yee). The farms take approximately five to ten women to manage, serving as a steady occupation. Floating farms work well in harsh weather conditions, and can hopefully be further modified in the future. As a consequence of harsh weather conditions, schools and homes are destroyed to the point of rubble. To provide uninterrupted education, schools on boats for children would be tremendously beneficial, as school kids would not have to worry about gaps in their education. Another recommendation would be to use more advanced irrigational systems which would minimize the pressure on groundwater usage, and optimize crop water consumption. One method would be to use Tubewells because they are one of the most common and affordable methods to increase irrigation to acreage (Community). Tube wells come in three structures; shallow, deep, and hand tubewells. These are in use typically after a major flood, and are purposed to distribute water among the rural population.

The government of Bangladesh has partnered with the World Bank to implement a \$10 million project to install solar powered irrigation systems to cultivate rice farming in large land areas. This method will be more energy efficient, and work to reduce the amount of carbon emissions annually (Toward). In addition to organizations like the World Bank, other projects have been undertaken to ensure the betterment of Bangladesh's water purification and sanitation practices. The Max foundation has sought to eliminate child mortality rates by providing hygiene education, and incorporating latrines and other methods of safe sanitation procedures into Bangladeshi villages (Community). Though this particular organization is small in size, great potential is in store for this project as they start small and achieve what they desire initially. By using this method, it would make it easier to work more efficiently and at a faster pace.

Being a nation subject to such gruesome climate pressures, Bangladesh has struggled to develop as a stable nation. Constrained to ancient social practices has inhibited many Bangladeshi citizens from reversing their old daily habits. This affects not only the environment, but agricultural products as well. There are, however, relatively simple measures that can be taken in order to alter the troubling conditions faced by Bangladeshis. Education is perhaps the best, quickest, and most effective tool to help inspire change among the people. With knowledge, so many rural individuals will be exposed to a new way of life, and will not have to worry about destroying one's health by merely learning how to wash hands before food preparation and after latrine usage. With assistance, it is possible to construct safe toilets and latrines to ensure that the farm fields of Bangladesh are waste-free and at their best for agriculture productivity. With these efforts of change, a scintillating future for the wondrous nation of Bangladesh is in store.

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