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Prioritising indigenous plants and peoples: the key to combating malnutrition in rural Kenya

Abstract

In Kenya, malnutrition, particularly in children, is a growing concern. According to the Global Hunger Index (GHI), 36.8% of the population is undernourished, an increase from 2016, when the figure was 22.2% (Global Hunger Index, 2025). Prolonged drought is a prevalent influence on malnutrition in Kenya. The rainy period of October to December 2025 was "the driest season recorded since 1981 in parts of eastern Kenya", according to an article from WHO Africa (WHO | Regional Office for Africa, 2026). This threat develops as the worsening effects of climate change continue to alter climatic conditions in a myriad of ways, including a general temperature increase, exacerbating aridity and reducing arable land, which comprises only 11.4% of landmass in Kenya (data.worldbank.org, n.d.). Effects of climate change will cause already vulnerable Arid and Semi-Arid Land (ASAL) Counties such as Mandera and Turkana to suffer economically, agriculturally and nutritionally, worsening the malnutrition crisis and causing a further deterioration of food security within the country, particularly affecting indigenous populations that rely on pastoralism and agriculture for their livelihoods (Google Arts & Culture, 2024). This research paper explores the causes of malnutrition and the effects of climate change in rural Kenya, and proposes solutions through the utilisation of indigenous flora, community initiatives and inoculation through mycorrhizal fungi to enhance agricultural productivity and increase resistance to climate change.

Background and Context

The Republic of Kenya is a country situated in East Africa, with a population of around 53,331,000 (KNBS, 2024), and a mean household size of 3.8 people, higher in rural areas at 4.3 people, and at 6.3 people in North Eastern areas, according to a 2019 census (Kenya National Bureau of Statistics, n.d.). As of 2024, 36% of the population live in ASAL areas, which comprise approximately 89% of land area (Nunow, 2024). ASAL areas are incredibly important nationally in regard to Kenya's GDP: agriculture is the main source of income, at 21% of the Gross Domestic Product, and is the area of employment for around 40% of the national population, and 70% of the rural population; ASAL areas house approximately 70% of Kenya's livestock . However, due to the increasing threat of climate change combined with other contributing factors such as poverty, prolonged droughts have caused a substantial decrease in successful livestock rearing, with over 2.5 million livestock lost over the last 4 decades (HandInHand, 2024). Prolonged periods of drought not only contribute to water scarcity, reducing arable land for agriculture and pastoralism, but also exacerbate extreme weather when precipitation occurs, due to the reduced permeability of the soil, causing natural disasters such as flash floods. The negative effects of this are illustrated in the March-April-May (MAM) long rains season in early 2025, which affected 23 counties, and over 14,700 households; the resulting overflowing of the Kiambere Dam caused

government-ordered evacuations in Tana River and Garissa; furthermore, the floods caused the spread of water- and vector-born diseases, including cholera, causing 11 recorded deaths, and visceral leishmaniasis, a disease associated with high mortality, which affected ASAL counties, such as Marsabit, most severely (ReliefWeb, 2026). These increasingly harsh conditions massively reduce agricultural and pastoral success, reducing the amount of food available grown in-situ, and hugely impacting the livelihoods of the majority of the rural population which rely on agriculture and pastoralism for their livelihoods, particularly in indigenous nomadic communities. the Turkana people, a nilotic people native to the Turkana County, traditionally rely on nomadic pastoralism as their primary source of livelihood, and maintain a nutritious diet of animal products and wild edible plants (Oluoch *et al*, 2023), however, with increasing aridity and natural disasters, indigenous populations will have to transition to a heavier reliance on imported food and crops grown from large-scale agriculture, causing a loss of traditional practices and diet, and a loss of a relationship with nature. These factors accumulate, impacting nutrition nationally.

Malnutrition in Kenya is a national concern, however northern ASAL counties are most affected by malnutrition. A report from the IPC (Integrated Food Security Phase Classification) has asserted that Turkana, Marsabit and Mandera Counties, along with four other counties, have not improved from ICP AMN (Acute Malnutrition) Phase 4 between February 2018 and February 2026, which is classified as critical. Furthermore, Marsabit and Mandera counties have deteriorated into ICP AMN Phase 5, the most severe category, listed as “extremely critical” malnutrition levels (IPC, 2026). The most prevalent form of malnutrition in Kenya is Protein-Energy undernutrition (PEU), which primarily affects children. In a study conducted in Kibera, Nairobi, on children from 6-23 months old, results indicated that 34.6% of participating children were stunted as a result of malnutrition (Kariuki, 2002). In ASAL areas, up to and over 20% of children are wasted due to malnutrition (UNICEF, 2024). Death as a result of malnutrition in children is common, with approximately 51% of in-hospital child deaths likely being a direct cause of malnutrition based on mid-upper arm circumference (MUAC) (Bejon *et al*., 2008). Lasting health effects impact surviving children, with stunting and wasting of muscle.

Maternal malnutrition in both pregnant and breastfeeding women has detrimental effects on healthy childhood development. Prenatal malnutrition is common, as not only must pregnant women provide adequate nutrition for personal health, but also enough nutrients and calories for the developing fetus. A lack of appropriate nutrition in pregnant women can cause harm to both mother and child, increasing the risk of potentially fatal conditions such as pre-eclampsia in mothers, and causing wasting, stunting, developmental delays and stillbirths in infants (UNICEF, 2022). Breastfeeding after birth is being gradually replaced by bottle-feeding, increasing from 22% in 2022 to 34% in 2025 (Lidigu, 2025). Whilst bottle formula is better than foregoing food, its nutritional benefits cannot compare to breastfeeding; breast milk enhances immunity, reducing infection risk, and is shown to reduce the risk of Sudden Infant Death Syndrome (SIDS). The risks associated with these factors are further increased in rural ASAL areas, particularly in indigenous communities such as the Turkana, Sengwer and Ogiek peoples, due to reduced access to healthcare facilities, a lack of education on appropriate nutrition, and cultural norms, such as the frequent tendency for men in the community to be prioritised during meals (Chege, Kimiywe and Ndungu, 2015), which could deprive children and women, particularly pregnant women, of adequate nutrition as they are instead given less nutritious leftovers.

The determinants for the declining nutritional status in ASAL Kenya are multitudinal and intersectional. Examples include the prioritisation of agriculture and eco-tourism by local and national governments; Predominant crops grown in large-scale monoculture include potatoes, wheat and Kenya’s main staple

crop, maize, which rose to become Kenya's staple crop during the 1960s, as Kenya gained its independence. Maize accounted for 4,028,320 tonnes of production, and used 2,407,025 hectares of land (National Agriculture Production Report, 2025). Although production of global staple crops like maize is certainly beneficial for the country's economy, through in-situ sales and exports, and provides livelihoods for rural communities with few other formal employment opportunities, the increasing threat of climate change, particularly in ASAL counties, means that production of these crops at this rate, with the current agricultural methodology, will not be sustainable to grow enough for the projected population by 2050, due to decreased production and inability to afford the remaining crop (Projected Impact of climate change on household diets in Kenya Insights from Busia County, Kenya, n.d.).

Furthermore, indigenous populations are particularly vulnerable to incoming effects of climate change due to their rural way of life, dependence on livestock such as cattle that are susceptible to drought and heatwaves, and available land potentially not being arable. These populations have been marginalised governmentally; populations of the Maasai, Yaaku and Ogiek peoples have all been illegally displaced from their homelands; allegedly in order to create nature reserves or prevent illegal logging. The Ogiek people have been repeatedly evicted from their ancestral land of the Mau Forest, though a ruling from The African Court of Human and People's Rights ruled that they were entitled to live on the land (www.african-court.org, n.d.). Despite this, illegal evictions continue to occur, forcing indigenous communities to migrate to ASAL land, with exacerbated effects of climate change including droughts and flooding (Maasai Cultural Exchange Project, 2025), affecting food security and nutrition for these communities.

Solutions and Recommendations

In 2023, responding to the declining state of nutrition, the Cabinet Secretary for Health in Kenya, Nakhumicha S. Wafula, announced an ambitious target: governmental commitment to eliminate all forms of malnutrition in Kenya by 2027 (Health.go.ke, 2025). However, as 2027 approaches, the national nutrition status deteriorates, and not enough has been done regarding the factors of climate change, marginalised communities and a lack of education.

Multiple solutions have been established at both national and local scales to attempt to better the situation, however efforts have been insufficient. To combat acute malnutrition, a high-calorie, high-nutrient paste called Ready-to-Use Therapeutic Food (RUTF) is deployed by foreign aid organisations. These paste packets are easy to store as they do not require refrigerating. However, due to US aid cuts, stores of these are not sufficient to tackle malnutrition nationally as a long-term solution, with stocks reaching only 77% of required quantities in late 2025, increasing the likelihood of stocks running out (Save the Children International, 2025). Local community initiatives are often set up, which do have effects locally but are not prevalent in all regions, and so are not effective large-scale, though they make positive differences within local communities: a community project in Kajiado County, the Aquaculture Learning Hub, combines fish, fruit and vegetable gardening to create a sustainable ecosystem that supplies locals with income, nutrition and education regarding self-sufficiency in sustainable agriculture, allowing nutritious food to be affordably accessed. This model of community project has been replicated throughout Samburu County (Africa Science News, 2025). These solutions are useful small-scale and for urgent acute malnutrition treatment, however

It is imperative that other solutions that centre longevity, sustainability and accessibility to combat climate change are implemented. Adapting current large-scale agriculture models, whilst minimising economic

and humanitarian impacts, is necessary to adapt to harsher climatic conditions such as prolonged drought. To do this, indigenous plants can be utilised. As they are indigenous to ASAL areas of Kenya, their genome is adapted to the climate, with mutations like increased drought tolerance allowing them to thrive in harsh conditions. Indigenous plants often have increased nutritional content when compared to regular staple crops: Finger millet, a native plant traditionally grown in Kenya for centuries, is still grown on a small scale, however it is not considered a major crop. Finger millet as a staple crop has numerous benefits: It is drought resistant, thrives in poor quality soil, has a high fibre content, does not contain gluten - and so is more accessible to individuals with gluten intolerances - and contains 340g of calcium per 100g (Healthy Master, 2025), which is over 10 times greater than the calcium content of wheat; hypocalcemia as a result of insufficient calcium intake can cause rickets in children, so partially phasing out wheat in favour of the better-adapted finger millet results in more secure harvests and higher nutritional value, acting as an affordable staple, will fortify the health of children living in poverty or traditional indigenous communities which are vulnerable to malnutrition. Millet varieties can also be used as livestock feed, increasing livestock security during periods of drought or maize shortage. However, the possibility of growing many of Kenya's diverse indigenous crops has only recently become available. In 2012, the passing of the Seed and Plant Varieties Act meant only government-certified seeds could be planted, excluding numerous indigenous seeds, with penalties of up to 2 years in prison, or a fine of KES 1,000,000 (£5755). This was challenged by the Seed Savers Kenya Network and overturned in 2025 (Kiser, 2026), however as the right of farmers to plant these seeds has only recently been introduced, beneficial indigenous plant varieties have not been introduced at a necessary scale.

Other indigenous plants which are already prevalent, like cassava, tamarind and African baobab - all also drought-resistant, with multifaceted uses including fuel & fibre - are nutrient-dense, with calorie-rich roots, and leaves containing high amounts of protein and vitamins (Montagnac, Davis and Tanumihardjo, 2009). Despite this, a challenge in growing plants like cassava, while minimising synthetic fertiliser use, is the lack of soil phosphate. ASAL areas of rural Kenya often have poor soil quality, causing difficulties on phosphate uptake. A study in Columbia involved using in-vitro methods to produce specific arbuscular mycorrhizal fungi strains, which were utilised to inoculate cassava plants to increase phosphate absorption and cassava yield. Inoculating cassava roots positively impacted growth, significantly increasing root yield by 20% (Ceballos et al., 2013).

Indigenous peoples are proven to be better stewards of natural ecosystems than other populations, with forests they maintain storing more carbon on average (Forest et al., 2025). However, due to evictions of indigenous peoples from their lands, stewardship may be ineffective, reducing efficiency of crop production in these areas, and also removing many indigenous peoples' livelihoods, placing them at an increased risk of malnutrition. To improve livelihoods of indigenous peoples such as the Ogiek and Turkana peoples, ancestral land must be repatriated, with governmental support, which would positively impact land such as forested areas (Nitah, 2021) and allow stable livelihoods for indigenous peoples, being involved in indigenous crop production and agroforestry taking place in these areas. To tackle other factors impacting nutrition success in Kenya, an educational approach can be taken, as malnutrition occurring prenatally or in infancy is frequently due to a lack of education for mothers, particularly young mothers (Gewa, Oguttu and Yandell, 2011), on healthy feeding methods. The Positive Deviance/Hearth (PDH) method was introduced in some areas of Kenya, consisting of repeated 10-12 day behaviour change and education sessions, uniting communities to overcome childhood malnutrition (www.wvi.org, n.d.). Through an iteration of this programme in Mogotio Sub County involving over 500 children and their families, over 450 children were fully rehabilitated during a 3-month period, exhibiting a 90%

success rate (County Government of Baringo, 2025). Implementing similar education models targeted towards young mothers of children living in areas most affected by malnutrition, such as in Turkana, would have positive community repercussions, reducing child mortality and disease from malnutrition.

Conclusion

To sustainably and effectively reverse the deteriorating malnutrition crisis in ASAL Kenya, agricultural priorities must shift from staples like maize to drought-resistant indigenous crops like finger millet and cassava, utilising agroforestry methods - involving trees such as African baobab to provide shade and further resources - on available arable land to ensure sustainability. Plants that struggle in phosphate-poor soil such as cassava can be inoculated with mycorrhizal fungi strains to increase growth, as evidenced by trials carried out in Columbia (Ceballos et al., 2013). In order to increase economic feasibility and widespread support, campaigning efforts must be made to inform the general public of the nutritional, economic and climatic benefits of indigenous agriculture. Repatriating ancestral land to indigenous peoples such as Ogiek, Sengwer and Turkana people provides sustainable and traditional agroforestry livelihoods for indigenous populations and stable income for food purchase, and rehabilitates land, increasing longevity of local agricultural projects. Carrying out community-scale models such as the PDH model unites communities and effectively rehabilitates childhood malnutrition (County Government of Baringo, 2025). However, many of these solutions will require governmental and community support. Campaigning for larger-scale solutions like indigenous land repatriation and mycorrhizal fungi inoculation trials, to increase public pressure on the government, is necessary; community initiative is imperative for smaller-scale projects such as PDH models and small-scale agroforestry utilising indigenous crops, so these initiatives gain traction, leading to tangible positive effects combating malnutrition. If indigenous crops and communities are prioritised, along with solutions enhancing yield, and community projects to further rural education, Kenya will be able to mitigate the malnutrition crisis and climate change effects, increasing the quality of life for many citizens in the face of an uncertain future.

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