

### **Malnutrition in Sudan**

Agriculture has always been based upon food and farms. From the first farm to the present day, agriculture plays a key role in food and good nutrition. Without the proper supply of healthy foods, at a healthy quantity, people can not thrive. They will instead become malnourished, causing developmental complications and even death. The Central African country of Sudan not only ranks as one of the most malnourished countries in the world but also is the 11th highest country for childhood hunger (South Sudan: 9 Hunger Facts, 2014). Children and adults have dealt with malnutrition since 1987. For the past 40 years, people have struggled and succumbed to irreversible chronic malnutrition as the government sat idly by. The lack of assistance from the government, conflict, and climate has led to a severe problem that continues to worsen. In Sudan, more than two million children under the age of 5 suffer from a level of malnutrition, ultimately affecting their adult life (South Sudan: Food Insecurity - 2015-2018, 2015). Malnutrition is a severe form of undernourishment in which a person is either not fulfilling their nutritional needs, not eating enough healthy proper foods, or their body is unable to use the nutrients from the foods that they do eat. Malnutrition can have many effects on people, especially children. Malnutrition can cause stunted growth and developmental delays leading to disabilities. Young children who are still developing can get some of the worst effects of malnutrition, such as severe developmental delays and disabilities. Children who are malnourished tend to have difficulties with their education and many common activities in their regular day, due to their developmental delays and disabilities. Adults are also affected. For example, nursing mothers do not have enough nutrients in their bodies to support themselves, let alone another human being. Adults strain to work, finding difficulties in completing simple tasks.

The malnutrition crisis has many contributing factors, including food security, the hunger gap, climate, conflict, and an unhelpful absent government. Malnutrition is an effect of poor food security in an area. Food security is the idea that "all people at all times should have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (Chapter 2. Food security: Concepts and measurement, n.d.). When these needs are not met, people can become undernourished and in severe cases malnourished. Malnourished people have difficulties with everyday tasks such as providing adequate care to their crops. The crops not being properly cared for die and the farmer ends up with a smaller yield and losses in profit. The growing population and large family sizes make it impossible to feed everyone on such a small amount of food. Without access to safe nutritious foods that meet their dietary requirements has led to a food security issue. It is found that in July of 2016, approximately 4.8 million in Sudan are severely food insecure (South Sudan: Food Insecurity - 2015-2018, 2015). This means that one in every three people does not have access, availability, utilization, or stability of a food source due to geographic location, poor crop production, or insufficient funds to purchase food, leading to malnutrition and starvation. Malnutrition has ravished families in Sudan for years, and the more time that passes the worse the crisis gets. In February of 2017 more than 1 million children under the age of 5 were acutely malnourished, while there were 273,600 recorded cases of children under 5 being severely malnourished (South Sudan: Food Insecurity - 2015-2018, 2015). These were only documented cases of malnourishment, it is thought for there to be even more children suffering from this dilemma. The children are not the only ones suffering. Approximately 6 million people in Sudan are food insecure to catastrophically food insecure. Making  $\frac{2}{3}$  of the general population minorly to severely malnourished. The people of Sudan are unable to control this issue on their own, and

seek the aid of their government and outside organizations to help them battle this problem before it's too late.

The typical farming Sudanese family is extremely poor and lacks many essential resources for everyday life such as fresh water, access to food, a market to purchase goods, and reliable shelter. Poverty and lack of resources in Sudan have caused many to live with extended family. So instead of a household of seven, two parents and five children, they are squeezing ten or more people in a household. The Sudanese diet relies heavily on porridges and stews because these are foods that can be shared by a large number of people with minimal required ingredients. Meals will commonly have water added to them to stretch meals farther. These foods, however, do not provide their bodies with enough nutrients, calories, or protein to function properly leading to nutrient deficiencies and eventually malnutrition. Malnutrition can be fixed if proper medical attention is provided. Sadly, the healthcare system in Sudan is severely underdeveloped, with only 9% of the countries spending being used in healthcare funding (Alamin, 2016). The healthcare system is not equipped to battle this crisis as the issue continues to affect the people of Sudan, especially the children. Children in Sudan struggle the most with malnutrition. Being younger than the rest, their bodies need more nutrients to support their growth and development, without access to these vital nutrients there can be lifelong consequences. As previously mentioned children who are malnourished can be affected by developmental delays and stunted growth leading to disabilities. These issues can cause their education to suffer as well because children who are malnourished to a point where they develop disabilities struggle to keep up with their school work. Putting them behind their peers, commonly this leads to a lower received education level for two reasons. Either they can not comprehend fast enough to keep on track, or their parents need them to leave school and enter the workforce to provide for the family. These individuals are less likely to get a high paying job resulting in a less than livable wage tightening the grip of poverty on their families, thus starting the cycle over with the next generation.

A majority of people rely on subsistence farming, this is when you eat what you grow. However the typical family farm size is determined by the amount of land a family can clear of weeds and cultivate, this leads families to have small hand-cultivated plots of land. These plots are not suitable to grow extreme amounts of food, especially to feed 10 or more people. Families commonly grow cotton, sesame, peanuts, tobacco, sugar cane, dates, citrus fruits, coffee, wheat, beans, corn, barley, sorghum, millet, pulses, and cowpeas. Most of these crops provide a good source of calories and nutrients. Other crops such as tobacco and coffee are cash crops. This is where the Sudanese who only farm get their money for seeds, materials, clothes, and other essentials. With such a wide variety of crops to grow it is shocking that so many are malnourished, well this is due in part to the climate, conflict, and agricultural practices set in place in Sudan.

The main agricultural practice in Sudan is diversification. This is the act of planting a wide variety of crops in hopes that no matter the climate or environmental conditions there will be some crops produced. This process is thought to reduce the risk to farmers and their families, however, this strategy has not been the most efficient in past years. Diversification does not produce maximum output but instead decreases the chances of starvation while increasing survival rate. The problem is that although there may be some product produced there is not enough variety or quantity of it to fulfill the calorie and nutrient requirements of the farmers and their families. The other main agriculture practice is mono-cropping. This is the practice of growing the exact same crop on the same land year after year instead of rotating crops ( Trott,

2011). In the past several years this practice has been encouraged more by the government instead of diversification. Sadly, this practice has shown little promise because the process of mono-cropping causes the soil to become deficient in many important nutrients that plants need to grow. The planting of the same plant repetitively in the same soil without rotation causes the same nutrients to be pulled from the soil year after year without time to become resupplied. The soil as a consequence becomes weak to a point where it can no longer sustain life without the help of fertilizers, which the average person in Sudan can't afford removes many valuable nutrients from the soil. Both of these practices have led to whatever food that is available to be highly rationed amongst families and communities, as well as making it difficult to improve agriculture productivity.. The difficulty of obtaining food is further increased during times of conflict and the 'hunger gap'. The hunger gap is a four-month period from May to September when weather and food production are at their worst. It is caused by low rain levels, the constant movement of people, disruptions to trade, and high food prices. During this time there is little rain causing many fields of crops to be wiped out with little to no production. Many families rely on their yields to feed their families. With small crop productions, food is rationed more heavily and meals are stretched farther. Reducing the number of calories and nutrients the families are getting. The constant movement of people due to conflict with South Sudan and other countries has made it impossible for families to establish and produce a crop. Despite the number of conflicts and terroristic acts in the country, reducing many people are still forced to flee their homes and farms with little to no warning. The resulting factor to the lack of rain and constant movement is an increase in food prices. Since farms are failing to produce a large enough yield or people were forced from their crops many turn to local markets as their sole source of food, however markets not only have limited supplies, but some have to travel several miles to the closest one. Those who have produced a yield large enough to sustain themselves with some left overturn to the market to sell their goods. The demand for staple crops in Sudan has exceeded the supply, causing a large spike in price. The market owners raise the price of their goods because of the high demand for their products in hopes of increasing their financial standings. The consumers, however, have little money and struggle to pay the unreasonable prices for the food. With those who have jobs working instead of farming, many only make minimum wage. In Sudan, the minimum wage is 425 Sudanese pounds a month with a yearly minimum income of \$1,100. It is clear that this wage cannot cover the cost of living. Despite the fact that it was increased from 165 pounds to 425 pounds in 2013, that was before the inflation of food and commodity prices (Sudanese president officially signs off on increasing minimum wage, 2013). Since many workers have a low education level due to the effects of malnutrition it becomes very difficult to secure higher up more sought after positions, causing them to settle for low minimum wage jobs. This leaves families in a hard place when competing to make ends meet with the inflated prices and low supply of goods.

The above issues have a large effect on the malnutrition crisis, but there are more less controllable issues the country faces. Climate change is beginning to affect more and more places, disrupting weather patterns and rain. The climate change makes it difficult to successfully grow crops, because the plants have difficulty adapting to the ever changing environment. Climate change is also affecting the amount of rain that Sudan is receiving, causing excess run off or drought. The drought causes people to ration their water amongst themselves in order to survive, neglecting their crops causing them to wither and die. Excess rain in some areas causes rapid extreme runoff either carrying the seeds away, or causing them to become too saturated and rot. Along with the rapidly changing climate there is also population growth. In Sudan it is customary to have many children, however this causes rapid increases in population as many people have 4 or more

children. The growing population causes for a larger need for food that is already scarcely available to the current population. Another issue faced by many is the lack of access to a clean water source. Water is just as important to the growth, development, and survival of humans. In Sudan 55.5% of the population that resides in improved areas have access to water. In unimproved areas 44.5% of the population have access to clean drinkable water. Even in the better established areas only half of the people have access to clean water while the rest drink from unsanitary water sources. Drinking contaminated water can lead to many illnesses especially those that cause diarrhea. The people consuming this water are already consuming little to no food, so when they contract a diarrheal disease they end up discharging a lot of vital nutrients and water leading to dehydration and commonly death.

There are already several efforts being made to help improve the problems in Sudan, however, these solutions are not extensive enough to fix such a widespread issue. Many organizations have begun providing aid to Sudan through humanitarian aid, and traveling to different places teaching the Sudanese about what they should be eating, hygiene tips, preparing healthy nutritious meals, and how to prevent malnutrition. All of these efforts have been helpful to a certain extent, but many people are not being reached through these programs. There are several new strategies that could be implemented to help more people and hopefully reduce the number of struggling people. Currently, in some regions of Sudan children under the age of five are being screened and if found to be malnourished will be provided with a nutrient supplement. The outreach is only reaching some people and is not inclusive of older children who are still developing. This program could be branched out into older children (around the age of 18) and expecting mothers to help combat malnutrition when they are still young. By helping expecting mothers, children can be born with not only a better survival rate but with a lower chance of becoming malnourished. Mothers who are malnourished themselves cannot provide adequate nutrients to their child resulting in them being born prematurely, underweight, and undernourished.

Expanding into older children will prevent a lot of developmental delays caused by malnutrition since children continue to develop well into their teenage years if their bodies are properly cared for they can grow into strong, healthy adults capable of accomplishing many tasks. This could be done by the government making it a requirement to have children 18 and under as well as expecting and nursing mothers be screened by a certified individual or doctor depending on geographic location. Not only will this help combat malnutrition, it will contribute to fighting poverty by providing jobs. By implementing this practice, children will be less susceptible to many developmental delays, and disabilities allowing them to flourish and succeed in their schooling. Along with the screenings, there could also be classes specifically for expectant and nursing mothers on breastfeeding and caring for their children. In many areas, new or expectant mothers are unsure of how to care for their child, commonly weaning them too early causing the baby to lose weight, become malnourished, and in some cases not survive. These classes could explain how long a child should be breastfed for, how to feed them once weaned, and overall care tips to give their child the best chances at life. This suggestion could be put into place by the government, requiring mothers to attend the class. Women and men could additionally take courses to then become instructors providing even more jobs for those living in poverty.

If the above-mentioned solutions are implemented correctly, it will help in the fight against malnutrition. However, there is more that can be done to solve this crisis as well. All over the world organizations and people are willing to help create an equal healthy living environment for everyone. These organizations can not possibly travel and help everyone in the world, this is

where the government steps in. The Sudanese government has been absent for a vast majority of this fight, but now they are working hard to try and reverse the damage. A large contributing factor to the difficulties in Sudan is the lack of stable effective agricultural practices. The government should establish agricultural practices that will not only help the environment but also assist their citizens to produce the most product. In Sudan, the agricultural practices are less than ideal with the government giving little to no help on better ways to manage crop and animal production. The government could not only establish new agriculture practices but also provide the citizens of Sudan a class or workshop to learn how to implement these new techniques. Sudan has several heavily agriculture reliant allies who they could ask for aid to on different agricultural practices that could be put into place. In addition, the government can also reach out to the Southern Sudanese government because they are also struggling to establish a stable food source. Settling their conflicts with each other they could work together to provide their less fortunate citizens with the best chances of survival and reduce the number of people being plagued with malnutrition. There are many organizations willing to help provide aid to the country. The implementation of these new strategies is a large feat to be overcome by only the government. An outreach to these organizations and missions teams could be made to help farmers and landowners become acclimated with these new techniques. Organizations could be reached out to in the need for assistance from the Sudanese government. Not only could great organizations like this help people become acclimated to the new techniques, but they can also provide aid for the more impoverished areas of Sudan as well. These organizations strive to not only provide aid for struggling people but also help them become self-reliant in themselves again.

Improving agricultural practices and reducing the number of malnourished people is only the beginning of the help that can be provided to Sudan. The changing climate and little rain during the hunger gap is an issue that if not rectified could result in fatal consequences. The genetic modification of crops to contain certain xerophyte (plants that need little water) (Xerophyte, n.d.) qualities may allow for a larger yield. By properly modifying a plant to be able to thrive in an environment with little water, a change in climate and droughts wouldn't cause such an upset in crop production. However, the extensive research required to implement this is not only time consuming but also expensive. Sudan does not have the finances to conduct such extensive research, despite this places all over the world people are/will be struggling with droughts and changes in climate affecting their crop productions. As this will become a global issue reaching out to other countries and working together to conduct this research will not only expedite the process but also cut down on the cost for Sudan as it will be distributed between countries.

For 40 years the country of Sudan has suffered the effects of a malnutrition crisis that has ravished throughout the country. Children and adults alike have fought with the repercussions of an absentee government, a rapidly changing climate, and poor agricultural practices leading to poor crop production and a reduced food source. These factors have contributed to minor and severe cases of malnutrition and death. It is apparent that this country is in serious need of assistance to help prevent the malnutrition crisis from worsening any farther. Through the implantation of screening and educating children and mothers, updating agricultural practices, and investing in genetically modified plants there will hopefully be the relief for the citizens of Sudan. Sudan is a farming country, and with the right assistance and hard work, they can become a flourishing nation. Agriculture and farming have a tremendous hand in the growth, development, and sustainability of a country, with help from the government, organizations, and the citizens the malnutrition crisis in Sudan can be stopped.

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