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Chad, Malnutrition

### **Chad: Utilizing Red Lentils To Save A Suffering Population Of Millions**

Malnutrition is a killer causing 155 million children below the age of 5 to experience stunting (WHO), causing over 1.5 million deaths yearly (FAF). One country that has been particularly affected by malnutrition, is known as Chad. Chad is a landlocked Sub-Saharan African country neighboring Libya, the African Central Republic, Sudan, Cameroon, Nigeria, and Niger (BRI).

Chad has one of the highest levels of hunger and malnutrition in the world, with 87% of its people living below the poverty line (WFP). The population consists of 22.8% urban residents, with 77.2% rural residents, and an overall population of 13,634,000 (BRI). The current land in use for cultivation is 39.66% (BRI), while major crops include cotton, sorghum, and millet (BRI). Some of their major exports include cotton, cattle, and fish (NE). The climate in Chad also varies from hot and arid, to wet and humid, while also being affected by occasional flooding and persistent droughts (BRI). The average farm size in Chad is about 6 acres, which visually, would be equivalent to the size of 12-16 homes put together (TCHAD). A typical family size is 8-9 people per home, primarily with 6-7 children for both urban and rural families (TCHAD). The typical houses in Chad are usually made of sun-dried clay, with cone-shaped roofs made of straw (TCHAD). Food is locally grown by families for subsistence or bought from a local market, with their typical diets consisting of millet, sorghum, and rice (OA), with preparation over an open fire (OA). The typical labor force is 20% industry-based jobs, with the other 80% involved with agriculture (CIA). The minimum wage for families is 59,995 CFA (Central African CFA franc) a month, which equates to 110 USD (U.S Dollars) a month, and 4 USD a day (CIA). Although being required by law to receive an education, only about 68% of children attend school with illiteracy rates at a staggering 50% (IN). Some issues with the education system include hefty entry fees for students that help to supply teacher salaries causing schools to be unaffordable for students, overcrowded, and understaffed (IN). Most families lack access to clean water, toilets, and electricity, with limited access to telephones (NE). However, families generally have access to roads and their local markets except for under severe weather conditions (NE). Major barriers for these families aside from earning wages and malnutrition, include drought, disease, and lack of access to proper medical care and clean water. (TCHAD).

Malnutrition is a major public health issue in Chad, as 727,857 children are affected by undernourishment, chronic malnutrition, and stunting, which affects 41% of children under 5 (CIA). As well as Iron Deficiency Anemia from malnourishment which affects 3 of 4 young children in Chad (FAO). Trends in the national rate of acute malnutrition have gotten worse with a growth rate of 2.6% in 2016, and a 4.2% growth rate in 2017 for Chad (RW). In particular, one large contributor to this trend has been persistent droughts, leaving families with no harvest to sustain their families. Both the rural and urban populations, face many of the same problems with nutrient deficiencies, and malnourishment, however, its slightly more prevalent with the rural population (RPP). Although the community of Chad is affected, women and children experience the worst of its effects. Most children suffer from severe acute malnutrition, while women have one of the highest maternal mortality rates in the world (UNICEF). Women and children suffer the most from malnutrition because children at early stages in life require lots of nutrients for proper development which they lack in their regular diets. Similarly, women who are pregnant suffer greatly from malnutrition, as the nutrients they lack in their diet causes them to not have enough nutrients or nutrient diversity for themselves, or their growing baby, which ends in both the mother and developing child having poor health, which is why their maternal mortality rates are one of the highest in the world. In particular, Chad also receives large numbers of refugees from neighboring

countries, whom are affected by food insecurity and malnutrition, due to the lack of resources with no assistance from the government (BRI). The way malnutrition has affected the environment has been severe over farming which has slowly depleted fields of their nutrients and ended in fields becoming non-arable. (NE)

Currently in Chad, a combination of variables with the droughts have brought Iron Deficiency Anemia, Undernourishment, and Lack of nutrient variety in diet. One solution to meet all these needs is the consuming of Red lentils. Red Lentils are bushy annual plants that grow in pods with lens-shaped seeds and are part of the legume family. Iron Deficiency Anemia is one of the largest public health problems being faced for the people of Chad with problems by lack of both variety and proper nutrients. This makes the Red lentils especially useful because they could pose as an aid for Iron Deficiency Anemia. The way Red Lentils could be able to improve nutrition in Chad, would be by providing an excellent source of Iron, while simultaneously supplying a more nutrient dense diet, while the increase in nutrients in their diets including the iron, would greatly reduce or potentially eliminate Iron Deficiency Anemia, as well as aid in reducing the high levels of malnourishment in local communities. Red Lentils can achieve this given their wide array of different nutrients including Protein, Fiber, Sugar, Fat, Folate, Manganese, Phosphorus, Copper, Thiamine, Vitamin K, Magnesium, Vitamin B6, Zinc, and Vitamin B5.

Red Lentils can also decrease malnourishment in women and children because Red Lentils possess 9 of the 21 required nutrients for basic nourishment, which still is an excellent source of Iron, Fiber, and Protein making it a very beneficial inclusion to any diet. This could also decrease maternal mortality rates, as well as improve child development in children in Chad. Many families in Chad have also been devastated by the effects of persistent droughts with the entire harvests of crops being unprepared for drought. This only ends in the devastation leaving families with no food for an entire harvest season. Although cereal type crops are usually grown in Chad, such as Sorghum and Millet, Pulse crops or Legumes like Red Lentils, would still be an excellent crop for Chads environment. Red Lentils are perfectly acclimated to Chads given soil and weather, thriving in hot and humid environments, and prospering in drought conditions, which makes them a perfect candidate. The type of soil which is needed by Red Lentils is high drainage soil which matches perfectly with Chads' very sandy and high drainage soil type. Red Lentils could even withstand the occasional floods Chad is accustomed to because the soil conditions are so high in drainage. The soils' high drainage property would largely prevent waterlogging and thus allowing the Red Lentils to thrive in the fields of Chad. This solution could also be used by the vast majority of the country as over 80% of the population is active in agriculture and subsistence farming (CIA).

The best plan of action for this solution would be to set a projection plan for costs of seeds, when to plant for optimal yield, and strategically where to plant first to help the areas currently with the highest demand for Iron supplementation like for example, the Sahelian belt. After this plan has been set into place, the coordination of who will facilitate which parts of the process and how seeds will be transported, bought, and planted would be put in place. One effective policy that could be adopted by the Chad government to make the project more successful could be a distributive policy with the purpose of evenly distributing the Red Lentil crops to the specific communities chosen for the launch of this project. Chad's government would also assume a key role by assisting in the management of the farms and people locally as well as by providing local communities with information such as how much nutrient diversity children need in development, the nutritional values of Red Lentils, and the benefits of including Red Lentils in diet on an individual's health. Some barriers that may pose as challenges for the government include getting funding for the project, potential rejection of the project completely from the public, and enacting such a policy. One way to overcome the barrier of funding could be to start a donation fund for the project from the different organizations leading the project as well as from the Chad government for the initial buying and planting of the seeds and for compensating families or by leaving it open to the public for donations. A way to overcome the barriers of enacting a policy as well as avoiding public rejection of the project

would include sharing information about the nutrient diversity children need in development, the nutritional values of Red Lentils, and the benefits of including Red Lentils in diet on an individual's health with the community chosen to start the project in, and the purpose, course of action, and goal of the project being clearly outlined and shared with the community as well.

After giving them in depth information on children developmental needs from their diets and how malnourishment affects the body, it is important to be very clear in the purpose, course of action, and results planned for the project and respect their feelings and be understanding and provide as much information and answer as many questions as possible. With the public's knowledge of the purpose, course of action, and desired results from the project, and having access to the information on its health benefits, while also respecting their feeling and answering their questions, this could make the project very clear in its purpose for improving the lives of the local community and would have a much higher chance of being accepted by the public when it is clear what the purpose is and their questions and feelings are considered. Representatives from the Chad government agricultural department, or individuals partnering with the government for this project from any of the relief groups or the agricultural extension agents could be the ones who inform the local communities in meetings. In these informational meetings, general information about the project and Red Lentils would be shared as well as an open dialogue for the questions or concerns of the local communities can be considered and evaluated on if they would like to participate in the project after supplying them with all information and answering questions to determine if they would like to participate in the project or if they do not. If they do agree to participate then the project would continue as planned, however if they do not then it is best that their feelings and opinions are respected and that the project is not continued if the community does not see it to be beneficial to them after all information has been provided, which is why the best way to avoid its rejection is to work with the community in educating on the subject as well as hearing their questions and concerns. The other organizations that could assist the Chad government in this project are The Chad Relief Fund, The World Vision Organization, Action Against Hunger, World Food Programme, International Fund for Agricultural Development, or a partnership between them. Although there are not any local or international organizations doing this type of project in Chad, organizations like the International Fund for Agricultural Development actively fund and work with agricultural projects in both under developed countries to improve the lives of local communities and in Chad. What makes organizations like this successful is support through volunteer work, other organizations, federal funding, or donation funding, which is also how these organizations can be supported. The selected organizations could provide funding, support, or management or a combination of the three for this project since each of these organizations already have initiatives going on in Chad with the purpose of helping communities in Chad. In addition, the partnership would be able to come together in this new way to continue their missions to improve conditions in Chad by starting a project that has the same purpose each organization works by of trying to improve the lives of local communities in Chad and could provide relief to one of the most concentrated areas of malnourishment in Chad. The role of the citizens play in this project includes encouraging the government to enact the distributive policy, voicing their concerns or questions about the project, assisting in the planting process, and encouraging the government to be involved in the project.

The role of the government and organizations for successful implementation of the solution includes the partnership of the organizations and the government in creating the plan which including purchasing and transporting seeds, planting, and management for the crop distribution policy. The partnered organizations would also follow a traditional extension model where they could inform extension agents of the project and how to grow the Red Lentils and the extension agents could teach some local community farmers how to grow the Red Lentils. After those local farmers are well educated by the extension agents they could train other farmers locally as well. After the local farmers have been well educated on planting and growing the Red Lentils, then the planting of the seeds could begin. The Red Lentils would be planted on local farm land donated by farmers of the community who are willing to try the project or it could be grown and planted on a government owned plot of land for the first harvest. However, it is very important

to consider that if the project is grown on community farm land, that is later equally distributed, it is important that is properly communicated to the farmers and that they would receive financial compensation for giving up or losing of any land to also avoid public rejection. If the Red Lentils are grown on government owned land for the first harvest, then once harvested they could then be distributed equally to the local communities and give the farmers the choice in continuing on their own land after learning how to grow Red Lentils and the benefits on an individuals health associated with them, or they could choose not to grow them but instead buy them from others in their community. If the Red Lentils are grown on donated farm land, then the first set of crops growing would be provided for free since the local farmers land would be used. The organizations would also provide compensation for the families depending on how much of their land they give up with a replacement of a currency value for the same amount their land is worth over the time period before the first harvest.

The way the crops would be distributed would be based on the total yield of the first harvest and the amount of families involved in the first project. The selected organizations and government would take the total yield of the first harvest and separate it equally to the different families involved. Each family would be entitled to use their Red Lentils however they chose to do so whether it is for their family to eat, to store, or to sell. After the first harvest, then the farm land can be distributed equally by family for growing the Red Lentils. Once the Red Lentil growing land has been equally divided, then farmers who lost any amount of land would be financially compensated for their lands worth, or could negotiate a deal with another family for a certain amount of land in which one family would then compensate the other for the deal.

After the plant site has been decided and the seeds have been purchased and transported, then the educated farmer volunteers from the local communities as well as volunteers from the partnered organizations, and the extension agents could also assist in planting the seeds. After the seeds have been planted, then the local farmers could maintain the crops until harvest time approaches based off the knowledge they learned from the extension agents. The partnered organizations or a government representative and extension agents could also visit monthly or bi-monthly to check on crop progress and assist with any questions or concerns the local farmers may be having about the crops. The distribution policy would also include a clear explanation and understanding being set with guidelines including the basis of government intervention, as well as if regulations are violated. For example, a violation could include not distributing equal shares of land, withholding shares of land from families, or violation of any other set rules and regulations set to maintain fairness and equal distribution with punishment by government intervention. In addition, The government would have to manage the extension agents visits, the first crop harvest equal distribution, the equal land separation after the first harvest, and any violation are concern with the process. The other partnered organizations would oversee and train the extension agents, assist in planting and transporting the seeds, and oversee the project throughout its duration.

The use of Red lentils for this project could dramatically change the lives in Chad and open their minds to a new solution. This solution could improve diets significantly, as well as reduce stunting in children by providing more basic nutrients. After the first harvest in Chad, this could easily be self-sustainable with the implementation of the Red Lentils to provide an excellent source of iron for combating Iron Deficiency Anemia, with the help of the selected organizations and government. This project has the potential to truly make a difference in the lives of local communities in Chad. It could also empower women and the local communities in Chad by giving them greater access to nutritious food to help them combat Iron Deficiency Anemia, as well as infant mortality rates by providing more iron, protein, fiber and more into their diet giving their future children a better chance for a brighter future.

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