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Preu, Factor 9: Water & Sanitation

Peru: Clean Water for Those with None

Worldwide, people struggle with life-altering problems daily. Whether it be not having food to eat, no safe place to sleep, or as simple as not having transportation. While some are struggling with these problems others look at not having the newest technology or not knowing what to wear while staring at a closet full of clothes as huge problems. When not having the eight-dollar coffee is their biggest problem, they forget there are people dying because they do not have clean drinking water. When you start looking at the things you do have rather than not your perspective changes, instead of thinking “I wish I had a better car” think “Wow I have a car.” Doing these minor changes will change the way you see the world and make you think about the things that others do not have but you have an abundance of. One of the main things is clean drinking water and not just having clean water but a way to get rid of it once it is used.

Life in Peru:

The country I chose to investigate and try to find ways to help was Peru. Peru is a larger country sitting at about 317.6 million acres (about twice the area of Texas). Peru is in South America next to Brazil and is considered an underdeveloped country. The population of Peru is 34,125,960 with 25.5% of the population being rural and the other 74.5% being urban. The government that exists in Peru is a multi-party semi-presidential system, this means there is a president, prime minister, and a cabinet. Most underdeveloped countries usually use these types of government systems. The weather in Peru has an average temperature of 85°F to 90°F during the day and about 68°F at night year-round. They have wet and dry seasons just like many other countries. January through March tends to be the hottest and driest season while April through August tends to be the cooler and wetter season and September through December is right in between.

About 20% of the land in Peru is currently cultivated which means the land is being used for agricultural use, such as crops and small family gardens. The main things that are grown in Peru are potatoes, rice, and plantains. All families have their own small home garden where they grow most of the fruits and vegetables they will use throughout the year. Most of which are planted in September and October to start off the agricultural year. Most of the harvest season is in May, June, and July. "During this harvest they give a percent of it back to Pachamama, who is the goddess of indigenous" ("What Is Pachamama?"⁴). Pachamama watches over their crops and over the planting and harvest of the crops. This ceremony is to give back what she has given to them, this tradition has dated back to before the 1400s. During both the planting and harvesting seasons they honor Pachamama and give thanks for what she has and will supply them throughout the year.

A household in Peru consists of about seven people, normally three kids, and in most households, either one or both sets of grandparents live in the house. It is common for most close families to live under one roof, aunts, uncles, parents, kids, and grandparents. The houses are not noticeably big, normally some have seven small bedrooms but most only have two to three separate bedrooms with a small kitchen, a small eating room, and a bigger open room for the rest of the family to live in. Wealthier families may have wood or brick houses while other families with less wealth have houses made of scrap wood, handmade clay tiles, old scrap plastic sheets, and straw. Most people in the family will learn how to farm, except some girls who will learn to cook, clean, and care for their family. These families live together to save money and keep the family bond strong.

Peruvians are all about family, they live, eat, farm, and even sleep together. Most meals are eaten together as a family where they talk about the day, life, and any other things happening. Religion is also particularly important to Peruvians. About 92% of the population of Peru declare themselves to be Roman Catholics. They also blend their traditions into their religion, they worship and pray to Pachamama. Pachamama is like the Virgin Mary. They thank her and pray to her for their needs and wants. Before meals, they pray to Pachamama and thank her for the food that she has provided to them and the weather that she gave them to be able to have this food.

The food in Peru consists of foods influenced by European, Asian, and African cuisine. Many diets include potatoes, rice, chicken, fish, and vegetables. Most families even eat Guinea pigs daily. Peru is extremely popular for the breeding of Guinea pigs, there are over 28 million guinea pigs. Those guinea pigs then go on to produce 36,000 pounds (about twice the weight of a school bus) of meat a year. The reason for eating guinea pigs is that they are much cheaper to raise and take up a lot less space than a normal pig.

Most families grow fruits and vegetables, they also raise the animals that they will then go on to eat. Some families have small stands in town where they sell any food they grow or raise. Other families will go and buy food from the local market normally found in town. They cook their food over a fire and families that are a little wealthier cook on a stove. The kitchens that they cook in are normally quite small

and only have a small gas stove, if there is not a stove, they cook outside over an open flame with big pots, pans, and metal bowls over top. Meals are cooked in big portions for the whole family and any food that is not eaten will be saved and used for the next meal. These meals are normally cooked by the women in the house while the men are out farming or working to make money for the family.

Peru's city offers many of the jobs we have in America like working at a store, restaurants, and some office jobs. In rural areas, most people are farmers or builders, there are few options for people living in rural areas; some do not own cars or have a way to get a job in the city. The wages range from about \$458 to \$540 a month. While the cost of food for one week for one person is only three dollars and fifty cents, consider the man in the house is supplying the whole household. That is about twenty-five dollars for the average family each week. When they are only getting about 114 dollars a week when they also must pay for other household expenses that money goes fast.

Most families do not have access to education; the reason for this is the price and how far it is from where they live. If they live far from a school, then the families do not see it as worth it to send their children to school. "Public schools in Peru are free" (Prado 2), but others cost money. Some families do not have the extra money to spend on their kid's education. Most people also do not have access to health care, whether that be doctors, dentists, or a hospital. The reason for this is also the same: the place they live affect their access to it. Peruvians do have free healthcare though, this is the main part of Peru's primary healthcare service, and this is a good thing for the poorer families of Peru.

Most families do not have access to clean water, toilets, or consent electricity. In some towns they have a well in the middle of the city that Peruvians can go to pump out fresh water and haul back to their house to use for cooking, drinking, and any hygiene uses. Telephone roads and markets are a little more common and accessible for families but are not up to date and are nowhere near as good as in the U.S.A. Some people can afford cell phones, but in rural areas, they do not get service. The roads they have are not nice and paved; they are more like gravel paths to walk on or drive on if you have a car. Markets are more accessible in town; some rural areas have small fruit or vegetable stands on the side of the road. There are cars in Peru, like most other things they are not too great. If the family can afford a car, it is normally older and breaks down a lot, another thing with cars is gas. Gas is ninety-four cents for only one liter. Since the cars are older, they need more gas to run. One of the biggest challenges in Peru is transportation, clean accessible water, the money to get nutritious food, and a way to access the things they need.

2. Problem

Many people in Peru are suffering from a lack of fresh drinking water. Even if they may have fresh water many do not have a way to get rid of the wastewater. "16 million people (48% of the population) lack

access to a reliable, safely managed source of water, and 15 million people (47%) lack access to safely managed household sanitation facilities" ("Peru's water crisis - water in Peru 2022" 1) this means almost half of the entire population does not have access to clean water or a way to dispose of the dirty water. The status and severity of this issue is high, this issue affects so many people and is so important. The average human can only go three days without water and that is just the starting point of why people need water. Other reasons include hygiene, livestock, and cooking. In some areas, there are people trying to help by putting freshwater wells where people can get the water they need. Doing this is only helping an area of people that are closer to these wells.

The reason this issue continues is that the population is rising, and they are continuing to grow plants that need water. Both contribute to the hold on better sanitation and fresh drinking water. The issue affects the rural more than the urban, but both are struggling. The rural people are in more desperate need of better sanitation because they do not have the city's water running out to them. Another reason This issue affects all people no matter of age, race, or gender. Water is a necessity that all people need and when you go without it leads to dehydration and many times even death.

The lack of clean water and lack of water disposal affects minorities, refugees, and indigenous people more than others because the little money they have is not enough to get any fresh water. If they do not have free access, they must pay for it, and when they have no money, they cannot get it. This issue affects the environment not in a severe way but still in a way that affects many things. The animals also need some slightly fresh drinking water, not as much as the people but they still need fresh water to live and get the right nutrients to become an animal that is good for the Peruvians to eat. Plants can be watered with almost any water if it is not full of chemicals and things that could affect the growth and nutrients of the plants.

The lack of rain in some seasons affects the growth of plants, so in the dry seasons, the farmers must supply the plants with the water they need. When this happens, farmers and their families lose the water that needs to be given to the plants. In many cases, families will go to a nearby river, stream, or even a pond to collect the water to give to the plants. They also use this water to clean themselves and when they are in desperate need they use it to drink. Doing this causes many problems, the first one being drinking this water is not good for them at all, this water can be full of anything such as chemicals, bacteria, and population from other sources. Another problem that comes from collecting water from a natural water source is carrying it back to their house or crops. One gallon of water weighs almost nine pounds, which is about four kilograms. It takes 162925.5 gallons (about 616739 L) of water to water just half an acre of land, with no transportation which is almost impossible. Not only will this take a long time, but it is breaking them down, carrying this much weight rubs the joints and breaks them down to where they cannot do the walking anymore.

3. Solution

There are many ways these issues can be corrected and help make the people of Peru a little safer. Some organizations have already tried helping by putting a well in the middle of town for people to come and use. The problem with this is transporting the water back to their house. Another problem is this does not help the wastewater problem. A way that this could be improved is by putting a well in some of the smaller towns, so they do not have to walk as far and carry the water back to their house. Something that has been done in other countries to help resolve the issue in an impactful way is installing special tanks that store rainwater for irrigation. This is where they collect rainwater and use irrigation to get it to people in need of fresh drinking water.

One of the easier solutions is a rainwater collection basin to collect the rainwater that Peru does get during the wet months. The way that these basins would be made while also being a cheaper option is by using industrial plastic drums with a series of filtration systems on the top. The first layer of filtration would be a metal crisscross layer that would filter any larger objects, the next would be a mesh layer to filter the medium-sized debris out, and the last layer would be a filtration cloth that would finish the filtering. After the water goes through all the filters, it would be collected in the drum, and on the outside, the outside would have a faucet so they can easily get the water out and take it when needed. The pros to this solution are that it is easy for people to use, and easier to supply to people. They can also use water for hygiene uses and for drinking water for animals since the water will not be 100% clean. The cons of this solution are the water will not always be fresh and drinkable for all people but can still supply them with some drinking water and water for other uses. Another dreadful thing about this solution is Peru does not always get rain.

Another possibility is to purify water using portable water purifier packets. This would be done by distributing these packets to the people in need of water. Some of the advantages of this are that the packets are easy to use. The only thing that they must do is collect the water and pour the packet into the water then stir and wait about five minutes. Another pro is that it makes water 100% percent clean and drinkable, it is easy to get to people except for the cost, and one Packet cleans up to 10 liters of water. There are also companies like P and G that sponsor the supply of these packets so the only thing that would have to be done is the distribution of them. Though this is a good possibility, there are disadvantages such as these packets were not cheap coming in at about \$1.50, which is expensive and would be hard to give to all the people that need it. Another con is that the Peruvians would need a lot of them so they could last. These packets would need to be replenished often, and that is not possible.

Another way to help is to send people over and run lines for wastewater to take all the used and unclean water away from their freshwater so it does not contaminate the good water they do have. This will fix two problems at once and help them profusely. This would help with the wastewater problem and help move the water away from the house, making it safer and clean while also bringing clean water into them. Some of the terrible things about this are that it will cost a lot and we will need people to do the work to help. It would be hard to find volunteers that would be willing to help run the lines. It would also need a

good bit of money to buy all the supplies needed. Another downfall to this solution is that there are a ton of people that need help and really would not be able to help them all with this problem.

Collecting water used to wash or cook to filter out and reuse or to water plants. An upside of this is this will help cut the wastewater and help in not wasting good water. Some disadvantage of this choice is this would be hard for everyone to do. This is because some do not have the space to save that water, and some do not have a way to filter the used water. Another downfall is that it will not help with all water because not all water is savable and reusable.

A huge issue with some of the solutions is the government of Peru. They need to push to try and make clean water a part of everyone's life. This could be through funding from taxes that the Peruvians pay, using this money they can help run lines to the rural areas. I understand that running underground lines is very costly and would need a lot of people to help, so another solution that is not as costly is using the money from taxes to put wells in the city. The next solution is the water purification tablets, the way these tablets work is using chlorine, iodine, and chlorine dioxide. These compounds make the water a place where bacteria and other harmful organisms cannot live. Doing this makes the water safe from unclean organisms that are not visible to the human eye. This mix of chemicals and compounds also links to the bigger particles such as dirt, sand, and any feces that might have been in the water. This acts as a coagulator and makes the dirty particles denser which then sink to the bottom making the thin layer along the bottom of the container. After dropping the tablet in and mixing for three minutes then letting the water sit for about thirty minutes the water is ready to drink.

Some of the problems with these solutions are that the water purification tablets are that it kills 99.999% of the bacteria. Though this seems like a problem this is a way to make it cleaner, this is by boiling the water after it has been purified. This is an extra step that ensures the water is safe. The next concern is with the rainwater collection basins, the concern is how long they last. The average fifty-five-gallon drum holding water can last up to seven to ten years. A full fifty-five-gallon drum can supply two people with the recommended amount of water for up to two weeks. The chemical coating on the outside of the barrel protects the water on the inside from anything that encounters the barrel. A last precaution is washing the inside of the barrels before installing them, ensuring there are no harmful traces of any bacteria, pathogens, or organisms from contaminating the clean water on the inside.

4. Final Solution and Outcome

Solutions two and four would be the most helpful to the people, though these solutions will be the most expensive and the hardest to do. All, the final solution that would be the most helpful and most doable is the water collection opposition. The reason this is the best solution is that it is the easiest one to distribute and the cheapest to do. The universal system would only cost about 185 dollars which is a lot less than

solutions two and three. This is also easy for people to use because all they must do is set it up, leave it, and let the barrel do its work. The only bad thing is this would sometimes need more purification and that it does not always rain in Peru.

The way that this would be made possible is to start a non-profit organization and try to get people to donate money and supplies. Another thing is to also ask for donations from other organizations and then ask for volunteers. This project would be funded by other organizations and people wanting to help. Community members would play the role of volunteers and funders. Other organizations would help build my organization up and they would help give me funding and support. The Peruvian government would need to dedicate more tax dollars to this rainwater collection system. Some cultural norms that need to be taken into consideration are what Peruvians eat and how they keep up with their hygiene. Many other things like crops and animals play a role in this too. The way this project could be sustainable is by starting early, I can get as much help as possible. I would also like adults to help me out, so I am more recognized.

Not having clean water to drink relates back to food insecurity because when you do not have water then there are foods that you cannot make. Water is also part of our daily diet, and we need it to live. Doing all these things would help the Peruvians in ways that would last for a while. This solution would be beneficial to the Peruvians and help the further development of Peru. There are other ways that the plan could be more helpful, but it would be more expensive and not as achievable. Overall, this solution is a great solution and seems very possible if there are others that are willing to help and put in further work to keep this solution around for many years to come. To conclude there are many possibilities to help Peru, but Peruvians are in dire need of help, and something needs to change soon before it is too late.

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