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Ethiopia, Water and Sanitation

## **How We Could Improve Ethiopia's Water Sanitation Crisis**

We take our potable water for granted. When we want to drink, we hold a cup under our faucet and pull a lever. When we want to shower we twist a knob and gallons of water pour onto us. In each of these daily scenarios, we never question the quality of the water as it pours out crystal clear and readily available from many freshwater sources. But what if this luxury was taken away from us? What if we had to travel miles just to attain water from potentially questionable sources and have very real chances of contracting a bacterial infection that could debilitate us for days? This is the reality many Ethiopians have to face due to their water sanitation crisis. Droughts and poor allocation of water has led to many economic, sanitary and agricultural issues with large consequences for the nation. It's also caused many deaths among Ethiopian children. Despite the grave consequences, solutions can be formed through minor policy changes, cheap rainwater collection systems, and reallocation of freshwater, providing it to much more of the population. It's an issue whose resolution could improve the lives of many.

Ethiopia is currently undergoing a water crisis with about sixty percent of its population lacking access to drinkable water (Lifewater). This critical sanitation issue is partly the result of insufficient freshwater sources for the Ethiopian population. These sources have been dwindling due to major droughts in Ethiopia, with the most recent droughts lasting 40 years and are ongoing. The remaining natural freshwater lakes and rivers in Ethiopia are still decent in size, but are overused. Multiple communities will often drink, clean and bathe within close proximities, creating sprawling bacterial colonies that can contaminate the drinking water. While Ethiopia does have drinking wells, many are hand-dug and lack filtration. These are only marginally better than the contaminated rivers and lakes. Another reason for Ethiopia's lack of freshwater is agriculture. Agriculture is Ethiopia's largest consumer of freshwater with about 93% of the supply being used for the farming industry (USAID 1). This leaves only 7% of the country's water for non-agricultural purposes. Ethiopia's water supply is spread too thin, leaving only a small amount for necessities outside of farming. In summary, Ethiopians don't have broad access to sanitary water, and as a result they have to drink from bacteria-infested wells. Many of these wells contain E Coli which makes people very sick and have overarching effects on the Ethiopian population.

One of the most devastating effects of Ethiopia's water crisis is E Coli contamination. E Coli spreads in unclean water, which makes many of Ethiopia's hand-dug wells epicenters of harmful bacterial colonies. A survey found that eighty five percent of Ethiopia's drinking wells had evidence of E Coli (Central Statistical Agency of Ethiopia). E Coli is a devastating illness that can put Ethiopians out of work for weeks, making them unable to provide for their families. This makes E Coli colonies a leading factor of Ethiopia's nationwide poverty. The correlation between healthcare and poverty is described as "a vicious circle of poverty in every angle. Income poverty led to illiteracy and ill health, and illiteracy and ill health led to income poverty" (Western Michigan University). Illness spread by E Coli can devastate Ethiopia's economy by depriving its workforce. Worse yet, children under the age of five are the most susceptible to illness from E Coli. A study by the National Laboratory of Medicine found that E Coli contamination is "the leading cause of childhood morbidity and mortality" (National Laboratory of Medicine). Diarrhea is devastating to people who don't have ample access to clean water to replenish themselves. It wastes what little water the children have and dehydrates them even further. Children under the age of five are dying from illnesses that are largely prevented in the US simply because of Ethiopia's poor water quality. This water sanitation crisis has just as great effects on people whose lives revolve around clean water: Ethiopian families.

The typical Ethiopian family consists of three generations: the oldest partners, their sons and son's wives, unmarried daughters, and the grandchildren from their sons that married (Culture Atlas). Because of Ethiopia's cultural and religious diversity there isn't a definitive way of life for all Ethiopian families, but in general the men are tasked with laborious jobs and are supposed to provide the family with a stable income. Farming is the most popular job in Ethiopia, with about 67% of its population being involved in agriculture (USAID 2). Women are tasked with doing an equal amount of work in the family's house. Because of the clean water crisis many Ethiopian families, specifically women and children, may be forced to travel long journeys to wells far from their homes with the water supply for the entire family often being whatever one family member can carry. Those that can't make the journey or don't have wells in close proximity are forced to collect water from hand-dug, potentially contaminated wells or unclean rivers that can temporarily debilitate family members with illnesses. Aside from just drinking, Ethiopians rely on clean water for food. The typical Ethiopian diet consists of beans, rice, and flatbread, which are used as ingredients for different dishes. Most dishes using these ingredients require water for cooking, and other ingredients like meat can already be affected with E Coli from unclean water sources. From farming to basic necessities, water is essential to Ethiopian families, which explains why the crisis has been so devastating to the country.

Insufficient access to clean water has created many problems for Ethiopia by inducing sickness, death and unstable financial situations to many. However, there are ways to improve the crisis and give more Ethiopians access to clean water and resolve many of their underlying issues.

One of the largest contributors towards Ethiopia's water crisis is freshwater used for trading and exporting goods rather than domestic use. 16% of Ethiopia's natural water sources are used for crops that are exported to other countries (Blue Water Footprint). This is because foreign companies use Ethiopia's water for cash crops like rice that are exported and sold around the world. While the Ethiopian government does receive money from the land used for these massive company plantations, these deals reduce the amount of water Ethiopians can use to fight their water quality crisis. Furthermore, it reduces the amount of land that Ethiopians can use for domestic farming. This may lead to insufficient crops and water supplies for Ethiopia's growing population in the future. If nothing is done about the exportation of Ethiopian-grown crops this cycle will continue and more companies will continue to deplete Ethiopia of essential resources. However, if this cycle is stopped it would allocate more water towards Ethiopians in need of it, and keep farmland for Ethiopians to produce food for themselves rather than nations that already have ample food and farmland. Policies must be put in place to limit the amount of crops and land that can be sold to foreign companies. This would ensure that Providing water to Ethiopia's people is placed at a higher priority than making short-term cash, and could be a significant step towards solving Ethiopia's water crisis and its underlying issues.

Additionally, even though Ethiopia is currently experiencing a water crisis, there are many surrounding African nations that have clean, stable water supplies. Botswana, for example, has access to clean water for 99.5 percent of urban civilians and 83.5 percent for people living in rural communities (United Nations). Much of Botswana's water is brackish, or partially freshwater and partially saltwater, so similar to Ethiopia, they require strong filtration systems to make their water drinkable and usable for farming. The difference between the two African nations is that Botswana has largely solved their drinking water problem while over forty percent of Ethiopians struggle to find clean, drinkable water. So what is Botswana doing differently to have such a substantial improvement in water quality? One major factor is their investments in large water sanitation plants that purify water on a large scale. These sanitation plants get water from the Chobe River and filter the water using lamellar clarifiers, as well as sand and carbon filters. Even though some rivers have dried up in Ethiopia, similar plants could draw water out of the Nile, Tekeze, or Omo rivers, providing drinkable water to the many communities that live along these rivers. While they may be ideal for providing drinkable water to large populations, these

plants can be very expensive. Smaller sanitation plants implemented in areas near groundwater could be much cheaper and more realistic. A device by a company called SafeWaterAfrica implemented water sanitation units around Mozambique and South Africa (CORDIS). These sanitation devices are smaller than the massive plants the United States has, and can produce 10 cubic meters, or 10,000 liters of sanitary water per day, which is enough for roughly 300 people. The devices require maintenance over time, which could give jobs to unemployed Africans and hopefully reduce Ethiopia's poverty rates. These sanitation devices could be easily implemented in Ethiopia because they collect water from rivers and only require energy from the sun. CORDIS, the agency that provided this information, also claims that they're affordable, and can be placed in both remote and highly populated areas in Africa, ensuring that everyone, regardless of income and location, can have access to clean water. Currently only two of these units are deployed in Africa, and neither are in Ethiopia. These devices were originally funded by a European Union-funded program called SafeWaterAfrica. This program should be further funded by nations of the European Union and partially by the Ethiopian government. The program's importance should be held at a higher level and larger investments should be allocated by Ethiopian and charitable organizations. Doing so would create clean water sources around Ethiopia, ensuring a long term solution to one of the nation's greatest problems. This demonstrates that funding from charitable projects alone gives hundreds access to sanitary water, and it's a realistic goal given time and realization of Ethiopia's massive issue.

Finally, changing policies and collecting sufficient funds for charity-sponsored wells can take time, so while we wait for more permanent solutions to be introduced there are cheap and simple solutions to give more Ethiopians access to clean water. Rainwater is generally safe to drink, and Ethiopia has plenty of it. On average it rains over 177 days per year in Ethiopia, which is roughly 45.9 inches. The problem is that many Ethiopians don't take advantage of this rainwater, as collecting it would require a gutter and container system. However, rainwater collectors are actually easy to make. They can be made out of different materials in many different forms. The three most common rainwater collection systems are rain barrels, dry, and wet systems (Rainwater Harvesting). The barrel design is the simplest to make because it's simply a barrel with a gutter pouring into it. This could be the easiest way to collect rainwater for Ethiopian homes, but the open top allows for debris to fall into it. The dry and wet systems both contain the water in enclosed cylinders, which could be harder to make, but would protect the water from contaminants. Any of the three options could greatly improve the water quality in Ethiopia, and depending on the design, it could be as simple as running a pipe into any kind of barrel. This could be easily implemented and an effective way of giving Ethiopians access to cleaner water. More importantly, these rainwater collection systems would be affordable. For a rough estimation, in the United States 10 feet of gutter irrigation pipes and a 50 gallon water containment barrel would cost about \$55. However, these costs could be reduced for homes that already have gutter systems and enclosed containers. In Ethiopia there are around 21,850,103 households with an average of 4.61 people per household (Wikipedia). Consequently, it would be about 559 million dollars to implement the rainwater systems for the 43% (9.4 million) of the population without access to clean water. While this may be a high expense for a country with high poverty rates and low wages, a combination of fundraising from individuals and investments from the Ethiopian government could make nationwide rain collecting systems a reality. Prices could be reduced further if larger projects satisfy some of the need for clean water for large populations. As stated before, SafeWaterAfrica's solar powered treatment facility is small, provides wages to workers, and are allegedly cheap to make and easy to implement in African Nations. Because it's a European Union-based project, there are plenty of potential funding opportunities sourced from many different countries.

Ethiopia's water sanitation crisis is at the root of many of the nation's issues, but progress is slow to improve it. Ethiopia's water supply is used for unnecessary purposes like exportation of crops, and farmland is sold to foreign companies when these resources should be used for feeding and giving water to Ethiopians. Too much of Ethiopia's agricultural economy is based on short-term financial gain instead of building an agricultural system that provides in the future. If Ethiopia is to improve its water quality,

the freshwater it does have should be allocated primarily towards the people rather than agricultural businesses for profits. This could be done through government policies or incentives to keep Ethiopia's water supply in a more local circulation. However, these things take time, and until these government actions are put in place, cost-efficient rainwater collection systems and charity-funded wells can be implemented around Ethiopia to temporarily aid the nation's major draughts and unclean water issues. While this major issue may seem impossible to fix, actions can be done immediately to improve it. It's completely possible to provide clean water to many, and improve so many underlying issues, with a bit of government action and affordable solutions in the meantime. We could stop preventable deaths of children and improve the lives of many. All it would take is a bit of water reallocation, a bit of money, and a whole lot of care towards improving Ethiopia as a whole.

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