POLICY BRIEF ON THE BIODIVERSITY CLIMATE NUTRITION NEXUS: A MODEL FOR DIVERSIFIED FOOD SYSTEM FOR PASTORAL COMMUNITIES IN MARSABIT COUNTY

By WWF KENYA

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EXECUTIVE SUMMARY

Marsabit County stands at a climate tipping point. Projected warming, rainfall variability, and extreme weather threaten livelihoods and ecosystems. There is a need for targeted support for pastoralist households transitioning to agro-pastoralism, especially amid growing evidence that many pastoralists who are becoming sedentary face significant malnutrition. The drought resilience program by WWF, PISP and MAWICA in Shurr settlement (conservancy), Marsabit county, adopts an integrated, community-based approach to strengthen food and nutrition security through climate-smart agriculture, improved livelihoods, and ecosystem health models that are based on agroecological approaches. By using irrigation to cultivate diverse crops, diversifying livestock production through poultry programs and pasture establishment, the program boosts local food availability while supporting livestock production. Food access is enhanced through on-farm employment and women-led income-generating vegetable farms. The model reduces reliance on volatile markets, promoting food stability. Nutritional outcomes have improved through dietary diversification as communities now produce vegetables and poultry products. Additionally, the program protects biodiversity and natural resources by planting trees and conserving water, reducing deforestation, and preventing human-wildlife conflict. Developing and scaling up such interventions that ensure climate resilience while boosting food and nutrition security among pastoral communities call for a holistic and sustainable solution that respects existing livelihoods and integrates agroecology principles where new and culturally acceptable alternative agricultural livelihood options are integrated. The policy recommendations emphasise investing in sustainable water systems, such as rainwater harvesting and solar-powered boreholes, to support year-round nutritious food production. Also advocates the need for strengthening pastoral livelihoods through improved access to water, pasture, and complementary farming, so that the community has adequate animal proteins. Also emphasises the need for community co-design of interventions to ensure relevance and effectiveness, while providing social safety nets and diversified income sources to boost resilience. Adopting gender-sensitive approaches, especially across patriarchal systems, since it empowers women and improves nutrition. Lastly, the need for sustainable financing mechanisms to reduce one-off donor and externally driven interventions, by working with local communities to unlock public sector finance. Finally, policymakers must shift the narrative around pastoralism from one of backwardness to one of resilience and viability. Pastoralism is not a relic of the past; it is a dynamic and adaptive livelihood system that continues to sustain millions. With the right support, it can remain a cornerstone of community food security and rural development, offering a nutritious and dignified way of life for generations to come.

BACKGROUND

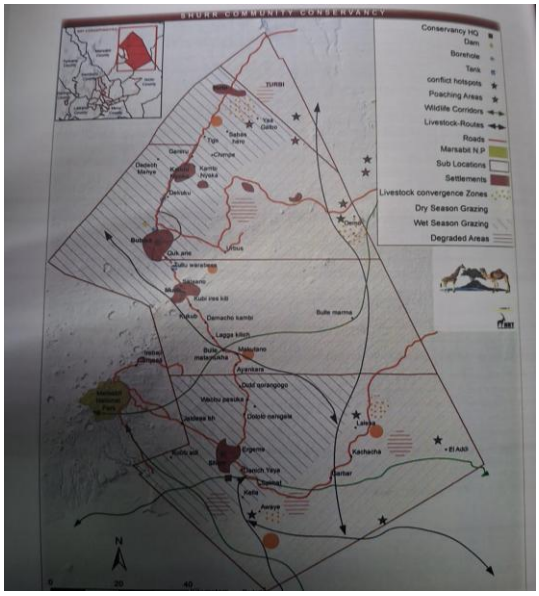
About Marsabit County (Kenya)

Marsabit County is located in northern Kenya and shares an international border with Ethiopia to the North. It spans approximately 70,691 km², making it the largest county in Kenya. It borders Lake Turkana to the west, Wajir and Isiolo counties to the east, and Samburu to the south. The county comprises four sub-counties: Saku, Moyale, North Horr, and Laisami, which double as electoral constituencies, with 20 wards and 100 village units forming the lowest administrative units. According to the 2019 Kenya Population and Housing Census, the county's population stands at 459,785 (243,548 males, 216,219 females, and 18 intersex), accounting for about 1% of the national population. It has a population growth rate of 3.4%, higher than the national average of 2.2%, with projections of over 565,000 by 2027. The majority (over 60%) of residents are under 25 years, indicating a youthful and growing population.

Marsabit's terrain is predominantly arid and semi-arid, except for areas around Mt Marsabit, Kulal, and Hurri Hills, which receive relatively higher rainfall (~700 mm annually). About 75% of the land consists of low-potential rangelands. The main economic activities include pastoralism (81%), agro-pastoralism (16%), fishing, small-scale farming, trade, and minimal mining and tourism. Livestock rearing remains the cornerstone of livelihoods, while bee-keeping and fishing are growing in importance. Marsabit has a high poverty rate, with 80% of residents living in absolute poverty and 83% facing food insecurity, largely due to erratic rainfall, over-reliance on rain-fed agriculture, and limited economic diversification. Land in Marsabit is primarily communally owned, with less than 2% registered, mainly around urban centres. While landlessness is rare, resource-based conflicts and displacements are periodic. This policy brief has been developed based on the situation and interventions implemented in Shurr conservancy (settlement) of Marsabit county.

Project location Shurr Conservancy

The project operates within Shurr Conservancy (settlement), North Horr constituency in Eastern Marsabit Mountain, an area of approximately 4,140 km², characterised by arid rangelands and a population of about 2,000 households organised in 14 village clusters. Rooted in pastoralist traditions, the region supports both local and migratory livestock herding due to its seasonal pasture availability. However, overgrazing, climate change, and the erosion of traditional rangeland governance have critically undermined the sustainability of pastoralism within the Shurr settlement. Shurr Conservancy is one of nine established conservancies in Marsabit County and has introduced structured grazing plans and designated zones for alternative livelihoods. Notably, small-scale agriculture is emerging, particularly in seasonal floodplains with fertile soils, although water scarcity remains a major constraint. While initially met with resistance due to cultural norms and land-use conflicts, agro-pastoralism is gaining traction as a pragmatic adaptation option within the conservancy. This shift illustrates a broader community-led transformation toward diversified and climate-resilient livelihoods, supported by remittances and other income sources. The Shurr Conservancy drought resilience program now represents a critical model for adaptive land use and livelihood transition in the face of climate change, environmental and socio-economic stressors.



<u>Pastoralism, Nomadic Lifestyles, and Nutrition</u>

Pastoralism remains a cornerstone of rural livelihoods across Africa, supporting an estimated 268 million people, according to the African Union (Carr-Hill, 2013). In Kenya, particularly in arid and semi-arid regions like Marsabit County, pastoralism has long been the primary source of food, income, and social identity. However, profound changes are underway, threatening both the viability of this livelihood system and the nutritional well-being of the populations it supports. Children, the elderly and women in pastoralist communities are among the most nutritionally vulnerable in the world. Across Eastern Africa, studies have consistently identified high rates

of acute malnutrition in these populations, often peaking during seasonal lean periods, especially during droughts when food is scarce and mobility is constrained (Chotard et al., 2010).

Pastoralist systems are historically well-adapted to harsh climates and environmental variability. Strategic mobility allows herders to move livestock in search of pasture and water, sustaining animal productivity and, in turn, ensuring a stable supply of milk and meat for household consumption. These food sources form the core of traditional pastoralist diets, nutrient-dense and biologically appropriate for the context. In places like Marsabit, this nutritional model has been deeply embedded in daily life. However, the growing frequency of droughts, compounded by external pressures such as land privatization, conservation restrictions, and urban expansion, is disrupting traditional patterns of movement and access to grazing areas.

As mobility becomes increasingly difficult, many pastoralists are being forced into sedentary lifestyles. This shift has significant nutritional implications. Sedentary households often consume fewer animal-based foods and become more reliant on purchased staples such as maize and pulses. While such staples provide calories, they lack essential micronutrients found in milk and meat. Several studies, including recent assessments in Marsabit, have shown that children living in permanent settlements are more likely to suffer from acute malnutrition than those spending more time in mobile fora settlements, even during drought periods.

Climate change further compounds these challenges. Traditional coping mechanisms are no longer sufficient. Where once a single failed rainy season could be managed, consecutive years of drought are now pushing communities beyond recovery.

In response to these growing threats, humanitarian and development organizations have introduced various interventions. Food aid has been a common emergency response, particularly during crises. While food aid can mitigate severe wasting in the short term, it does not address the underlying drivers of undernutrition. Some people feel less dignified as they stand in long lines waiting for food. A number of organisations are also supporting food production which has been mainly rainfed. Most of these programs never go beyond the project period, this is because such programs are often too top-down and designed without sufficient community input or attention to gender dynamics. Women's central role in nutrition, caregiving, and livestock management is frequently overlooked. In most of these projects, funding is often short-term and donor-driven, which limits sustainability.

Climate Change in Marsabit County:

Trends, Projections, Risks, and Impacts

Marsabit County, located in Kenya's arid and semi-arid northern region, is experiencing the harsh realities of climate change. Characterized by extreme temperatures ranging from 10.1°C to 30.2°C and erratic rainfall between 200 mm and 1,000 mm annually, the county's climate is highly variable and heavily influenced by altitude. For instance, low-lying North Horr receives as little as 150 mm of rainfall annually, while high-altitude areas like Mt. Marsabit and Mt. Kulal receives up

to 800 mm. However, across the region, high evaporation rates—often more than ten times the rainfall—intensify aridity and water stress.

Rainfall analysis for Marsabit over the past 35 years (1980–2015) indicates a decline in first-season rainfall and a modest rise in second-season precipitation. While this has slightly extended the second growing season, it has also introduced greater inter-annual variability, making agriculture more unpredictable. First-season rainfall decline, coupled with rising temperatures, is reducing season lengths and increasing heat stress days, placing immense strain on crop and livestock systems. Future climate scenarios for Marsabit based on Representative Concentration Pathways (RCPs) 2.6 and 8.5 project increasing temperatures across both growing seasons. Under RCP 8.5, temperature rises are more extreme and may reduce the length of the second growing season. Rainfall projections show increased unpredictability, with more consecutive dry days expected under both scenarios, exacerbating drought risks.

"We have watched this warming happen slowly over the years. Now, the droughts come too often, and they last too long, sometimes more than three years. I remember in 1992 and 1993, the heat and dryness were so bad it brought a terrible drought. We lost so many of our animals. Then again in 2015, and from 2018 all the way to 2022, it was another long drought. It's become too frequent now. We don't even get the chance to restock our livestock before the next one hits. We keep losing them, again and again. For many of us elders, this life has become too hard, it's pushing us into real suffering." One of the old ladies reported.

Climate Hazards and Their Impacts

The impacts of climate change are deeply felt across multiple sectors. In pastoralism, mobility, a key coping mechanism for climate variability, is increasingly constrained by water scarcity, pasture depletion, livestock diseases, and wildlife incursions. Drought is the most widespread climate hazard across Marsabit County, with varying degrees of impact based on geography and socio-economic vulnerability. Conversely, erratic rainfall leads to flash floods, washing away livestock and damaging infrastructure. In 2023, short rains triggered extensive flooding in most areas, destroying property and displacing communities. Human and livestock disease outbreaks have also emerged in the wake of climate shifts. Climate change also brings the challenge of human-wildlife conflict as animals venture closer to homes and farms in search of food. Recurrent droughts and growing pressure from livestock have accelerated environmental degradation, and rangelands are rapidly deteriorating, exacerbated by poor grazing practices as animals converge from different areas during drought. Climate change is also leading to biodiversity loss and increased human-wildlife conflict. Climate change is escalating resource-based conflicts in Marsabit County. Increasingly scarce pasture and water have fueled intercommunal violence (Table 1 shows community views on hazards and impacts).

Quotes from community members

“Drought represents the most severe and recurring environmental challenge in this region, significantly impacting water availability and contributing to heightened levels of conflict. During periods of drought, competition over scarce resources intensifies, often resulting in both inter-community and human–wildlife conflicts. This is particularly evident when pastoralist communities, including those from Wajir and the Rendille ethnic group, converge on designated dry season grazing areas, so-called fallback zones, which exacerbate tension and resource-based disputes.

“Although less frequent, flooding also poses a considerable threat. The settlement is believed to lie along a natural watercourse, making it highly susceptible to flash floods. During such events, water must be actively diverted to prevent the destruction of homes and infrastructure. Post-flood conditions typically lead to increased incidences of both human and livestock diseases, with a notable rise in vector-borne illnesses such as malaria in children and outbreaks associated with ticks and tsetse flies.” Young woman respondent

Key Socioeconomic and Environmental drivers of vulnerability in Marsabit County, Kenya

1. Limited livelihood diversification: Marsabit's economy heavily depends on pastoralism, limiting economic resilience and adaptability. Scarce resources and the slow transition into alternative income sources increase pressure on pastoralist systems and household vulnerability.
2. Increased vulnerability due to resource scarcity: Scarce water and pasture force pastoralists to travel further, increasing human-wildlife conflict and land degradation. This worsens exposure to climate shocks and undermines ecosystem sustainability.
3. Shift in agro pastoral practices not focused on food: Many households are replacing food crops with cash crops like miraa (*Khat)*, leading to poorer nutrition. This shift, along with food imports, heightens food insecurity and vulnerability.
4. Education access and gender disparities: Access to education is low, with children often traveling far or dropping out due to household responsibilities. Gender roles further disadvantage girls and limit long-term opportunities for youth.
5. Healthcare access and marginalisation: Health services in Marsabit are inadequate due to previous marginalisation, as much as the county is putting up health systems, that's not adequate, forcing some residents to seek care in Ethiopia. These gaps result in poor health outcomes that translate to food and nutrition insecurity.
6. Water access and management: Water scarcity and patriarchal norms prioritize livestock over household needs, reducing availability of water for domestic use. This fuels conflict, worsens hygiene, and threatens food production, all these factors ultimately impact nutrition outcomes.

Climate Change and Nutrition: Intersecting Global Challenges

Human well-being is intricately connected to the environment, with climate change representing a critical threat to nutrition and health outcomes worldwide. This relationship is captured by the “vicious circle” model, which illustrates how environmental degradation—such as climate change—interacts with poverty, population growth, and poor health to perpetuate cycles of vulnerability, especially among low-income populations (Bremner et al., 2010).

The Intergovernmental Panel on Climate Change (IPCC) asserts with *very high confidence* that climate change is already contributing to global food and nutrition insecurity (IPCC, 2023). The adverse health effects of climate change are projected to disproportionately impact sub-Saharan Africa, where climate-sensitive sectors such as agriculture, livestock, and fisheries are critical to food systems and livelihoods (Ramin & McMichael, 2009). Vulnerable populations—particularly women, infants, children, and adolescents—are at greatest risk of undernutrition, a condition likely to be exacerbated without urgent, coordinated interventions.

Climate change affects nutrition through complex and often indirect pathways. One key mechanism is the disruption of food availability and accessibility due to changes in temperature, rainfall patterns, and extreme weather events, which reduce agricultural productivity. This is particularly concerning for populations reliant on subsistence farming. A decline in crop yields and fish stocks, along with climate-induced livestock stress, is expected to elevate food prices, undermining food access for low-income households (FAO, 2022). Moreover, climate-induced

migration can further destabilize household food security, leading to increased rates of malnutrition.

Nutrition insecurity is a systemic and intergenerational issue, and addressing it requires action across multiple sectors. Global policy frameworks have increasingly recognized this urgency. The Sustainable Development Goals (SDGs) reflect a comprehensive approach to combating malnutrition, especially through Goal 2: Zero Hunger, which emphasizes ending hunger, achieving food security, improving nutrition, and promoting sustainable agriculture. Goals 3 (Good Health and Well-Being), 6 (Clean Water and Sanitation), and 13 (Climate Action) are also closely linked to nutritional outcomes, illustrating the interconnectedness of climate, health, and food systems (UN, 2015).

The Rome Declaration on Nutrition, adopted at the Second International Conference on Nutrition (ICN2) in 2014, and its accompanying Framework for Action laid the groundwork for coordinated responses to malnutrition. These were reinforced by the UN Decade of Action on Nutrition (2016–2025), which called on governments to take primary responsibility for addressing all forms of malnutrition and invited global stakeholders to support implementation (WHO & FAO, 2014).

KEY FINDINGS

The connection between climate hazards and Food and nutrition in Marsabit County

Climate change poses significant threats to all four dimensions of food security—availability, access, utilisation, and stability—particularly in vulnerable regions such as the Shur settlement. The project addresses these dimensions through targeted interventions aimed at building resilience and promoting sustainable food and nutrition security.

1. Food Availability: Climate variability and long-term shifts in temperature and precipitation patterns directly reduce the availability of food. Increased incidence of pests and diseases, exacerbated by warmer temperatures, affects crop yields, livestock health, and fish populations. Water scarcity, soil degradation, and erratic weather events contribute to declining agricultural productivity. Rising ambient temperatures also compromise food safety by accelerating microbial growth, leading to increased spoilage and the risk of food-borne illnesses.

2. Food Access: Climate-induced disruptions in global and local food production contribute to price volatility, which disproportionately affects subsistence farmers and market-dependent households. As food prices rise, a larger share of household income is allocated to food purchases, often at the expense of dietary diversity and

quality. In the long term, repeated shocks can destabilize local food systems, heightening the risk of acute malnutrition and food crises.

3. Food Utilisation: Changes in food availability influence consumption patterns and diet quality. As familiar food sources decline and new or less palatable varieties are introduced, dietary diversity may decrease. Poor water quality and increased exposure to pathogens heighten the risk of diarrheal diseases, reducing nutrient absorption. Soil and pasture degradation further diminish the nutritional value of crops and livestock, threatening micronutrient intake.

4. Stability of Food Systems: Extreme weather events such as droughts and floods disrupt food supply chains and market systems, undermining the stability of household food security. These shocks contribute to unpredictable food prices, reduce access to essential services, and impair the ability of poor households to maintain adequate diets. The cumulative effect of such instability can result in long-term nutritional deficits, particularly among vulnerable groups such as infants and young children.

Food, Nutrition Security, Biodiversity, and Climate Change: Biodiversity underpins food and nutrition security by ensuring access to a diverse range of foods and maintaining essential ecosystem services such as pollination and soil fertility. Climate change-induced biodiversity loss threatens agricultural productivity and food quality, thereby reducing nutritional outcomes. Protecting biodiversity is therefore critical to sustaining resilient food systems and ensuring long-term human health and wellbeing.

Table 1: Interaction of climate hazards with food security and nutrition

Climate Hazzard	**Effects**	**Impacts on food and nutrition security (direct quotes from community)**
Drought	Losses and destruction of habitats, Lack of pastures and browse for livestock and wildlife, wind erosion, overgrazing, fall back to charcoal burning as a livelihood, loss of biodiversity, escalation of resource conflicts and insecurity, general lack of food and malnutrition.	**Food access**: During drought, food prices go up, and unless we sell livestoc,k there will be no food. During drought, livestock prices go down, most people are selling and so you will not get a good price. This reduces our ability to purchase food; in such times, we depend on 1 meal per day. **Food availability:** During drought, men go grazing away, so the animals left behind lose body weight, they don't even provide milk, they cannot be sold or eaten, at that time, there is extreme hunger. At times, the men will go and come back after a whole month, in such a time

		communities just drink black tea (tea without milk). **Food utilisation**: During drought, we don't have milk, during that time, the elderly cannot eat hard foods, also lactating mothers will always lack milk and hence babies don't get enough or nutritious milk. Also, during drought, wild fruits disappear and it's a good source of some nutrients for us. Food stability: After we lost our livestock, we started purchasing especially cabbages from the market, we have to send for cabbages in Marsabit (which is 2 hrs drive), if we send in the morning the cabbages arrive in the evening, and at times it is always very late, the vehicle gets spoilt or does not come back if there is a security scare.
Floods	Floods result in displacement and loss of livestock, also lead to emerging diseases causing organisms in both human and livestock, also reason for massive soil erosion	**Taking away time for food preparation**: Although floods are not common, they happen and the water passes through this village, it can wash away your house, it's like this settlement is on a water way and so during floods the settlements are heavily affected, we have to come out and redirect the water when that happens. **Diseases affecting food utilisation:** when we have diseases like Malaria and respiratory diseases, even eating food by children and the elderly becomes hard.
Conflicts (land and boundary conflicts, human wildlife conflicts, resource conflicts	Disrupts travel, Leads loss of livestock, escalates and disrupts learning , disrupts water access.	**Food access and stability:** When conflicts happen Disrupts, we are limited from movement, this even makes it difficult to get food from Marsabit due to a rise in insecurity. During drought wild animals also migrate to water points around and at times we have to avoid moving in the evening and some of us cook from outside so it becomes so hard to have food.
Environmental degradation-overgrazing, deforestation, charcoal burning	Increased flooding, loss of pastures, wind erosion, reduced pasture and crop productivity, competition over dwindling resources by humans and wildlife, exposure of homes to wildlife,	**Food utilisation**: We depended on meat and milk for all our nutritional needs, our soils and pastures were rich, right now our rangelands are degraded, soils eroded, leading to a reduction in critical nutrients in the soil that are also critical to humans.
Human and Livestock diseases (Malaria,	Loss of both human and livestock.	**Food utilisation:** Due to climate change, there are so many diseases, we need to spray our

Diarrhoea, Kala Azar,) livestock (foot and Mouth, contagious bovine diseases (cows), contagious caprine pneumonia in goats, East coast fever due to ticks	Weaknesses in both humans and livestock are reducing productivity. Increasing incidences in livestock imply that we use medicines, and this is affecting people. The antibiotics could be the reason for the Cancers.	animals and give them antibiotics, which makes our food inorganic. The use of chemicals, food is not organic. Also, climate change through floods leads to hygiene-related diseases like diarrhoea, which really affects the health status of children.

Promoted Interventions at the intersection of climate change, food security and biodiversity

The Drought Emergency Program is a joint initiative by WWF Kenya, the Pastoralist Integrated Support Program (PISP), the Marsabit Wildlife Conservancy Organization (MAWICA), and Shurr Conservancy Management. WWF Kenya, a registered local CSO and affiliate of WWF International, works to halt environmental degradation and promote harmony between people and nature. MAWICA supports the development and strengthening of conservancy models in Marsabit, currently operating in over eight established conservancies and four emerging ones. PISP focuses on peacebuilding and reducing community vulnerabilities through development. Program implementation is led by PISP and MAWICA ensuring an integrated approach to development and conservation within local conservancies. As noted by PISP CEO Mwalimu Katelo, “This is a unique project that combines development and conservation and has been active for a year now.”

Implemented activities

Component 1: Climate-Smart Farming in Shurr Conservancy

In response to the growing impacts of climate change on livelihoods and food systems in Shurr Conservancy, the project established a 20-acre climate-smart farm, with WWF providing critical technical and financial support. A major milestone was the drilling of a solar-powered borehole, addressing acute water scarcity in the region. The borehole supplies a 50,000-litre storage tank that irrigates the farm and channels water to a wildlife dam located 500 metres away. This intervention has not only sustained crop production but also contributed significantly to wildlife conservation. The presence of lions, hyenas, and a wide range of bird species at the dam has increased noticeably since the water source was developed, affirming its ecological value. Site selection and crop planning were guided by comprehensive agronomic, market, and hydrological

assessments. To date, 9 of the 20 acres have been cultivated with climate-resilient crops such as onions, watermelons, and butternuts, alongside pasture and fodder crops for livestock. These crops were chosen for their market potential and adaptability to the local environment. In an effort to enhance ecosystem restoration, an indigenous tree nursery has been established on the farm. The primary species being propagated is *Acacia tortilis*, a drought-resistant tree valued for its multipurpose functions, including shade provision, livestock feed, firewood, and structural use in housing. The farm employs agroecological principles and strictly avoids chemical inputs, using only natural manure to protect the surrounding wildlife habitats. This approach promotes a holistic

balance between food production, ecological conservation, and community resilience.

Component 2: Women Empowerment Program

The women empowerment program targeted 60 women from 8 local groups within the conservancy, aiming to enhance their food security, economic agency, and leadership roles. This component included three sub-initiatives: kitchen gardening, poultry farming, and energy-efficient cooking technologies. Through the kitchen gardening initiative, the women constructed two net houses and began cultivating vegetables. This marked a major shift from traditional pastoralism to small-scale horticulture. The women reported significant dietary improvement and new income streams. As one participant, Godana Hako, explained,

> *“We previously just kept livestock. Now we can eat vegetables and even sell the remaining ones. Our main challenge is water, especially now that there's no sunshine and our water is solar pumped and we don’t have good storage systems, our vegetables are now suffering, but when the sunshine is there, we are able to produce well”*

The introduction of poultry farming represented both a nutritional and cultural breakthrough. Historically, eating poultry was considered taboo by elders, particularly among men. However, with increased exposure and dialogue, these perceptions began to shift.

> *"When we told our husbands we had eaten chicken at a meeting, the elders said they shouldn't drink cow milk, it would ruin the cows. But now, most of us have embraced it,"* one woman shared.
>
> Another one added, *"Chicken is the only asset owned by women. We never had anything we could call ours and decide how to use. Men have camels and goats, but poultry is ours, we can eat, sell, and feed our families without needing permission."*

The project also introduced energy-saving cook stoves to replace the traditional three-stone fire. These stoves have drastically reduced firewood consumption, from collecting firewood 3–4 times a week to just once a week. The health benefits are also clear, with less smoke in kitchens and reduced risk of respiratory issues. Alba Wario reflected on the impact:

> *"Our houses used to be black with smoke, and we worried about our health. Now, the stoves keep food warm and our kitchens clean. Even the old men are happy we're no longer cutting all the wood, and the environment is recovering.*

<u>Component 3: Knowledge Sharing and Capacity Building</u>

To expand local knowledge and inspire practical change, the project facilitated an exposure visit for 16 women to Yatta Farm in Kitui County, a nationally recognized model of dryland agriculture.

The visit introduced participants to proven techniques in water harvesting, soil and water conservation, vegetable and cereal production, as well as pasture management and preservation. This learning experience was transformative. Many participants came from strictly pastoralist backgrounds and had no prior exposure to crop production. The trip sparked a shift in mindset. Halkano Wario shared:

> *"We didn't know how to produce crops. We just kept buying food from the market. But with drought and fewer animals to sell, life became hard. At Yatta, we saw people in similar conditions growing food. That inspired us. In our first harvest, we had lots of spinach and sukuma wiki, everyone enjoyed having real, homegrown food."*

The visit demonstrated that climate-resilient food production is possible even in arid environments, planting the seeds of long-term change in the participants' home villages.

Component 4: Sustainability and Future Planning

To ensure long-term impact, the project team is collaborating closely with the Ward Climate Change Planning Committee to unlock additional resources through the FLOCCA (Financing Locally Led Climate Action) program. A proposal valued at KES 5 million, developed together with (PSIP), is currently under consideration for county government funding. This effort reflects a strategic approach to scale up climate adaptation efforts, enhance livelihoods, and institutionalize community-driven resilience planning.

How activities are transforming key pillars of food and nutrition security i.e food availability, access, stability and utilisation

The drought resilience program in Shurr represents an integrated, community-based approach to improving food and nutrition security through enhanced *food availability,* improved *food access*, greater *food stability*, and more effective *food utilization*. This model addresses the multidimensional nature of food and nutrition insecurity in arid regions by simultaneously advancing sustainable agriculture, livelihoods, and ecosystem health.

Food Availability: The farm increases the local supply of diverse and nutritious food by cultivating a combination of fruits, vegetables, and cereal crops. This integrated crop production ensures

that communities have year-round access to a wider range of food commodities, thereby reducing dependence on external food sources that have always been purchased from the market. Additionally, the production of pasture grasses supports livestock feeding, particularly during drought periods, ensuring the continued availability of animal-sourced foods such as milk and meat. This dual crop-livestock system enhances the overall food basket available to households.

Food Access: Access to food is improved through employment and income generation. The farm employs local casual laborers, prioritizing women, who then use their earnings to purchase additional food for their households. Moreover, women-led vegetable farms supported in parallel with the smart farm have enabled the cultivation and sale of surplus produce, such as spinach, onions, and kale. These initiatives empower women economically and enhance household purchasing power, directly contributing to food access.

Food Stability: The emphasis on local production reduces reliance on volatile markets and external supply chains, which are often disrupted by insecurity, climate shocks, or economic fluctuations. By strengthening food sovereignty, defined as the right of communities to control their own food system,s this model enhances food system stability. The farm also produces pasture for livestock during droughts, reducing the risk of food shortages caused by erratic weather and ensuring a consistent supply of animal protein.

Food Utilization: Diversification of the local diet has been one of the most visible impacts of this initiative. Previously, households relied primarily on cabbage as their main vegetable. Through the women's vegetable farms, the community now consumes a broader variety of nutrient-rich vegetables, leading to better dietary diversity and micronutrient intake. In addition, the poultry program ensures the availability of cheap women women-controlled protein, where eggs and chicken meat are easily consumed at home. Additionally, the introduction of energy-saving stoves has contributed to improved food utilization by reducing the time and labor burden on women. These stoves keep food warm throughout the day, allowing women to cook once and ensure that children and other household members have access to ready-to-eat, warm meals critical for nutritional outcomes, especially where labour constraints limit meal frequency.

Environmental Co-benefits and Biodiversity Protection: The model also contributes to long-term sustainability by reducing the pressure on natural resources. Energy-efficient stoves lower the demand for firewood, thereby curbing deforestation and preserving habitats for wild food species.

Furthermore, the smart farm includes a dam that provides water for both agricultural use and wildlife. By reducing competition over water resources during droughts, the dam helps prevent human-wildlife conflict and supports biodiversity conservation, an essential element for ecosystem services that underpin food systems.

Success story narration

For years, our community struggled with food insecurity. We never knew how to produce crops and relied solely on purchased food when we could afford it. Vegetables were a luxury, and during extreme climate events, hunger was often a part of life. That changed when the project came to our area. Through hands-on training and exposure visits, we learned practical farming skills how to prepare land, plant, irrigate, and manage crops. For the first time, we had hope that we could grow our own food. In the first season, we had adequate water, and with the skills we had gained, we planted and harvested vegetables several times. The results were beyond our expectations: we had a good harvest. We finally had food on our tables, fresh vegetables that we had grown ourselves. We didn't just eat better; we sold the surplus to our neighbours. Now, when we grow our own vegetables, we save the money we used to spend on food. With those savings, we can buy other essentials like rice and spaghetti. Our families eat better and have enough food during the growing seasons. This project didn't just teach us how to farm; it gave us dignity, self-reliance, and the ability to provide for our children. We believe that if we have enough water for production, we are no longer just going to be thinking about survival, but we will be thriving, like other

communities. These success stories have been shared during learning events with stakeholders and media to influence climate-resilient nutrition programming.

CONCLUSION AND RECOMMENDATIONS

The Shurr drought resilience program offers a replicable model that addresses the full spectrum of food security through availability, access, stability, and utilization while advancing women's economic empowerment and ecosystem resilience. It presents a compelling case for integrated rural development interventions that link climate adaptation, nutrition, and sustainable livelihoods. For policymakers and development partners, scaling such models could be pivotal in achieving food and nutrition security goals under national development plans and global frameworks such as the Sustainable Development Goals (SDGs).

Policy Recommendations for addressing the climate- food and nutrition nexus across programs in ASAL areas

1. Invest in Sustainable Water Management Systems

Water is the cornerstone of food production in arid and semi-arid lands. Policymakers must invest in systems that ensure adequate and equitable access to water for all essential uses. This includes developing infrastructure that clearly separates water sources for household use, livestock, wildlife, and irrigation. When water is scarce, households often prioritise livestock and cooking needs, leaving vegetable production vulnerable. Expanding access through rainwater harvesting, small-scale irrigation, and solar-powered boreholes will enable communities to maintain kitchen gardens and food production year-round.

2. Support Pastoral Livelihoods as a Foundation

Pastoralism remains central to the identity, economy, and nutrition of communities in regions like Marsabit. Policies should be built on this foundation rather than seeking to replace it. Livestock are not only a source of food and income but also serve as savings and social capital. Livestock helps access food directly and indirectly by supporting food buying and financing interventions that ensure increased access to food. Most importantly, animal-sourced foods such as milk and meat are vital for the nutritional well-being of pastoralist households. Policies must ensure that these sources remain available and accessible year-round. Therefore, interventions must prioritize livestock production by ensuring access to pasture and water for livestock, particularly during periods of drought. Support for complementary practices such as fodder farming, vegetable farming and poultry keeping can enhance resilience while maintaining links to traditional livelihoods.

3. Mainstream Gender-Sensitive Programming

Gender-responsive programming must be integrated into all interventions. Initiatives like poultry farming have shown significant success in empowering women, improving household nutrition, and enhancing women's decision-making power. Providing women with access to education, financial resources, and training opportunities strengthens entire communities and ensures that interventions reach the most vulnerable members of society.

4: **Food and nutrition programs must adopt a holistic approach that addresses the underlying drivers of vulnerability.**

In Marsabit, climate-related events significantly heighten community vulnerability in diverse ways. Therefore, food and nutrition security initiatives must go beyond immediate needs and tackle interconnected challenges, such as gender inequality, limited access to education and healthcare, environmental degradation, conflict, and low household incomes.

5. Promote Context-Specific and Community-Co-Designed Interventions

Successful interventions in pastoral areas must be tailored to local conditions and developed through meaningful community participation. Co-designing programs with local populations ensures that interventions are culturally relevant and address the real needs of the people. Food and nutrition interventions must integrate local knowledge, but also ensure an understanding of the challenges that such communities face, like food-related taboos.

6. Enhance Social Safety Nets and Diversified Livelihoods

While communities acknowledge the importance of government relief during extreme climate events, traditional informal safety nets such as social networks and livestock redistribution are weakening due to commercialisation and resource pressures. Policymakers must strengthen formal safety net programs while also promoting alternative livelihood opportunities that align with local ways of life. Supporting small businesses, value-added livestock products, and other

income-generating activities can provide economic resilience while ensuring communities meet their food and nutrition needs.

7. Preserve and Strengthen Strategic Mobility

Mobility is a key adaptation strategy for pastoralists, allowing them to access grazing areas across landscapes. Government and development programs must protect and support strategic mobility rather than attempt to sedentarise pastoralists. Herders who move with livestock (Fora) remain essential to herd management, while those left behind require sufficient resources to care for the animals and families that remain at home, so that they supply the required food and nutrition needs for the remaining household members.

8 .Strengthen long-term financing for local resilience

Short-term, one-off projects are insufficient. Counties and the national government must invest in stable, locally led financing mechanisms that support sustainable livelihoods and ongoing climate actions to ensure the resilience of pastoral communities.

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