

### **Tanzania: The Implementation of Genetically Modified Foods and Sustainable Practices**

A small country on the East side of the African continent, surrounded by other struggling and devastated countries facing the same problem. With Rwanda recently ending a civil war directly to the West, and harsh temperatures being brought on by the Atlantic ocean, Tanzania has had to face some pretty daunting challenges in the past 50 years. As the country becomes more poverty filled, the level of food insecurity rises. Food Insecurity is defined as “an economic and social condition of limited or uncertain access to adequate food”. This is exactly what the country of Tanzania is facing, with major droughts and uneducated citizens starving daily, the challenge is not only feeding everyone, but making sure it is sustainable. The country of Tanzania is less than 28% the global average in sufficiency of food supply, according to the food insecurity index. Something must be done, 3 out of every 10 residents in Tanzania are poor. According to the World Food Programme, 34.7% of children under five years old are stunted in Tanzania (Tanzania; World Food Programme, n.d). This is all because the country is uneducated and very underdeveloped. This country is completely falling apart and the only way to save it and its citizens is to create a sustainable agriculture program to set in place. As the great saying goes “You can give a man a fish and feed him for a day or teach a man to fish and feed him for a lifetime”. By teaching the people of Tanzania to grow using new methods and more sustainable practices, we could teach the poverty filled country how to feed themselves for a lifetime. Tanzania has subsistence agriculture predominately, meaning that they really don't have large scale farms, but farms that are meant to support a single family. The amount of food grown in this country is scarce, by introducing genetically altered varieties to this struggling nation is the first of many steps that can be set in place to help get Tanzania on its feet.

The average family in the country of Tanzania is around 4.9, almost 5, people per household. One fourth of all households are headed by women across the country, women really do get the job done. Many children are orphaned and fostered due to death or loss of one or both parents. One out of every 10 children are orphans because of this tragedy in the country (Tanzania 2004-05 Demographic and Health Survey, n.d). Another issue in Tanzania is the lack of proper nutrients due to the strict and limited diet of starches. Meats are only harvested during special occasions such as a birth of a child or a large celebration. The average food consumed by Tanzanians range from sorghum to cornmeal, beans, millet, and pilaf. Tanzanians take on a very starchy diet, which does not provide all of the necessary nutrients needed to make a person healthy. The lack of education is also another large issue in Tanzania, a large number of children receive a primary education, however secondary education statistics are much lower. This is because secondary school is taught in English and many students have an issue learning the new language with little to no extra help or tutoring. Less than 30% of average students get a secondary education due to this issue (Yhal, n.d). The education system greatly benefits the wealthy but hurts the average citizen of the country. Because of this lack of education, there is a very poor doctor to patient ratio with one doctor to every 20,000 people. This means that not only do they have a very poor amount of qualified doctors in the country, but they also have rough conditions to make it much worse. The country is sweeping with HIV/AIDS to the point that nothing can be done other than to give palliative care, no one can be completely saved. Education of upcoming generations can take place which could lower the amount of the disease transferred from person to person. Charities have come to help find ways to try to help stop the transfer of it from mother to baby during birth. This could help for a while however, the lack of staffing and resources makes the situation much more difficult. Malaria is also a huge epidemic in

Tanzania that is killing infants and pregnant women by having babies born way underweight and moms severely anaemic by the time they give birth. While healthcare is free in Tanzania and programs have

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been established, many citizens are unable to get access to areas with healthcare (Hinksman, 2015). The country is very poor as a whole so healthcare has been struggling.

Tanzania is a very under developed country which means that most agriculture is subsistence farming. Subsistence farming is when food is grown just to feed a small community or family, it is not large scale production like the United States does. Farms are very small, ranging in size on average from 0.9 to 3.0 hectares. A hectare is a metric measurement used to describe a unit of land or of an area. One hectare is equivalent to 2.47 acres, so these farms are very small. Tanzania does not have the technology and money to afford mechanized systems on their farms so 10% of the crops are cultivated by tractors while 70% is cultivated by hand and hoe. The remaining 20% is completed by an ox plough. The staple crops being harvested by hand and hoe and partially ox plough are mainly maize, rice, millet, sorghum, wheat, beans, cassava, bananas, potatoes and plantains. They are able to produce these because of the warm and partially tropical environment. The very small amount of export crops that are harvested with tractors and machinery are tobacco, cotton, coffee, and cashew nuts. There is only a small amount of production in this country because of it's lack of food and frequent, unexpected droughts. These crops are grown mainly by uneducated average citizens of Tanzania (Makoi, n.d). Therefore, no fertilizers or pesticides are being used because of lack of knowledge as well as the lack of availability. It is a very poor country with little area to be technologically advanced in agriculture with current financial standings. The country is just at a low right now.

Agriculture in Tanzania faces many challenges both geographically and financially. As the global climate is changing, the amount of droughts are expected to rise. Most subsistence farms are rain-fed due to lack of proper and clean water readily available. This causes full dependence on rain seasons which are soon expected to change, leaving Tanzania in a rough situation. Another major barrier that must be taken into account when discussing the improvements to agricultural productivity is finances. Many new technologies and practices need financial stability to make they systems work. They do not have the money to import new seeds or pesticides, nor have the proper education to use them. Some pesticides can be hazardous so lack of knowledge and education is also barrier. Tanzania's largest workforce is in the agriculture industry which is very small, meaning that a large portion of citizens are most likely unemployed. The wage in the private sector for labor was about 78,000 a month which is equivalent to currently \$34.92 in United States dollars (Morisset, 2012). This is an okay wage but only a fraction of the country is receiving it. The country of Tanzania is not well governed to there is an unequal distribution of healthcare and food. Major urban areas receive food and healthcare, as to rural communities who do not have good access to either of those things. It is difficult to rebuild a country and increase food security with so many challenges.

Sustainable agriculture is a factor that not only affects the environment but the stability, food security, and availability. By caring properly for the land and sustaining resources such as soil and nutrients, they can remain successful, if new changes were implemented. Sustainable agriculture in Tanzania is very limited on how they produce food and their current methods. Because they do not think longterm wise when producing food by subsistence farming, they are hurting their natural resources unknowingly. If sustainability became a concern then many more jobs could be created for citizens. Since sustainability isn't considered greatly when farming, the output of products is lower. If we switched to focus on better

methods and introducing new varieties, then the output would be larger and more labor would be needed in the fields. The lack of food in the country means a lack of nutrition. In many countries in the southern part of the African continent, vitamin A deficiency has been a concern in diets. Some varieties of rice have been modified to help give consumers the vitamins they need. If this variety was introduced to Tanzania then many children could have their blindness due to vitamin A deficiency reversed. This would greatly increase their access to adequate nutrition.

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The situation in Tanzania is very severe, they rank less than 54% than the global average of proportion of population under global poverty line (The Global Food Security Index, n.d). They cannot implement new and more environmentally friendly techniques because they are too expensive. This causes many of the crops grown to not have what they need and so they die off. The environment is slowly being degraded because the nutrients are being removed time and time again, if better practices such as the crop rotation method were put into place, nutrients would be put back into the soil making it much more sustainable. Sustainable practices are not currently in place making it an issue affecting the country's economy, food security, and its future. Women, developing countries, urban poor, and rural are all disadvantaged because of the lack of resources and opportunities. They are not given consideration because they are not viewed as highly important to larger scale countries so they get pushed to the side.

The trend for agriculture sustainability can be shown by the food produced every year by the amount of food security in the country. If the agriculture sustainability was good in a country, then the land would be healthy, as well as all the citizens would be would have food and wouldn't be starving, and the economy would most likely be better and more stable. The potential change in methods and varieties could greatly improve the situation of Tanzania. If more food was able to be produced in a healthy and sustainable way then the economy could rise, the health of the country would rise, as well as the citizens would be fed. Currently, without the changes, conditions are staying the same/worsening. This is because the current practices are not going to last for a good and healthy output so they aren't continually feeding the population.

If changes were made to the current way they grow their food and their sustainability standards changed, major positive outcomes could be accomplished. The quality and quantity of food would dramatically increase if these changes were made because the food would be grown effectively and sustainably. This would allow for families in the country to have better access to food. The income of households would increase because more labor and employment would be needed to pick the extra products. If agriculture sustainability was set in place, environmental sustainability would occur. To sustain our agricultural resources, we would also be helping our environment. This would help economic development by creating more labor jobs and helping to produce enough food so that the poverty filled areas can afford it and eat. This would majorly help small holder farmers by advancing their technology, helping to increase yields, and preserve natural resources. Agriculture sustainability can be affected by urbanization and water scarcity depending on the method and variety used. If crop rotation is used then it would depend on rainfall for it to succeed. Urbanization could also affect the outcome by taking out a farm to replace with an urban area, which hurts the environment. Water scarcity could be harsh if they had to choose to water their crops or get water themselves. However, urbanization isn't completely bad overall. By creating new cities and new job opportunities, more income could be made for households. This would bring in more money to the economy, which is very good!

I feel as though genetically modified seeds that are more resistant to drought and harsh conditions can be used with a mix of new techniques that help the environment such as crop rotation. Golden rice is a genetically modified food that has beta carotene that helps with vitamin A deficiency as well as gives the citizens an easy crop that benefits them. Crop rotation allows for nutrients pulled out of the soil to be put back in by planting other crops which also allows diversity. Tanzania is currently using a genetically modified corn seed that is drought resistant that has proven to be beneficial. This could be increased on a larger scale for more success (Molteni, 2016). The United Nations could work on harmoniously working together to create more varieties for the country and surrounding, similar countries that are drought resistant. The World Bank would help with funding the research and the cost of the seeds to help start up the program in Tanzania. International research agencies would research new varieties as well as how to create the most yield with farming practices to teach the people of the country, this would help them get

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back up on their feet. Non-governmental agencies such as church groups or leadership trips also can help donate time to help teach and show them how the new technology works and how to preserve the environment the best. Civic organizations also like churches also can help inspire farms to believe in God as well as also help to teach and instruct. Rural farmers need to be key roles in implementing and staying up to date with what can be done to make the outcome improve over time. This could increase production and help get Tanzania on its feet. The United States could also provide in helping to educate the citizens how to grow crops effectively, give them more varieties to plant and flourish, as well as supply them with food until the new methods and crops prove to be successful. In return, Tanzania could provide the US with some of their natural gas and oil supply that they recently discovered. An “I scratch your back, if you scratch mine” type arraignment so that everyone wins! Urban families can remain involved by understanding what is going on and encouraging/helping in any way they can.

Food security and safety is a huge advantage that I take for granted. Countries like Brazil, Venezuela, and Tanzania are all facing some intense challenges that I hadn't really heard about prior to researching this. Enough food is produced, the challenge is just transporting it and not wasting it. The country of Brazil is more than capable of feeding the entire country but the transportation of foods over rough and far areas makes it very difficult to transport it to everyone. Tanzania faces major food insecurity because they just don't have the recourses or finances to support major agricultural growth. This is hard when a very large amount people are starving and there isn't that many things you can do to fix it. A country that has been surrounded by war and famine for the past 30 years is a problem that is worth fixing. Genetic modification of plants is the future with 9 billion inhabitants by the year 2050. We might as well put this technology into use to help those who truly need it. Saving and preserving the planet and our natural resources needs to be a priority. By changing farming methods to put nutrients back into the earth to ensure success for next years harvest, is vital to creating a more stable food source. Food security is a huge topic and trying to lessen food insecurity in places that truly need it is the best way to start to end world hunger. Food is the most important thing for a society to have so making small impacts could eventually lead up to big changes.

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