

Komal Yavagal
Myers Park High School
Charlotte NC, USA
Somalia: Malnutrition
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Meet in the middle: A realistic solution to the malnutrition crisis in Somalia

Somalia, a country located on the horn of Africa, has a rich culture, vibrant traditions, and flavorful cuisine. Livestock, particularly goats, sheep, camels, and cattle, are central to the Somalian diet, providing milk and meat for daily consumption. Staple crops like sorghum, maize, and rice are combined with aromatic spices to create everyday meals. On a typical day a Somalian eats a flatbread called *canjeero* (similar to a large, spongy pancake) served with butter, sugar, or a stew for breakfast. For lunch, the largest meal of the day, often features a spiced rice dish called *bariis iskukaris* or pasta (*baasto*) introduced during the Italian colonial period. These are served alongside meat, vegetables, and often a banana, which adds a distinct sweet and savory element to the meal. A light evening dinner might consist of beans or cornmeal patties. A dish of well-cooked adzuki beans mixed with butter and sugar, known as *cambuulo*, is also a popular dinner option (Contributors to Recipes, Taste of Tradition). Xawaash – a unique blend of spices known as the backbone of many Somali dishes giving it the authentic flavour of traditional Somali cuisine (Hooyos House). Dried fruits like dates and raisins are part of Somalian cuisine, with dates being significant in Islamic traditions for breaking fast during Ramadan (Ethnomed).

However, the people of Somalia face many challenges, including poverty, civil war, and malnutrition. This research paper will explore some of the causes of malnutrition in Somalia and recommend a solution to address it.

Over 3.4 million people in Somalia suffer from food insecurity (WFP), placing it in the top 10 countries experiencing malnutrition globally (World Population Review). Of Somalia's population as a whole, malnutrition mainly affects children and women. On a global scale, approximately 149 million children under 5 are chronically malnourished to some degree and 6.9 million females are suffering from acute malnutrition (Malnutrition in Mothers, Food Crises response).

Climate plays a huge role in the malnutrition crisis as it impacts available food resources. Somalians face extreme climate change as they endure arid droughts and torrential floods. During periods of drought, widespread crop failure, soil degradation, and fewer available resources for livestock and direct consumption cause hardship. For example, during a period of drought between 2020 - 2022, 80% of rural households reported reduced access to water and food, and livestock losses exceeded 50% in some regions (Impact, 2024). Floods can completely destroy crops and decimate the harvest. As a result, the country suffers greatly as the decrease in the quantity and quality of available food impacts the Somali agricultural economy heavily. For example in 2023, rains killed over 100 people and devastated one-fifth of the harvest in South Central Somalia, including 1,400 metric tonnes of sorghum along Juba and Shabelle (rivers in Somalia). It is expected that 1.5 million hectares of farmland in Somalia were

adversely affected by the floods (Oxfam, 2023). This crisis has affected Somalia tremendously, from malnutrition on an individual level to the implications on the country's economy.

Malnutrition affects children on a biological level, given the decrease in nutrient-rich crop availability and the heavy reliance on starchy staples. The Somali diet has historically exhibited deficiencies in macro and micro nutrients required to support optimal human health. These diets specifically lack vitamin A and iron: exemplified by the fact that 40% of all women and children in Somalia suffer from iron deficiencies (UNICEF). Furthermore, Anemia (lack of iron), in both children and women in their childbearing years, affects the development of babies, negatively impacting cognitive development and causing lower immunity. It has also been found that many Somalis don't get enough Calcium and Vitamin C in their diets (Maxwell, SM et al, 2021). This can cause weak & brittle bones in the body. If malnutrition is left unaddressed, it is highly likely that irreversible mental and physical disability will follow (Cleveland Clinic). Unfortunately Somalia has seen the effects of this as 29,000 children in 2024 alone died from malnutrition in Somalia & many others were left adversely affected (UNICEF).

Besides individual biology, the societal effects of malnutrition are immeasurable, catalyzing detrimental poverty cycles, increasing strain on an already unstable healthcare system, and loss of educational opportunities. Malnutrition traps communities in cycles of poverty, as opportunities to improve livelihoods are stymied by individuals' shrinking productive capacity. Moreover, the children in malnourished communities are less likely to attend school and perform well academically due to poor health, further limiting their future opportunities. Additionally, on a macro scale, economic growth and development are hindered by the aggregated decay in economic output due to severe droughts, floods, the pandemic, insecurity, and conflict. According to World Bank, Somalia's real GDP growth averaged only 2.4% annually in 2019 - 2024 with an average real GDP per capita growth of -0.4% during the same period (World Bank, 2025). This means that while the economy of Somalia grew, the growth was slower than the increase in population. Thus, resulting in a decrease in economic output per person.

As people migrate towards food and resources, individuals and families are continually displaced, causing cyclical unemployment and instability. Somalia's already weak healthcare system is further strained in treating the high rates of malnutrition, anemia, macronutrient deficiencies, and illness, significantly reducing the availability of quality healthcare (Power of Nutrition).

The main contributors of nutritional aid to Somalia currently are United Nations International Children's Emergency Fund (UNICEF), World Food Programme (WFP), and the International Rescue Committee (IRC). The Somali government, working in partnership with these organizations, is trying to provide immediate assistance to distressed citizens and create long-term solutions. As of August 2025, UNICEF has nutrition programs in 95% of the districts in Somalia and has funded programs that give treatment for malnutrition, such as Ready-to-Use Therapeutic Food pouches (UNICEF in Somalia). However, the operational effectiveness of these humanitarian efforts are impeded by climate, conflict, global politics, or monetary support. For example, UNICEF lost 142 million dollars of funding from USAID this year therefore their impact is highly dependent on participation of other countries and external donations.

Proposed Solution

To properly address malnutrition, I propose a three-part solution that works cohesively to address nutritional gaps, crop yield, and food storage.

Camel milk

The first part of the solution is using camel milk. The ongoing challenges of drought, conflict, limited infrastructure, and dependence on imported food have made it difficult to maintain consistent access to nutrient-rich diets for the average Somali. However, Somalia's own cultural and environmental resources present an untapped opportunity—camel milk. Long valued in Somali tradition, camel milk has the potential to become a cornerstone of national nutrition strategy, improving food security while leveraging locally available resources. Nutritionally, camel milk contains three times more vitamin C than cow's milk, high levels of iron, calcium, and antimicrobial proteins, making it ideal for preventing and treating both macronutrient and micronutrient deficiencies (Swelum, Ayman A et al.). Environmentally, camels thrive in Somalia's arid climate, requiring less water than cattle and producing milk year-round. Culturally, camel milk is already part of Somali heritage, meaning it is more likely to be accepted, trusted, and consumed widely (FAO). Economic and logistical feasibility are equally compelling. Somalia already has a significant camel population—the largest in the world. By investing in small-scale milk collection, pasteurization, and distribution systems, local cooperatives could provide fresh or dried camel milk to schools, health clinics, and urban markets. Additionally, camel milk powder could be developed as an emergency food aid alternative, reducing dependence on imported blends like Plumpy'Nut. As a local Somali doctor says “If we can modernize how we raise camels and handle the milk, we can create jobs, improve nutrition, and build pride in our own local products.”(AP news)

This proposed solution is already in the works backed by the Somali government with the establishment of a Dairy Act. By engaging with UN agencies (like Food and Agriculture Organization), NGOs, and development organizations with experience in livestock systems it would be plausible to scale this solution effectively.

Financing is critical to make the camel milk sector sustainable. Initial investments in infrastructure, training, and distribution of camel milk could empower Somali livestock producers not only to supply domestic nutrition needs but also to achieve greater economic independence. One pathway could be through microloan programs, where herders access small loans to purchase equipment such as refrigeration units or transport vehicles and then repay these loans through the sale of milk products. This model has been successful in East African dairy cooperatives, where repayment rates remain high because producers see direct profits from their investments. Grants and subsidies from NGOs and international partners could complement microloans in the early stages, reducing the financial burden and sharing risk. Building homegrown financial capacity—such as livestock cooperatives reinvesting profits back into infrastructure or local banks developing livestock-focused loan products—could ensure long-term growth. By combining initial funding from international partners with Somali-led cooperative and financial initiatives, the camel milk industry could transition from an aid-dependent project into a self-sustaining pillar of national nutrition and economic resilience.

Solar Drying and Solar Powered Cold Storage

The second part of this solution addresses food storage. According to the World Food Programme, “Drought, floods, conflict, high food prices and dwindling harvests are pushing Somali families to the brink of hunger.” While emergency food aid remains essential, it often fails to address the underlying problem: the country’s inability to preserve nutrient-rich foods for year-round access. Low-cost solar drying, an affordable, sustainable food preservation method, offers a practical, community-driven solution to this challenge. Malnutrition in Somalia stems not only from insufficient food production but also from post-harvest losses. Fresh fruits, vegetables, and dairy products spoil within days without refrigeration, especially in rural areas lacking electricity. Studies by the Food and Agriculture Organization (FAO) estimate that up to 40% of harvested produce in East Africa is lost before consumption due to poor storage and preservation (Sarangi, Prakash Kumar, et al, 2024). Solar drying addresses this by using simple, sun-powered dehydrators to remove moisture from food, slowing bacterial growth and extending shelf life from days to months. Unlike energy-intensive refrigeration, solar dryers can be built with local materials such as wood, mesh, and transparent plastic sheeting, keeping costs low and maintenance manageable for communities. Solar drying aligns with Somalia’s environmental, economic, and cultural realities. Environmentally, the country has abundant sunshine year-round, making solar energy reliable and free. Economically, small-scale solar dryers cost as little as \$50–\$100 to build—affordable enough for cooperatives or aid organizations to distribute. Socially, dried foods such as dates, mangoes, goat meat, and even milk powder are already culturally accepted in Somali diets, which means adoption faces minimal resistance (Mumuquad, The Somali Kitchen, Nutrition and Fasting in Somalia, EthnoMed). The adoption of low-cost solar drying in Somalia could transform the malnutrition landscape. First, it would smooth seasonal food availability, ensuring that nutritious produce harvested in the rainy season is still accessible during drought periods. Second, it would enhance household nutrition by preserving vitamins and minerals—studies show that properly solar-dried fruits retain over 80% of their vitamin C. Third, it would provide economic opportunities, as surplus dried goods could be sold in local markets or even exported, fostering microenterprise and community resilience. Over time, this shift could reduce dependency on emergency aid, empower rural women (who are often the primary food processors), and increase resilience of local food systems against climate shocks.

Solar drying has also proven to help increase food security. A study done in rural Mozambique shows use of solar dryers significantly increased the amount of food available to households. It also showed families using solar dryers experienced more months during the year when they had sufficient food. There was a measurable decrease in food insecurity levels among households using solar dryers, as indicated by lower HFIAS (Household Food Insecurity Access Scale) scores. (Matavel, Custodio, et al., 2022)

One possible solar dryer that could be leveraged in implementing this solution is the Nimsy Solar dryer: This solar dryer extends the shelf life of perishable food from three (3) days to twelve (12) months helping farmers fight against post-harvest losses (Nimsy Agro Solar Concept, The World Food Prize Foundation). While cost and effectiveness of this specific product has not been outlined, a solar powered dryer is the most feasible option to extend the shelf life of these vegetables by months.

Building upon the success of drying products using solar energy, cold storage powered by solar should also be implemented. For example, Somali farmers could use the Climavault solution. This innovation includes solar-powered IoT-enabled cold storage hubs that extend the shelf life of fruits and vegetables from 2 days to 21 days. It is designed to operate off-grid and is accessible through a pay-as-you-store

model, making it affordable for smallholder farmers, market vendors, and farmer cooperatives. Since 2021, the Climavault solution has helped reduce post-harvest losses by 42%, saving over 57,000 metric tons of food which translates into a 35% average increase in income for its users (ClimaVault Africa, The World Food Prize Foundation).

These two solar-powered tech innovations provide promising solutions to address gaps in food storage therefore strengthening food security.

Genetically Engineered Crops

Lastly, genetically modified crops can play a huge role in addressing food insecurity as they help address crop resilience in changing environments and can alter nutrient availability in crops. Agricultural biotechnology has emerged as one of the greatest inventions to solve malnutrition. Genetically modified foods have the potential to alleviate malnutrition in Somalia through the enrichment of staple crops and farm production in times of drought and war. Biofortified GMO crops such as maize or iron and vitamin A-enriched rice can overcome common deficiencies that otherwise lead to anemia and micronutrient deficiencies. Additionally, GMO crops resistant to drought will withstand Somalia's volatile weather and ensure food availability even in years of scarcity.

While genetic engineering holds a lot of promise for nutrient rich and resilient crops, there are many barriers in cultural adoption of genetically modified crops. Some of these barriers included monetary investment, cultural adoption, and Somali laws. Currently, GMOs are banned in Somalia and there is a bit of a misconception around GMOs (Samira, and Qeys Ahmed, 2024). To educate the Somali government one could advocate to the Ministry of Agriculture and Irrigation in Somalia. This is the main body responsible for agricultural policy. Sending a policy brief or arranging a meeting here is the first step. In addition, speaking with the Parliamentary Agriculture Committees could strengthen advocacy efforts. Lastly, collaborating with the Somali Agricultural Research Institute (SARI) could help act as a bridge of communication findings.

It's plausible that by taking the steps to educate the Somali government thus giving them the means to therefore educate their people. There will be an increased need to discuss GMO crops and the science behind them. One way to address this could be a marketing campaign. This method has proven successful for the orange-fleshed sweet potatoes (OFSP) in east Africa. Nobody would eat them even though they are rich in Vitamin A because they prefer white-fleshed. It took a marketing campaign to win hearts to eat the OFSP. A similar approach could be used to break the stigma of GMOs in Somalia. By adopting GMO maize into their daily diets, Somalians can reap all the health benefits that these crops have to offer.

In terms of implementation, Somalia does not currently have companies that engineer local GMO seeds, so initial supply would have to come from partnerships and imports. Nonprofit initiatives could supply Somalia with this initial supply. For example, HarvestPlus for biofortified crops like vitamin A maize. African Agricultural Technology Foundation (AATF) distributes GMO seeds for smallholder farmers all over Africa. Neighboring African countries such as Kenya and South Africa recently approved GMOs. They could serve as policy models for implementation by the Somali government. Research institutes such as International Maize and Wheat Improvement Center (CIMMYT) and International Institute of

Tropical Agriculture (IITA) which develop drought-and pest-resistant GMO varieties for Africa could pilot plots in Somalia with them. In addition, international seed companies such as Monsanto/Bayer, Syngenta, and Corteva Agriscience operate in several African markets and could easily expand into Somalia. One drawback of using GMOs is that it creates a seed dependence which could be a cost burden, but the improved genetic traits make these seeds worth the investment.

If Somalia decides to implement the use of GMOs through NGO organizations, funding for it could come from private organizations such as the World Bank Climate-Smart Agriculture Program which would support GMOs as part of drought resilience strategies. Programs such as FAO Somalia already fund pilot programs in seed distribution and could integrate GMOs into those. The Somali government could use part of its agricultural development budget or incoming climate adaptation funds from international donors to subsidize GMO seeds for pilot projects. With the dissolution of the United States Agency for International Development (USAID), many countries such as Somalia have faced a gap in funding and grant opportunities. Moving forward, to fund GMO programs Somalia will have to rely more heavily from private sources.

Using GMOs could however complicate trade with regions like Europe that restrict GMO imports, potentially narrowing Somalia's export options for certain crops. However, Somalia's main export crops today are primarily sold to the Middle East, East Africa, and Asia, many of which are more open to GMO trade. Additionally, the main export crops include bananas, sesame, and livestock feed of which only livestock feed & sesame have GMO alternatives. Strategic planning could focus GMO use on domestic food security crops and keep export-oriented crops non-GMO to maintain trade flexibility.

While each of these solutions account for the Somali climate and situation, a few barriers still remain. For example, communication of such solutions would require close cooperation with the Somali Government, pre-existing NGOs, and citizens; education would play a vital role in kickstarting all the solutions. Secondly, funding may be an issue which is why it's crucial to partner with existing NGOs and ensure proper government fund allocations. Lastly, cultural adoption is the greatest challenge, to overcome this educational resources about the numerous economic and biological benefits of each solution is crucial.

Conclusion

The proposed solution to address malnutrition in Somalia suggests "Meeting in the middle". That is to utilize what Somalia is strong in and mold it to reap the benefits and put a stop to malnutrition. Through recognizing strengths such as the largest camel population, high amounts of sunlight for solar drying and cold storage, it is possible to maximize the benefits of local resources. In addition, adjusting vitamin content in staple crops provides great benefits without a big change. Camel milk, solar-powered storage, and GMOs are not only reasonable but also feasible with communication, education, & thoughtful marketing.

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