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 Cambodia, Factor 9: Water and Sanitation

Clean Water: Life's Essential Element

As a developed country, we take for granted the gift of running, sanitary water every day. Did you know that the average American family of four uses approximately 400 gallons per day? ("EPA") This is hard to comprehend for most of us, because it is all we have ever known, but for a family in a developing country such as Cambodia, this number is staggering. Clean water supplies more for us than we even realize, but as we look at the detrimental effects of unsanitary water in other countries, it is easier to see just how fortunate we are. In Cambodia, citizens have plenty of water resources, as the Mekong River flows through the country, but the water that they do have access to is unsafe. Citizens who do consume and use this water usually experience severe sickness, taking away from their jobs, educations and other areas of life that provide for them. While experiencing the sickness caused by contaminated water, Cambodians cannot attend those places such as school and work. This takes away their ability to earn money, causing a vicious, unending cycle of poverty and food insecurity. With the advance of modern technology though, these problems are becoming easier and more reasonable to solve, make the future for Cambodia and other countries look bright.

Cambodia is a country located in Southeast Asia, bordering the Gulf of Thailand between Thailand, Vietnam and Laos with a total area of 181,035 square kilometers. The population of Cambodia reaches almost 16,000,000 with approximately 90% of the population under the age of 50, and 50% of the population being under 25. The young population can be attributed to the high infant mortality rate which accounts for about 50 deaths for every 1,000 births, along with the high maternal mortality rates which estimates almost 200 deaths for every 100,000 births. ("UNICEF") The average mother has 2.6 children with the average life expectancy at just 61.69 years for males and 66.7 years for females. Sexually transmitted diseases affect only 0.64% of the adult population which is equal to about 74,600 individuals which is a very low percent, especially considering the access to health care in the country. Only 7.5% of the total GDP in Cambodia is being set aside for health care with just 0.17 physicians/1,000 people. The risk for waterborne diseases such as bacterial diarrhea, typhoid fever and hepatitis A in the country is very high. Vector borne diseases such as dengue fever, Japanese encephalitis and malaria are also a risk, along with the highly pathogenic H5N1 avian influenza being a risk for those who have close contact with birds. 29% of children under the age of 5 are considered underweight due to the high rate of malnutrition in Cambodia. Only 2.6% of the Cambodian GDP is dedicated to education, but an average student does attend school for 11 years. A relatively high 84.5% of males are literate compared to just 70.5% of females; making 77.2% of the total population literate.

There are 7.974 million people in the labor forces with 48.7% of these individuals being directly involved in agriculture ("CIA"), but almost 60% of the population is engaged in agriculture in some way. ("UNICEF") Another 19.9% of the work force is involved in the industry and 31.5% being involved in services. Only 0.3% of the population is unemployed but 17.7% of people are below the poverty line. The lowest 10% of the population receives just 2% of the total income while the highest 10% receives almost 30%. Exports in Cambodia account for \$7.867 billion dollars coming from commodities such as: clothing, timber, rubber, rice, fish, tobacco and footwear. Imports total \$10.65 billion and include: petroleum products, cigarettes, gold, construction materials, machinery, motor vehicles and pharmaceutical products. Economic situations in Cambodia have experienced strong growth over the last decade but situations are still less than ideal. In 2012, approximately 2.66 million people lived on less than \$1.20 per day and 37% of Cambodian children suffered from chronic malnutrition.

Cambodia has a tropical, rainy climate with the monsoon season running from May to November and the dry season occurring from December to April. Within these seasons though, there is little temperature variation. Almost 60% of the land is forest and 32.1% of the land is used for agriculture with the most common crops being rice, rubber, corn, vegetables, cashews, cassava (tapioca and manioc) and silk. Animal agriculture in Cambodia includes: beef, buffalo, mutton, goat, poultry, and swine. Natural resources include oil and gas, timber, gemstones, iron ore, manganese, phosphates, hydropower potential, and arable land. The main waterway through Cambodia is the Mekong River, stretching out to about 3,700 kilometers. Cambodia also uses airplanes, trains and trucks for transportation. (“CIA”)

Even though Cambodia is making huge strides towards becoming a more developed country, they are still not there yet and suffer from a multitude of transnational issues that may be a result of that. One major current issue is trafficking. Cambodia is a source, transit and destination country for men, women and children subjected to forced labor and sex trafficking. Men, women and children from Cambodia, looking for work, migrate to countries in the region and the Middle East, but are subjected to sex trafficking domestic servitude or forced labor in a variety of areas including: fishing, agriculture, construction and labor in international waters and held there for years. Children are significantly more vulnerable than the men and women looking for work and are therefore subject to forced labor, which may include domestic servitude and forced begging. Women and girls are the most at risk to be trafficked from rural areas to urban areas for sexual exploitation. The men directly from Cambodia are the main exploiters of these prostitutes, but men coming from other countries in Asia travel to Cambodia for child sex tourism as well. Cambodia also struggles with illicit drugs, especially narcotic-related corruption which has reportedly involved some in the government, military and the police force. The country is also susceptible to money laundering due to the cash-based economy and weak borders. (“CIA”)

Many developing countries are facing a lack of water sources, but this is not the case in Cambodia. The typical family’s main barrier is the lack of water sanitation. Cambodia has plenty of available groundwater and surface water, but the problem is not much of it is safe to drink. Many open wells are contaminated from a variety of sources. (“Charity: Water”) It is common for water to be collected in large cement structures which is then stored for extended periods of time. This allows for unsafe environmental parasites and can be the source of mosquito reproduction. It is found to be extremely expensive to receive treatment and adequate chemicals to purify the water, and because of a lack of financial resources, it is even harder to purchase them. (“The Water Project”)

The lack of water sanitation, though, is not just caused by it being contained for long periods of time. Many of the wells that store Cambodia’s water are contaminated with industrial run-off, human waste and other contaminants like arsenic and E. coli bacteria. (“Charity: Water”) It is common for trash to be thrown on the ground behind restaurants, houses and other structures, because citizens have no other place for it. The trash then sits in the mucky water which is usually shared with fields that produce their food. Studies have also shown that cash crop farming in China, Laos, Vietnam and Thailand determine the water levels and the quality of the rivers all the way in Cambodia. (“The Water Project”)

The water contamination obviously denies a significant amount of Cambodians the access to potable water. Approximately 80% of the population lives in rural areas which is the location where most of these problems persist. 25% of the population in Cambodia lack complete access to safe water and a staggering 58% lack access to improved sanitation. (“Water.org”) These percent’s are equal to some 6.3 million of the 14.9 million Cambodians. This lack of access to clean water leaves Cambodian children severely at risk and vulnerable to diseases such as bacterial diarrhea, which is known to be the 2nd leading cause of death among children who are under 5 years of age. (“Radio Free Asia”) These deaths could be easily avoided with the implementation of solutions to water contamination.

With the average income of a Cambodian being just a scant \$950 per year, or \$1.20 per day, the access to materials or chemicals that could solve some of the water quality issues is very hard to reach. Almost 60% of the labor force is engaged in agriculture, but the majority of this group is just involved with subsistence farming, allowing them just enough food and income to get by. Farmers are unable to purchase equipment or other necessities for a significant production of food and commodities, allowing the circle of poverty and hunger to just keep continuing. The farmers are dependent on the monsoon rains and irrigation from the Mekong River, which again, is highly contaminated. Spring and fall monsoons have become more sporadic and unpredictable, making rain fed rice growing more risky, due to prolonged drought periods. Erosions and flooding are also becoming increasingly problematic and pose threats to the farming community. (“World Renew”)

The problems in Cambodia only continue though, as the detrimental effects of poor agriculture production lead to the astounding percentage of children who are underweight and live with malnutrition. The cause of nearly one-third of the child deaths in Cambodia are linked to malnutrition. Sadly, the number of children suffering from acute malnutrition may have increased in the past few years. Major links to malnutrition include: inadequate complementary feeding practices, poor hygiene and a high prevalence of diseases. Since 2008, the price of food in Cambodia has continued to increase, making it even harder for citizens to produce or purchase it. Another unfavorable effect in the nutrition and health of Cambodians is the presence of anemia in children under five. The condition is also affecting more than 80% of children under the age of two. Anemia is caused by not enough healthy red blood cells, otherwise known as a lack of blood. (“UNICEF”)

There are a number of ideas that will help lead to the solution of the water sanitation issue in Cambodia. The most general idea or solution that will need to be implemented is the use of better hygiene practices among all Cambodians. The implementation of better hygiene will most likely lead to a large decrease in the disease and death rate among the citizens here. In addition to improved hygiene, the use of bio-sand filters will also allow for a variety of treatments among the individuals living here. Bio-sand filters are very effective for bacteria, protozoa, helminthes (parasitic worms), turbidity, odor, taste and color. They are also able to be somewhat effective for the elimination of viruses and iron. With bacteria being the main cause for disease stemming from water, the bio-sand filters are unarguable one of the best options for Cambodia. Unlike other countries, Cambodia’s biggest struggle is not with the lack of water or the lack of money to purchase the materials needed to fix these issues, which allows for these two solutions to be very applicable.

While hygiene is a significant issue in Cambodia, the solution(s) to the problem would not be extremely hard to carry out. A general knowledge of the importance of hygiene among the citizens is going to be a very important concept as the issue is being solved. Government programs should be implemented with the plan, as it is a substantial issue affecting a majority of the country, including even those who are above the poverty line. Leaders from the Ministry of Health (MoH), Cambodia’s ministry responsible for governing healthcare, the healthcare industry, public health and other health related topics, could be responsible for conducting the classes. Having leaders come from a higher level of government such as the MoH would really help implement the solution across the country as opposed to each class being responsible for finding their own teacher.

With the implementation of a bio-sand filter, the rates of diseases and death rates would go down, with a doubt. The bio-sand filter (BSF) has been adapted from the traditional slow sand filter, which has been used for community water treatment for hundreds of years. The filter though, is much smaller and more efficient, making it suitable for even household use. The BSF works by allowing the water treatment to be carried out by the sand inside the filter. Consumers have options when choosing what filter container to use as it can be concrete, plastic or any other water-proof, rust-proof and non-toxic material. Once a citizen chooses their container type, each container is filled with layers of sieved and washed sand and

gravel and a biological layer of microorganisms develops at the sand surface, contributing to the water treatment. Once this is completed, a perforated diffuser plate or basin is used to protect the bio-layer from disturbance as the water is poured into the container. These are the main functions of the BSF, but it gets even more interesting from here. (“CAWST”)

The ability to remove the contamination from the toxic water is at the country’s fingertips. More specifically than the points stated above, pathogens and suspended material are removed through a combination of biological and physical processes that take place in the bio later and within the sand bed. The bio-layer is the key to removing pathogens from the water and the BSF is significantly less effective without it. The only things users need to remember is that a pause period is needed between uses to allow time for the microorganisms in the bio-layer to consumer pathogens in the water. Users should also wait at least one hour after all the water has been filtered before filling the filter again. The water is best filtered when the BSF is used every day, but the users are able to wait up to a maximum of 48 hours between filters. As time goes on, the flow rate of the filter will slow down as the sediment becomes trapped in the upper layer of the sand. If the turbidity of the water is above 50 NTU, consumers must also strain it through a cloth or sedimented layer before use. Once the water has been through the filtering process, it should be collected in a safe storage container placed on a block or stand. The container should also have an opening directly under the outlet, minimizing the risk for recontamination. (“CAWST”)

When the flow rate of the filter drops to a level that is inadequate for the household use, it requires a simple maintenance procedure. This first option allows the user to perform a “swirl and dump” procedure, performed on top of the sand, only taking a few minutes. Cambodians must also be aware that they should clean the BSF regularly with soap and water or a chlorine solution. The Bio-Sand Filters also have an outstanding lifespan. Plastic filter can last over 10 years and cost about \$75. Concrete filters last for over \$30 years and cost anywhere from \$12-50, making this an economically friendly option for all Cambodians. (“CAWST”) Because Cambodians live without making much money, the best option for most of them would be to purchase the concrete filter as it has a long lifespan and costs much less. While they don’t make much money, the cost could be spread out amongst a span of time with small payments. This idea is cost friendly for a large percentage of citizens and could be implemented relatively easily.

Cambodian’s will pay a small fee which will cover their entry into a class about the basic hygiene practices that they will need to be educated about. This fee will also cover the cost of the Bio-Sand Filter, as well as the skills needed to put the filter together. The fee will range anywhere from \$20-85, depending on the material they want their filter to be constructed out of. As the program becomes more developed, the government may increasingly offer more assistance, but it will begin by consumers paying the fee on their own. Fortunately though, the plan is fairly economically friendly, and a large number of citizens are able to pay for this without many problems.

As you have read, Cambodians are struggling through a number of problems, all stemming from the water sanitation issue. All citizens, but especially children, are suffering from sicknesses such as bacterial diarrhea, typhoid fever and hepatitis A, which are having a negative effect on their ability to gain new knowledge and get other tasks accomplished. Almost 30% of children are also underweight, which is caused by the sickness they experience through the quality of the water. Cambodians also have a poor knowledge of what it takes to be hygienic, adding to the problems that they are experiencing. These issues may seem overwhelming, but the future for Cambodia is looking brighter.

The research shows that Cambodians, along with the help of others, are going to be able to defeat this issue. Modern technology is making it easier, as the Bio-Sand Filters show. The task of overcoming this water sanitation is a huge undertaking, but the steps that are being taking to do so will make a huge difference. The small fee will be able to provide knowledge about general hygiene as well as the Bio-

Sand filter and the steps that will need to be taken to assemble the filter. With time, the water will become much more sanitary, without a doubt, drastically decreasing the high percentage of citizens who suffer from bacterial sickness obtained through dirty water. These changes will impact Cambodia forever, allowing them to become developed, also allowing them to be more successful with other countries around the world. It will be hard work, but this will all be worth it in the end, as Cambodia grows to its potential through the availability of life's essential element, water.

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