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Food Market Systems Assessment (FMSA) for Samburu and Turkana Counties December 2021

FOOD MARKET SYSTEMS ASSESSMENT (FMSA) FOR TURKANA AND SAMBURU COUNTIES

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List of Acronyms

A2F	Access to Finance
APHRC	African Population and Health Research Center
ADF	French Development Agency
ACTED	Agency for Technical Cooperation and Development
ASALs	Arid and Semi-Arid Lands
BHA	Bureau for Humanitarian Affairs
BDS	Business Development Services
B2B	Business-to-Business
CEC	County Executive Committee
COD	Cost of Diet Assessment
COVID-19	Coronavirus Disease 2019
CIDP	County Integrated Development Plan
FHH	Female-Headed Household
FAO	United Nations Food and Agriculture Organization
FCS	Food Consumption Score
FGD	Focus Group Discussion
FMSA	Food Market Systems Assessment
GIZ	German Agency for International Cooperation
HEA	Household Economic Analysis
IFDC	International Fertilizer Development Center
ILRI	International Livestock Research Institute
IRC	International Rescue Committee
J2SR	Journey to Self-Reliance
KKCF	Kakuma Kolobeiye Challenge Fund
KBA	Kaputir Business Association
KIM	Kenya Investment Mechanism
KRCS	Kenyan Red Cross Society
KES	Kenyan Shillings
KII	Key Informant Interview
KAP	Kerio Riverine Agro-Pastoral Livelihoods Zone
LTF	Lake Turkana Fisheries Livelihood Zone
LUZ	Lodwar Urban Livelihood Zone
MUZ	Maralal Urban Livelihood Zone
MBP	Market-Based Programming
MSD	Market Systems Development
MSA	Market Systems Analysis/Approach
MSMEs	Micro, Small and Medium Enterprises
NARIGP	National Agricultural and Rural Inclusive Project
NDMA	National Drought Management Authority

NIB	National Irrigation Board
NGO	Non-Governmental Organization
NAWIRI	Nutrition in ASALs within Integrated Resilient Institutions
ODK	Open Data Kit
OFSP	Orange-Fleshed Sweet Potato
PREG	Partnership for Resilience and Economic Growth
REAP	Rural Entrepreneur Access Project
RA	Research Assistant
RTI	Research Triangle Institute
RFSA	Resilience Food Security Activity
SAP	Samburu Agro-Pastoral Livelihood Zone
SEP	Samburu Eastern Pastoral Livelihood Zone
SNP	Samburu Northern Pastoral Livelihood Zone
SNV	SNV Netherlands Development Organisation
SACCO	Savings and Credit Cooperative
SAM	Severe Acute Malnutrition
TOR	Terms of Reference
TOC	Theory of Change
TOT	Training of Trainers
2SCALE	Toward Sustainable Clusters in Agribusiness through Learning in Entrepreneurship
TBP	Turkana Border Pastoral Livelihoods Zone
TCP	Turkana Central Pastoral Livelihoods Zone
TAP	Turkwel Riverine Agro-Pastoral Livelihoods Zone
UN	United Nations
UNICEF	United Nations International Children's Education Fund
USAID	United States Agency for International Development
VAT	Value-Added Tax
WFP	World Food Program

Executive summary

The USAID Bureau for Humanitarian Affairs (BHA) is supporting the USAID Nawiri Consortium under a five-year resilience food security activity (RFSA) in the counties of Samburu and Turkana to build "resilience in the region, including through development of local food systems".[1] USAID Nawiri ultimately seeks to strengthen food security and resilience by addressing systemic constraints and opportunities that can improve resilient nutritional outcomes for vulnerable, food insecure communities and households.

The USAID Nawiri Consortium is led by Mercy Corps in collaboration with implementing partners including Save the Children, Research Triangle Institute (RTI), Boma Project, African Population and Health Research Center (APHRC), and Caritas Lodwar. USAID Nawiri aims to sustainably reduce persistent acute malnutrition.

Under the project's theory of change, USAID Nawiri seeks to identify the underlying drivers of malnutrition and food insecurity. Sustainable programmatic outcomes then transform local food systems to reduce persistent acute malnutrition. This work happens with institutions, local governments, communities, households, and individuals. The goal is to absorb, anticipate, and support the adaptation to risk in ways that influence nutrition outcomes at scale. This integrated approach reinforces Kenya's Journey to Self-Reliance (J2SR) and demands close collaboration with Partnership for Resilience and Economic Growth (PREG) participants, working through government-led coordination and leadership mechanisms.

USAID Nawiri commissioned this Food Market Systems Assessment (FMSA) as a part of the Phase 1 design to investigate supply and demand for nutritious foods, as well as the influence of local production and trade within the counties' different livelihood zones. The systems approach to food value chains and food availability will hinge on engagements with local actors and household members to identify 1) demand trends around nutritious foods, and 2) potential market opportunities to increase the availability and accessibility of nutritious foods year-round.

Summary of key findings and recommendations

Findings from FMSA qualitative interviews and quantitative surveys revealed important features about food systems, household demand, and the food trade. Below are the most relevant and prominent features.

- Households in more rural and remote areas outside of major towns find that their purchasing power for more nutritious and diverse foods is inextricably linked to their income from livestock sales. People know about diverse and nutritious foods, but they

[1] Global Alliance for Improved Nutrition (GAIN), GAIN partners in a new multi-sectoral approach to nourish communities in Northern Kenya, Kenya, 26 March 2020.

don't earn enough from livestock production to buy them. And they don't see any alternatives to earn money.

- Demand for fresh produce is small but growing outside of primary and secondary markets, which already have high demand. In **more rural and harder to reach areas, most households already eat fresh produce** and understand good nutrition.
- **Limited access to capital, credit, and finance** for any size of business has a far-reaching effect on the food trade, including vendors, shopkeepers, wholesalers, transporters, and consumers.
- Larger food businesses in central/primary markets, as well as local MSME traders are **constrained by market inefficiencies around food supply and transport**. Few can purchase food in bulk, which could lower transport costs, as well as improve price efficiency and competition.
- These market inefficiencies result in higher food prices that are driven by a confluence of factors among businesses and market actors in food systems. Rising fuel prices lead to **high transport costs**. Without efficient wholesale markets for fresh produce and other foods, **aggregation, ordering, shipment, and storage** pose challenges. **Demand is inconsistent** outside of Lodwar and Maralal because **livestock sales are seasonal,** meaning purchasing power varies. Local businesses need **access to working capital and finance throughout supply chains.** This would spur investment and help them negotiate cheaper bulk prices, lower transport costs, and smooth supply chains.
- Improved roads and highways transform eating habits, as food trade increases. Continued roadworks will improve regional and local trade. County development is moving in that direction, albeit slowly.
- **When income is *more* abundant in Samburu during rainy seasons, households tend to purchase less fresh produce** and rely more heavily on staples like meat, milk, maize, vegetable shortening, and beans, even though vegetables and fruits are more available in the rainy seasons.
- **Households in Samburu purchase and eat more fresh produce in the dry seasons when their incomes drop** with declines in livestock sales. Fresh produce is seen as a substitute for staples. Vendors sell more produce in the dry seasons, even though customer rack up debts to buy them.
- Turkana households buy more food with cashflow from livestock sales and eat more diverse foods in the rainy seasons. Turkana does not mimic the substitution patterns observed in Samburu, or at least not to the same extent.
- **Households still can't buy enough fresh produce during the lean seasons**, when hunger and food insecurity persistently grow. Many households can only afford vegetables during part of dry seasons. They often eat only maize flour mixed with water and vegetable shortening if they can't buy anything else, and will potentially access or purchase food on store credit from shops and vendors.

- **Women often have a say in what to cook but not in what to buy**. It is more likely that men participate in traveling markets where food, fresh produce and livestock are sold, which limits women's ability to influence diets through the purchase of specific foods.
- Feedback on eating habits suggested that men are seen as requiring 'more energy' for work, which may give **some indication of household inequity in food distribution and food choice.**
- **Low-grade maize flour is the most eaten food** throughout the year. It's cheap, purchased in bulk, and has a longer shelf life than fresh foods. It also can be eaten simply, mixed with water or milk, and often vegetable shortening.
- **Growing their own food transforms communities' diets** and improves trade. Growing food, at any scale, reduces households' dependence on livestock. Expanding crops is constrained by access to water, balancing time resources with other income streams, and governance capacities of groups.
- However, the needed **maintenance of irrigated farm sites** leaves most of them under-productive or non-functional entirely. They're **held back by droughts and deteriorating infrastructure**. Better equipment could make water more available year-round, but group dynamics, limited participation and poor governance complicate maintenance and planning around irrigation. Furthermore, farmers either can't find or can't afford seeds, fertilizers, pest control, or basic farming equipment. They also need proper agronomic support and training on farm management and irrigated farming techniques.

While not exhaustive, these findings summarize the primary constraints and opportunities for improving food systems in Samburu and Turkana Counties. A review of the FMSA findings was made during two separate stakeholder validation workshops held in the counties that included participants from county government, the private sector and civil society (December 6 and 7, 2021 in Lokichar for Turkana; and December 8 and 9, 2021 in Rumuruti for Samburu).

Participants in the validation workshops confirmed much of what is contained in this report. In addition to validating key aspects of food systems and market systems as well as the major constraints, barriers and opportunities for actors involved in the supply or production of food, the validation workshops provided critical insight into county-specific priorities and nuances relevant to future USAID Nawiri programming.

Specifically, it would be important for interventions developed by USAID Nawiri to address household level agricultural production for subsistence farming and engagement in markets, as relate to commercial farming. Participant observations also reflected the importance of market growth and development of food systems and supply, emphasizing the need for improved road and market infrastructure as the foundation for improved supply networks and trade both within and beyond the two counties.

Recommendations are discussed in greater detail in *Sections 5 and 6*. The facilitative, market-driven approaches below can make nutritious foods more available and accessible.

→ **Strengthen food supply chains and markets** through support for aggregation/distribution, transport, vendor, and supply networks by focusing investment and access to finance for transport and wholesalers.

→ **Facilitate capital investment in appropriate storage facilities** for primary markets and wholesalers, while looking for right-sized storage equipment for MSME food traders and vendors to smooth supply constraints through more regular bulk purchasing and transport.

→ **Leverage BOMA Rural Entrepreneur Access Project (REAP) model:** Improve market coordination in food systems by improving capacities for established MSME businesses to organize associations through business development support, increased investment, and access to finance; and by leveraging the leadership capacities of businesses supported under the BOMA Project REAP grant facility to organize with REAP and non-REAP businesses through association to play a role in demand aggregation for last mile services.

→ **Improve dryland irrigated agricultural production and local market supply:** Link producer/farmer groups and agro-pastoral communities with improved (private and public) agronomic extension, marketing support, and access to finance by ensuring that extension services are modeled as a cost of doing business, or through tripartite agreements with agribusiness/input service providers, credit/finance services and farmer groups.

→ **Invest in irrigation sites** to rehabilitate and upgrade infrastructure and equipment, while facilitating the development and expansion of local public extension and private agribusiness services to increase local food production by demonstrating the viability of commercial "farming as a business" through irrigated agriculture plots as model hubs for commercial and homestead agriculture in tandem with commercially driven agronomic services.

→ **Develop Access to Finance (A2F) partnerships through USAID Nawiri resource positioning:** Work with finance sector partners to build a management structure, due diligence, and governance systems under a USAID Nawiri Access to Finance (A2F) Facility that can facilitate the creation of new products and services in the finance sector for Samburu and Turkana MSMEs, businesses, groups/associations and producers.

→ **Build synergies around market demand creation and promotion of nutritious foods:** Design USAID Nawiri nutritional education programming for targeted community demand creation by developing a 'smart voucher' system to stimulate year-round purchasing of both fresh produce and other essential dietary foods for nutritional diversity from food vendors and traders.

1. Introduction

Persistent acute malnutrition in Samburu and Turkana has complex, interlinked causes. Shocks and stresses are compounded by systemic problems. Effective market-based programming and market systems development approaches can assist vulnerable communities. With the right incentives to change, communities can improve the way markets work.

By fostering connections and partnerships, USAID Nawiri programming could help markets work better – and make nutritious foods more accessible and affordable for households that remain vulnerable to seasonal shocks, limited access to employment and inconsistent access to financial security. At a minimum, future interventions must emphasize improved production of diverse and nutritious foods to improve the quality and quantity of diets in order to improve health and well-being outcomes.

Relevance: Food Market Systems, USAID Nawiri project framework and Theory of Change

Mercy Corps commissioned this Food Market Systems Assessment (FMSA) to investigate how supply and demand for nutritious foods influences local production and trade across Samburu and Turkana's livelihood zones. The systems approach was grounded in engagements with key public and private stakeholders, local market actors, and household members to:

1) Identify local demand trends around nutritious and diverse foods; and
2) Identify potential market opportunities for strengthening value chains to increase the availability and accessibility of nutritious foods year-round.

USAID Nawiri wants to understand which systemic drivers can be harnessed to reduce persistent acute malnutrition by transforming local systems. This means helping individuals, households, communities, and local institutions to absorb, anticipate, and support the mitigation of risk from cyclical shocks and stresses in ways that also promotes or influences nutrition outcomes at scale. An underlying assumption of the USAID Nawiri project framework is that work at the individual and household levels will not yield desired results without also strengthening local systems and institutions.

The USAID Nawiri Theory of Change is based on UNICEF's Nutrition Conceptual Framework and SPRING's "Systems Thinking and Action for Nutrition." Together, these frameworks guided the consortium's review of empirical evidence and informed stakeholder consultations that shaped the foundation of their approach. Working at multiple levels reinforces Kenya's Journey to Self-Reliance (J2SR) and demands close collaboration with the Partnership for Resilience and Economic Growth (PREG), working through government-led coordination and leadership mechanisms.

Nutrition & foods systems context

In Samburu's pastoral and agro-pastoral zones across, the outcomes of work – for example, herd sizes – function both as relative wealth and income. Also important are proximity to and engagement within local markets, primarily for livestock sales. The timing of rainfall determines the seasonality of livestock production and livestock movements. When local pastures are exhausted, the bulk of animals are moved … into dry season grazing areas. Households with smaller herds rely much more on non-pastoral activities for income.[2] Livestock are sold at weekly markets, and most are then transported outside of the counties to Nairobi, Meru, Isiolo and Nanyuki. Road infrastructure is a major challenge, as are the distances between markets and urban centers. During rains, travel on graded dirt trunk and feeder roads is difficult, and often impassable.

Turkana in Kenya's poorest county, with 79.4% of the population living below the poverty line.[3] In Samburu, poor and very poor households spend up to 90% of their income on food. These households have small herds, and can rarely depend on livestock sales. The two counties experience very similar socio-economic and livelihood conditions.

More than 75% of Samburu's land is classified as "low-potential" for agriculture. Only around 140,000 hectares (7%) of the total land-area is suitable for agriculture. Small-scale agro-pastoralists tend to grow on an average of 0.4 hectares, while wealthier households average around 20 hectares, mainly for livestock, but for crops and fodder as well.[4] Turkana only cultivates 7,200 hectares annually. Each household farms an average of 0.2 hectares.[5]

Samburu and Turkana have invested in irrigation, with a view to irrigate up to 3,000 hectares and 10,000 hectares respectively.[6] Interventions piloted by USAID Nawiri in its second phase could leverage current and future irrigation systems.

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[2] Save the Children, Livelihood Profiles Three Livelihood Zones in Samburu County, Kenya Assessed Using Household Economy Analysis (HEA), Food Economy Group, April 2021.

[3] Turkana County Government, County Integrated Development Plan (CIDP-II) 2018-2022, 2018. Cited from: KDHS, 2018 & SID, 2013.

[4] Samburu County Government, Second County Integrated Development Plan (CIDP) 2018-2022, February 2018.

[5] ibid, Turkana CIDP.

[6] ibid.

2. Food Market Systems Assessment (FMSA) approach & methodology

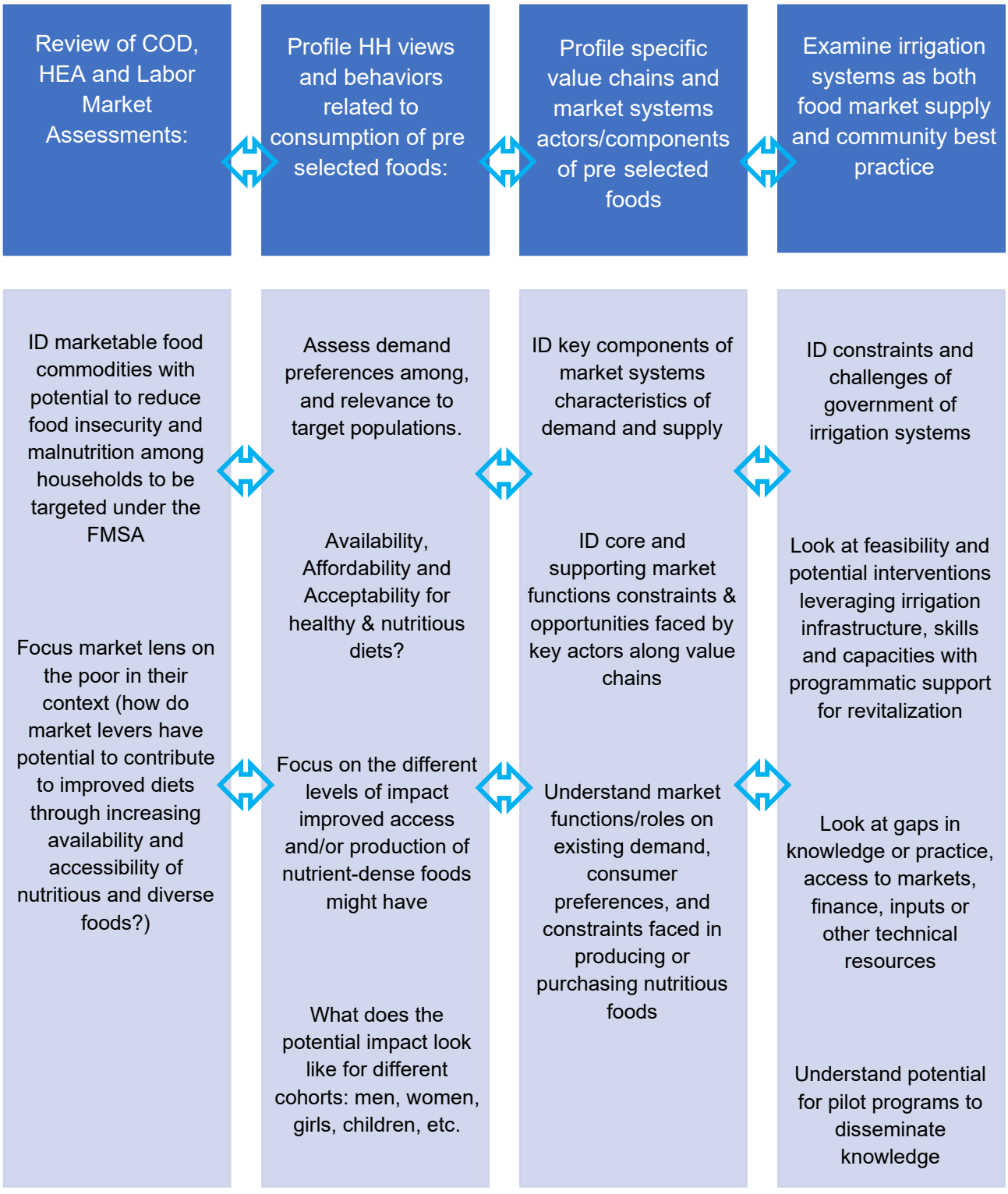
This FMSA examined household preferences and behaviors related to food consumption. It also considered how entities decide where to engage with the project's market-based interventions. This meant looking at the interests and motivations and risks and opportunities defined by collective and community-based organizations; formal and informal micro, small, and medium enterprises (MSMEs); large-scale businesses; market-based support services public and financial institutions, and others.

Research objectives

The FMSA's primary objective was to identify entry points for market-based programming by identifying key constraints, challenges, and opportunities facing MSMEs. It also looked at how to leverage investment and improve private engagement in support of food systems during the consortium's implementation phase (2021-2024). The FMSA sought to:

1. Identify critical bottlenecks and systemic market constraints impeding the availability of affordable nutritious foods in Samburu and Turkana.
2. Understand the structure of nutrient-dense food value chains: key value chain actors/stakeholders, market functions and incentives, opportunities and constraints to competitiveness and efficiency, or market demand response in improving year-round availability of acceptable and affordable nutritious foods.
3. Identify local household or community purchasing power, tastes, and preferences for specific food commodities in different livelihood zones, disaggregated by gender.
4. Identify key constraints women face either as market participants or in influencing market demand through household decision-making in buying nutritious foods.
5. Understand the potential production capacity and key factors affecting the production and marketing of nutritious foods, as well as participation of women in irrigation and rain-fed food production systems.

The market assessments and value chain/market system analyses will work to find synergies through:


Review of COD, HEA and Labor Market Assessments:
Profile HH views and behaviors related to consumption of pre selected foods:
Profile specific value chains and market systems actors/components of pre selected foods
Examine irrigation systems as both food market supply and community best practice
ID marketable food commodities with potential to reduce food insecurity and malnutrition among households to be targeted under the FMSA
Focus market lens on the poor in their context (how do market levers have potential to contribute to improved diets through increasing availability and accessibility of nutritious and diverse foods?)
Assess demand preferences among, and relevance to target populations.
Availability, Affordability and Acceptability for healthy & nutritious diets?
Focus on the different levels of impact improved access and/or production of nutrient-dense foods might have
What does the potential impact look like for different cohorts: men, women, girls, children, etc.
ID key components of market systems characteristics of demand and supply
ID core and supporting market functions constraints & opportunities faced by key actors along value chains
Understand market functions/roles on existing demand, consumer preferences, and constraints faced in producing or purchasing nutritious foods
ID constraints and challenges of government of irrigation systems
Look at feasibility and potential interventions leveraging irrigation infrastructure, skills and capacities with programmatic support for revitalization
Look at gaps in knowledge or practice, access to markets, finance, inputs or other technical resources
Understand potential for pilot programs to disseminate knowledge

The FMSA identified investment opportunities to strengthen markets, market actors, improve market linkages, and business support functions. This included identifying public and private partners who can engage with USAID Nawiri programming to encourage better business, marketing, and production practices, with a view to improving food supplies and making nutritious foods more available and affordable.

USAID Nawiri works with PREG, other USAID partners, and key local public and private organizations to strengthen market systems to expand access to nutrition-related goods and services. The FMSA also looked at how to increase access to financial services, including a possible small grants fund to leverage investment in value chains.

Research questions

The study gathered opinions on nutritious foods currently in markets, and why people did or did not like them. The study also asked about nutritious foods that people like, which aren't available in local markets.

The household and market survey was designed to enable disaggregated data by gender on a subset of nutritious foods, prioritized in collaboration with local government. The household and market actor survey provided a basis for identifying trends, and was structured as below:

- → What are the preferred and less preferred affordable nutritious diets within target populations in the different target zones/sub-zones disaggregated based on the preferences of women versus those of men?
- → Is there a viable business case to strengthen supply chains for preferred and less preferred nutritious foods?
- → What are the nutrient-dense food value chains, the structure, key actors, coordination challenges, opportunities, and constraints to the competitiveness of the value chains in improving year-round availability of affordable and nutritious foods?
- → What is driving the high prices of staple food? What is the impact of high prices on women's and men's purchasing power?
- → What tools, technologies, or practices most effectively reduce consumer purchasing price and elasticity of demand?
- → What are the key systemic market constraints that inhibit nutrition within each specific geography and how do the systemic constraints affect women and men in different age and life stages?
- → What are the current social/cultural norms and institutional structures of markets and nutrition-dense value chains that contribute to disparities between women and men in access to nutritious foods?
- → What, if any role, does the Boma Project's Rural Entrepreneur Access Project (REAP) model currently play in last mile supply of affordable nutritious foods? REAP is an adaptation of poverty graduation model that has been tailored specifically to the unique

needs of the ultra-poor in the drylands of Kenya. How might this be improved or complemented by other activities?

→ Is there a viable business case, including social enterprise, for use of previous dryland irrigation efforts for local market supply? Why have attempts to expand irrigated micro-, small- and medium-scale production, such as Turkana's and Samburu irrigated gardens, not achieved the desired acreage and food production potential? Is the business case viable for women and youth when considered against their specific constraints?

Key informant interviews, focus group discussions, and in-depth consultations were also conducted with household members and local food market actors. Local, county, and regional consultations included county departments, business owners, MSMEs, aggregators/transporters, food processors and traders in Samburu and Turkana. Consultations included representatives from value-added food services in Nyahururu, Isiolo and Nairobi as a part of the market systems analysis. The consultative interviews have:

→ Identified market opportunities, specific commodities, nutritious and nutrient-dense foods, value chain prioritization and lead-in to subsequent analysis.
→ Identified the structure of markets for nutritious and nutrient-dense foods: productive capacities, carrying capacity, demand and supply characteristics, key constraints, technical capacities, and opportunities for leveraging investment.
→ Identified value chain and market systems components, key actors, services/supply, support, information & access linkages.
→ Analyzed constraints and risks within market systems, skills and technical capacities, and existing practices; capital and access to finance requirements; seasonality in demand/supply; post-harvest and supply inefficiencies.

To start, the FMSA identified a group of widely available nutritious and nutrient-dense foods to include in the surveys. This food list also helped identify our key informants for consultative interviews. The survey used the food list to assess local demand, critical production issues, aggregation, distribution, and supply. The food list was culled from the Cost of Diet (COD) study carried out by Save the Children. The list was selected in collaboration between county-based Mercy Corps and Save the Children staff with county livestock, agriculture, and nutrition officials.

Foods were selected based on their potential to improve household nutrition and incomes, as well as their potential to be scaled up through market-based interventions. Food items were prioritized by 12 criteria:

1. Potential to increase household Income
2. Potential to increase household consumption of Nutritious foods
8. Positive influence on women's, girls', and child nutrition
9. Existing practice to scale up

3. Potential to reduce household food basket cost
4. Potential to increase supply and trade
5. Linkage to county health/nutrition/ agriculture policy priorities
6. Potential to leverage private investment
7. Potential to tie into women's economic empowerment and decision-making
10. High level of existing demand and/or availability in local markets
11. High potential for influencing around household consumption
12. High potential to reduce prices through increased, regular supply

Commodities were scored by each criteria on a scale from 0 – 10. The average of the unweighted raw scores yielded a total score for each food. Foods with higher scores were considered for further investigation. The top-ranking foods that were included in the FMSA are as follows:

Animal-Source Foods	Plant-Based Protein	Grains	Fruits & Vegetables	
-Dairy/Milk (Goat, Camel, Cow) -Poultry Meat & Eggs -Goat Meat	-Legumes (Groundnut, Turkana Only)	-Maize & Sorghum (Whole Grain, Milled Flour, Animal Feed)	-Kienyeji Traditional Vegetables (Amaranth, Skuma, Dodo, Sujaa, Managu) -Non-Traditional Vegetables (Kale and Spinach/Chard)	-Tomato -Cabbage -Tree Tomato

The full list of commodities (see Annexes 2 and 3) has been used on two fronts:

1) A long list of food items from each of the county internal meetings was used within the quantitative/digital survey tools to capture data on household preferences, market demand and availability. Respondents were asked about their preferences for each of the commodities)

2) The top 8-10 commodities (all ranking above 6.5, summarized in the table above) for each county was the focus of the detailed market systems and value chain analysis.

The focused commodities list formed a basis for in-depth analysis of value chain components during consultations with local public and private sector stakeholders (see Annex 1).

Consultations supplemented the survey data to understand the markets within the two counties and how constraints and challenges affect food availability, access, and affordability. Consultations also informed the FMSA analysis on where programming, interventions, and collaboration could support investment and capacity development in value chains.

Methodology and data collection

The key informant interviews and focus groups under the market systems/value chain analysis employed a purposive, snowball sampling method. They did not rely on a statistically representative population sampling frame due to the survey's time limitations and the varied set of actors to be interviewed. Participants were drawn from value chains for the prioritized food list. They were people involved in food production, irrigation, aggregation, distribution, marketing, or manufacturing and processing.

The mixed methods approach had four pillars: a household demand/preferences survey; a market actors survey; a survey administered to community members participating in government-supported irrigation systems; and qualitative market systems investigation and analysis.

1) *Household-level demand preferences survey* used a quantitative digital questionnaire on ODK Collect. It assessed household food security relative to nutritious food preferences. This was a proxy for demand relative to seasonal availability. It also captured household demographics, such as head-of-household, gender, geographical location and livelihoods zone. A limited number of *household focus groups* were conducted during the survey rollout.
2) *Market actor survey* was conducted using a quantitative digital questionnaire on ODK Collect. It assessed constraints and demand trends for traders and local market food vendors, across sub-counties and livelihoods zones. It specifically included BOMA-REAP grant recipients engaged in food trades or commodities supply. The market actors survey also assessed seasonality in sales, as a proxy for demand. And it assessed reasons for food price changes and constraints to availability. This included a limited number of *market actor key informant interviews* during the survey rollout.
3) *Irrigation systems community focus groups* gathered qualitative information on production potential and the scale of government-supported irrigation. This looked at

production quantities, land utilization and cropping patterns. It also looked at which foods were sold into local markets, against those eaten or sold within the community managing the irrigation.

4) *Market systems investigation and analysis* conducted key informant interviews with value chain and market systems actors. These included: producers, traders, transport operators and aggregators, business support services, input suppliers, public and private extension service providers, wholesalers and retailers, local government, business associations, private industry, producer associations, and cooperatives.

Training and deployment of research assistants

Teams of research assistants conducted the primary data collection through digital surveys, focus groups and key informant interviews. They were trained to use both quantitative and qualitative techniques. Each county-based team completed three days of training that included an overview of the FMSA approach, a detailed overview of the data collection tools, and a half-day field test of the OKD Collect quantitative tools.

Participants in the assessment

Survey and interview participants were purposively selected based on age (minimum of 18 years) and gender (at least half were women). Initially the survey intended for 20% of participants to be REAP grant recipients. The final proportion was slightly above 10%.

The surveys used a non-probability quota sampling to select respondents. Quotas were based on the county populations and further defined by livelihood zones, sub-counties, wards and villages, communities, and local markets. In total, 232 market actor surveys (104 for Samburu and 128 for Turkana), and 367 household surveys (188 for Samburu and 179 for Turkana) were collected through digital survey tools.

Qualitative interviews in Samburu included eight household focus groups, 13 market actor interviews, and six irrigation system focus groups conducted at *four* irrigation sites. In Turkana, 17 household focus groups, 16 market actor interviews, and 11 irrigation system focus groups were conducted at *six* irrigation sites. Some of the household and irrigation focus groups were separated by gender in the same location. A total of 47 individual consultative interviews were conducted between both counties with public, private, and NGO representatives.

Data analysis

Data analysis for the Food Market Assessment Household Survey was done in Excel. The structure of the quantitative analysis corresponds with the structure of the survey outlines. All non-demographic variables – for example, income sources, assets, food consumption score, available food items – were compared between the livelihood zones, across each county and between male and female-headed households. Frequency tables and descriptive statistics were

generated for each variable. Additionally, cross-tabulation and any other analysis for selected variables were generated as appropriate, to better understand dynamics and interactions.

Study limitations

The TOR's initiatives were complex. Field teams used multiple data-gathering templates for a wide range of different constituencies. With limited time in the field, teams were stretched by covering remote locations with all the tools designed to record feedback for a multitude of different people.

Three full days of training was likely not enough to train teams on all the data capture templates, and on how to conduct qualitative interviews effectively. Tools needed to be translated from contextual English into local languages, while interview notes needed to be transliterated and translated into the templates. The training time was not long enough for teams to grasp concepts and language used in the templates. As a result, delivery of the tools was inconsistent, lost in translation, or incomplete in the recorded feedback. This was true for both the qualitative as well as the quantitative data.

Another limitation was the visible and vocal frustration of respondents at participating in another USAID Nawiri study. Teams tried to mitigate this by clarifying that USAID Nawiri had been in a research and design phase for two years, and that the community feedback was needed to design interventions and programming. Still, respondents felt that USAID Nawiri, and by extension Mercy Corps, was not doing enough to tangibly help the communities.

3. Samburu analysis and findings

Household demographics

Most respondents interviewed (89%) were female, with female heads-of-household making up about 39% of the total. More than three out of every four heads-of-household surveyed (79%) had no formal education, and this figure increased to 88% for female-headed households. On average, households had six members — with 70% of households having five to 10 members, and 11% of households even larger, with up to 15 members. That was the largest household.

Table 1: Household Food Consumption Scores												
FCS Category	FHH	%FHH	MUZ	%MUZ	SAP	%SAP	SEP	%SEP	SNP	%SNP	Total Count	Total %
Poor	18	24%	8	18%	6	20%	24	33%	2	5%	40	21%
Borderline	31	42%	10	23%	11	37%	36	49%	14	34%	71	38%
Acceptable	25	34%	26	59%	13	43%	13	18%	25	61%	77	41%
Total	74	100 %	44	100 %	30	100 %	73	100 %	41	100 %	188	100 %

Nearly 60% of households had “poor” or “borderline poor” Food Consumption Scores (FCS), indicating strained or unacceptable dietary habits and coping strategies, low dietary diversity, and a lack of food to eat during the week before the interview. This figure jumps to 66% for female-headed households. In Samburu East’s pastoral zone (SEP), the figure was 82%.

As expected, incomes centered on livestock production: 65% of households sold livestock or animal products. In Samburu East and North’s pastoral zones (SNP and SEP) the figure increased to 76% and 90%. SEP respondents both depend more on livestock, and have much higher rates of food insecurity. Female-headed households relied on livestock at rates (65%) that met the average for all households. The Maralal Urban Livelihood Zone (MUZ), had by far the lowest reliance livestock (14%), as households generally had other ways of earning money (excepting milk sales) across the board.

Among non-livestock incomes, the most common were self-employed and small businesses (17%), charcoal sales (15%), petty trade (10%), firewood (10%), and milk sales (10%).

Table 2: Income Source (option of multiple selection)												
Source	FHH	%FHH	MUZ	%MUZ	SAP	%SAP	SEP	%SEP	SNP	%SNP	Total	Total %

											Co unt	
Sale of Livestock Animals or Animal Products	48	65 %	6	14 %	19	63 %	66	90 %	31	76 %	122	65%
Self-Employed/Small Business (Services)	12	16 %	10	23 %	2	7%	8	11 %	12	29 %	32	17%
Charcoal Sales	13	18 %	14	32 %	2	7%	8	11 %	4	10 %	28	15%
Petty Trade	11	15 %	7	16 %	4	13 %	3	4%	5	12 %	19	10%
Sale of Milk from Livestock	6	8%	6	14 %	8	27 %	2	3%	2	5%	18	10%
Firewood Sales	9	12 %	6	14 %	6	20 %	0	0%	6	15 %	18	10%
Employment NON-Farm Labor	3	4%	2	5%	1	3%	3	4%	8	20 %	14	7%
Sale of Crops from Agriculture	1	1%	1	2%	7	23 %	0	0%	4	10 %	12	6%
Petty Trade: Handicrafts/Cultural Products	6	8%	4	9%	1	3%	5	7%	1	2%	11	6%
Brewing	4	5%	1	2%	1	3%	1	1%	4	10 %	7	4%
Other (Casual labor)	3	4%	1	2%	0	0%	1	1%	2	5%	4	2%
Loans/Borrowing	2	3%	0	0%	0	0%	3	4%	1	2%	4	2%
Remittances	2	3%	1	2%	1	3%	0	0%	1	2%	3	2%
NGO Relief/Assistance/Cash	1	1%	0	0%	0	0%	2	3%	0	0%	2	1%
Employment Agriculture/Farm Labor	0	0%	0	0%	0	0%	0	0%	2	5%	2	1%
Gifts	1	1%	1	2%	0	0%	0	0%	0	0%	1	1%

Government Relief/Assistance Programs	0	0%	0	0%	0	0%	0	0%	1	2%	1	1%

In Samburu East's pastoral zone (SEP), self-employment was much lower than in other livelihood zones and female-headed households. In the agro-pastoral zone, lower self-employment numbers are explained by the higher incidence of crop sales (23%) and firewood sales (20%).

Household assets (*Table 3* below) also depend on livestock across livelihoods zones, with 75% of respondents owning goats; 74% owning sheep; and 68% owning cattle. Ownership of livestock in female-headed households followed similar patterns, showing a dependence on livestock as well.

The data shows strong adaptation to goat-rearing among pastoralists in Samburu East and North (SEP and SNP), where 95% and 88% of households report owning goats, with herds averaging 26 and 13 heads, respectively. The demand section below shows that goats have become an important source of food and income.

Cattle herds were largest in the SEP at an average of eight per household. Elsewhere in the county the average was 3-4 heads.

Table 3: Reported Household Assets (option of multiple selection)

LZ	FHH			MUZ			SAP			SEP			SNP			TOTAL		
Asset	# Who Own	% Who Own	Avg. Assets Owned	# Who Own	% Who Own	Avg. Assets Owned	# Who Own	% Who Own	Avg. Assets Owned	# Who Own	% Who Own	Avg. Assets Owned	# Who Own	% Who Own	Avg. Assets Owned	# Who Own	% Who Own	Avg. Assets Owned
Goats	57	77 %	13.9	17	39 %	5.5	19	63 %	10.1	69	95 %	25.6	36	88 %	12.6	141	75 %	17.8
Sheep	53	72 %	10.0	18	41 %	5.2	27	90 %	12.2	65	35 %	19.3	30	73 %	11.3	140	74 %	14.4
Cattle	51	69 %	4.1	22	50 %	4.4	17	57 %	3.2	60	32 %	8.1	28	68 %	4.1	127	68 %	5.9
Poultry	21	28 %	5.8	3	7%	3.7	16	53 %	5.2	16	9%	6.5	17	41 %	6.7	52	28 %	6.0

Land	9	12 %	1.0	18	41 %	1.1	10	33 %	8.6	1	1%	1.0	3	7%	0.8	32	17 %	3.4
Donkeys	11	15 %	2.5	0	0%	0.0	0	0%	0.0	20	11 %	4.0	8	20 %	2.3	28	15 %	3.5
Camels	10	14 %	5.3	0	0%	0.0	0	0%	0.0	16	9%	4.4	8	20 %	4.9	24	13 %	4.5
Mobile Phones	27	36 %	1.4	26	59 %	1.8	17	57 %	1.5	15	8%	1.0	31	76 %	1.4	89	47 %	1.5
None	5	7%	N/A	6	14 %	N/A	1	3%	N/A	1	1%	N/A	1	2%	N/A	9	5%	N/A

About 5% of households reported having no assets, increasing to 7% for female-headed households and to 14% in Maralal. Nearly half of respondents reported having mobile phones (47%), ranging from 76% in the SNP to 8% in the SEP.

Interestingly, 28% of households kept poultry, with an equal rate in female-headed households. More households kept poultry in SNP (41%) and SAP (53%). Anecdotally, poultry production and demand are very low. As will be seen later, hardly any households eat poultry, except for some eggs.

In interviews and informal conversations, people said they're not used to eating poultry. Some said chicken was a food for the elderly, the sick, or women. Men were strongly opposed to eating poultry. Chickens might be kept only for eggs. Interviews and consultations suggest the poultry trade could grow, as evidenced by the few small and medium sized producers in Maralal, including some who were investing in incubators for day-old chicks.

Nutritious food preferences

Household food preferences and food profiles: Focus group respondents were very clear that there is an abundance of available food, even if some is seasonal or have unreliable supply chains (see *Food Prices and Availability* below). People could list and characterize a wide range of both animal and plant foods that are sold or eaten locally:

→ Maize/maize flour (*posho*, can be cooked in a short amount of time)
→ Beans/legumes, lentils (seen as expensive)
→ Leafy greens: spinach, *sukumawiki* (kale)
→ Fruits: oranges, banana, avocado, passion fruit, oranges, watermelon, and mangoes
→ Rice (seen as expensive)
→ Tomatoes
→ Potatoes

→ Carrots
→ Onions
→ Avocados
→ Sugarcane
→ Green peas/Green grams
→ Sweet potatoes
→ Cabbage
→ Milk
→ Meat, Kamande/Ndegu
→ Sugar
→ Cooking oil
→ Eggs
→ Bread
→ Spaghetti

Respondents said limited incomes prevent them from buying foods. Their ability to buy enough food for their households varied by season and was limited by consistently high prices.

Livestock prices decline seasonally, and traders don't always show up at markets. This often forces pastoralists to return home with animals they are unable to sell. When herders can't sell their livestock, they can't buy food, meaning sales decline for food traders.

Of the 26 foods in the household survey, there is a strong concentration of staples: maize grain and maize flour (62% of respondents); goat meat (60% of respondents); goat and cow milk (32% and 29%). As seen in Table 4, animal proteins and maize are by far the most widely eaten.

Vegetables and fresh produce were less commonly eaten. But the most identified ones — cabbage, leafy greens, and tomatoes — did correspond with priority-ranked foods.

Table 4: Foods Consumed by Households (option of multiple selection)

Food item	FHH	%FHH	MUZ	MUZ	SAP	%SAP	SEP	%SEP	SNP	%SNP	Total Count	Total %
Maize (Grain, Flour)	48	65 %	22	50 %	13	43 %	47	64 %	34	83 %	116	62 %
Goat Meat	47	64 %	12	27 %	18	60 %	50	68 %	33	80 %	113	60 %
Goat Milk	15	20 %	11	25 %	20	67 %	8	11 %	22	54 %	61	32 %

Cow Milk	19	26 %	17	39 %	10	33 %	13	18 %	15	37 %	55	29 %
Cabbage	17	23 %	10	23 %	4	13 %	5	7%	23	56 %	42	22 %
Kale, Spinach (non-traditional green leafy veg)	17	23 %	20	45 %	1	3%	1	1%	18	44 %	40	21 %
Camel Milk	12	16 %	0	0%	0	0%	9	12 %	19	46 %	28	15 %
Tomato	14	19 %	8	18 %	0	0%	1	1%	19	46 %	28	15 %
Sujaa, Managu, Amaranth, Dodo, Kunde (Kenyeji traditional green leafy veg.)	4	5%	12	27 %	7	23 %	0	0%	0	0%	19	10 %
Cow Meat	8	11 %	0	0%	3	10 %	10	14 %	4	10 %	17	9%
Bananas	8	11 %	6	14 %	0	0%	0	0%	11	27 %	17	9%
Mutton Meat	5	7%	1	2%	2	7%	0	0%	10	24 %	13	7%
Poultry Eggs	2	3%	1	2%	5	17 %	0	0%	6	15 %	12	6%
Mangoes	1	1%	0	0%	0	0%	0	0%	4	10 %	4	2%
Poultry Meat	0	0%	0	0%	1	3%	0	0%	2	5%	3	2%
Sorghum	2	3%	0	0%	0	0%	2	3%	1	2%	3	2%
Green Grams, Cow Pea (Local production)	2	3%	0	0%	0	0%	0	0%	3	7%	3	2%
Camel Meat	1	1%	0	0%	0	0%	0	0%	2	5%	2	1%
Papaya	1	1%	0	0%	0	0%	0	0%	2	5%	2	1%
Fish (local)	0	0%	1	2%	0	0%	0	0%	0	0%	1	1%

Red Kidney Beans (imported)	0	0%	1	2%	0	0%	0	0%	0	0%	1	1%
Orange-fleshed sweet potato (OFSP)	1	1%	0	0%	0	0%	0	0%	1	2%	1	1%
Omena (imported fish)	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Groundnuts	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Watermelons	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Tree Tomato	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%

Maize flour (non-fortified, Grade 2, whole grain) is the most preferred food, as it can be purchased in bulk and has a longer shelf life from up to two months when stored optimally. It's eaten simply, mixed with water and often vegetable shortening. Or it can be combined with other foods, like beans, when available. Quoting one household FGD respondent, "most of the time my husband only brings maize flour and a little vegetable fat. That's what we eat almost all the time because it's the cheapest. We would also like to eat rice or meat, but it's expensive and we don't have money to buy them" (Ndonyo Wasin women's FGD).

Most respondents (66%) said households rely on buying food from markets or vendors (*Table 5*). In Maralal and the north, respondents relied even more heavily on markets (93% and 88%). As expected, households also rely on livestock as a source of food (40%). The north relied more on livestock (88%). Female-headed households relied somewhat more on livestock as a source of food (45%).

Table 5: Household Sources of Food

Source	FHH	%FHH	MUZ	%MUZ	SAP	%SAP	SEP	%SEP	SNP	%SNP	Total Count	Total %
Purchased from local markets/vendors	41	55%	41	93%	19	63%	29	40%	36	88%	125	66%
Own livestock (goats, sheep, cows, camel, etc.)	33	45%	4	9%	11	37%	46	63%	14	34%	75	40%
Purchased from local	11	15%	4	9%	2	7%	12	16%	6	15%	24	13%

community members												
Own crops / garden	1	1%	0	0%	6	20 %	0	0%	4	10 %	10	5%
Gifts from friends/community members	4	5%	1	2%	0	0%	4	5%	3	7%	8	4%
School feeding	0	0%	3	7%	0	0%	0	0%	3	7%	6	3%
Borrowing from friends/community members (debt)	3	4%	0	0%	0	0%	4	5%	1	2%	5	3%
NGO Relief/Assistance/Cash Programs	3	4%	0	0%	0	0%	4	5%	0	0%	4	2%
Other	1	1%	0	0%	1	3%	0	0%	2	5%	3	2%
Traded in kind with other goods or help/services given	0	0%	1	2%	0	0%	0	0%	0	0%	1	1%

Other means of accessing food were rarely cited, except among agro-pastoralists where 20% were able to grow food. 'Borrowing from friends/community members' was seldom identified, but focus groups and interviews revealed that households did buy food on credit from traders, vendors and shop owners, particularly in the dry/lean seasons (see below, *Market Actor Constraints and Challenges in Nutritious Food Supply Chains*). This option was not offered in the household survey.

Food prices and availability: Food prices almost always rise during dry seasons and fall in rainy seasons. But prices for some foods are more consistent, especially durable goods like maize flour, sugar and pre-packaged vegetable shortening, although this largely depends on the area or proximity to markets. All foods get more expensive when fuel prices rise.

Table 6: Average Reported Difference of Food Prices from "Low" to "High" by HH Respondents

FOOD PRODUCT	MUZ	SAP	SEP	SNP	Total
Cabbage	45%	42%	82%	33%	44%
Maize	51%	26%	119%	22%	44%
Sorghum	58%	-	-	0%	39%
Sujaa, Kunde (traditional greens)	-	23%	50%	-	30%
Cow Milk	20%	21%	20%	50%	27%
Tomato	100%	-	-	15%	26%
Goat Meat	38%	13%	40%	23%	25%
Fish (local)	-	25%	-	-	25%
Kale, Spinach (non-traditional greens)	60%	22%	25%	18%	23%
Goat Milk	14%	17%	34%	23%	23%
Camel Milk	-	-	-	18%	18%
Cow Meat	14%	-	-	11%	13%
Mutton Meat	-	20%	-	5%	8%
Poultry Eggs	-	-	-	0%	0%
Bananas	-	-	-	0%	0%
Red Kidney Beans (imported)	-	0%	-	-	0%
Grand Total	49%	25%	72%	21%	34%

Variably throughout the year, but particularly within dry/lean seasons, most fresh produce prices increase. Prices consistently double in the dry season, when demand for alternative food products and fresh produce is higher. During drought and lean/dry seasons, prices increase because the market for livestock shrinks and traders purchase animals at throwaway prices. Many animals also die without enough fodder, pasture, and water. During the rainy season, food prices drop as animal health, milk production, and livestock sales improve. Then households eat more animal products and more staple like maize flour, beans, vegetable oil/shortening.

When food prices increase, families don't buy enough food to meet their basic dietary needs. Many times, family members go hungry, or take on debt to buy food. They repay debts after the rains when livestock get healthier and fetch better prices. Although traders and vendors provide store credit, they don't always give credit for more expensive foods, and limit credit purchases to items like maize flour and oil.

"Nutritious foods are available in the rainy season because milk is plentiful, and animals are in good condition. We can also sell our animals at good prices, so we can afford to buy nutritious foods. Now our animals are in poor condition because of the drought, and when you try to sell the price is very low. You can't even afford nutritious food, so we have to depend on maize flour only and I don't think it is very nutritious."

Some households slaughter animals for food when prices are unaffordable. Typically, people only eat meat after the rains improve herd health and livestock sales, during festivals, or to celebrate the birth of children.

More nutritious foods and fresh produce are typically available only on market days that occur weekly. Other markets are simply too far away.

Insecurity on roads, the poor state of roads that are unpassable in rainy seasons also limit food availability (see below, *Market Actor Constraints and Challenges*). Insecurity and theft were also linked to seasonal food scarcity, as well as the dry season decline in livestock sales and prices.

Focus group feedback on household nutrition and food habits

Views on nutrition and nutritious diets: Households have basic understanding of linkages between nutrition and eating a variety of foods. They also understand that nutrition is essential for good health, especially for infants and babies, children and elderly, as well as pregnant and lactating women. Respondents knew that a healthy diet includes a mix of food types, such as carbohydrates, proteins, and foods perceived as vitamin-rich. They frequently mentioned vegetables, fruits and a mix of animal-sourced foods. Meat and milk were consistently seen as the most healthy and essential foods, but most participants were at least conversant with the idea that these foods alone are not a complete or nutritious diet.

Most respondents said a healthy diet provides energy for daily work and activities and prevents illness. They said families only differ in terms of who has enough money to buy food. 'Rich' families were seen as able to buy nutritious foods, but most households cannot afford to buy nutritious foods or to grow their own food.

Many respondents said they'd like to grow more of their own food, but said their main income activities don't allow time for growing. During the lean seasons, women often look for or take up jobs outside of the home, leaving little time to procure food for families, particularly for children. Without enough rain or groundwater in pastoral areas, growing crops is difficult.

During dry seasons, after meat and milk run out, households see themselves as dependent on cheap and readily available staples like maize flour and hydrogenated vegetable oil. In pastoral areas, people more often cited the importance of animal source foods for good health, as well as their reliance on maize flour and vegetable oil (commonly mixed together in a porridge called *uji*). Cultural preferences for traditional meals with meat, milk and blood were often highlighted.

Nonetheless, most respondents understood the importance of dietary diversity, including foods such as beans/legumes, leafy greens, cabbage, and potato.

Women and girls' nutrition: Women said they divide their time between casual labor, preparing food, and other household duties, like childcare. Women can work outside of the home

to earn money from charcoal making/selling, firewood collection, and selling animal milk or traditional crafts. Income from these jobs was widely seen as inadequate to buy healthy food. Mothers, often as head of household, face challenges to find childcare while they work.

Though many women do raise goats and sheep (or 'shoats'), most women said they don't have assets or business opportunities that would bolster their earnings and influence household decision-making. That left women with challenges in gaining men's support for women's work outside of home, childcare, and other household maintenance.

Widows and single mothers often depended on additional support from communities to manage the extra financial strain of being a sole income earner. Women were also reported to be vulnerable to engaging in transactional sex to generate additional income to supporting families. The lack of cash, income and assets signifies that women and children face an undue burden of hunger and risk of sexual exploitation.

In segregated focus groups, men said poverty forced women and girls out of school. They also said alcoholism and early pregnancy could lead fathers to disown women and girls, forcing them out of the home to fend for themselves.

Men and women also mentioned that women could benefit from better awareness of good nutrition and its benefits regarding specific foods. While conversations revealed a basic understanding about different food groups and the importance of dietary diversity, decision-making remained constrained by a more nuanced understanding about dietary decision-making for women and their households.

"I bring food to the house. Anything else in the kitchen is decided by my wife or girls, because their work is being in the kitchen to cook for the family… I can say women have little say when it comes to choosing what to eat because she only cooks what has been brought. She doesn't decide what to buy, but only cooks what the husband brought"

(Ndonyo Wasin men's focus group).

"Men do not contribute to food

Market access is limited by distance, which means women are hindered in their ability to buy more nutritious foods. Most participants said that since men attend markets to trade livestock, they also purchase food at markets. While men bought food, women were typically seen as overseeing food preparation and feeding. Women are often seen as only having a say in "what to cook but not what to buy, whether they like it or not".

Men would frequently say that women should be better informed about the nutritional value of local foods and how to cook them. However, men's buying decisions also contribute to the dependence on maize flour during dry seasons.

Women noted that young girls with unwanted pregnancies were ostracized by households and communities, worsening their diets as they struggled to support themselves. Many women were

forced into transactional sex to survive. Women observed the difficulty facing single mothers to feed their families, noting that pregnant women often lacked the health or strength to cook or actively find nutritious foods.

When a woman gives birth, the husband will often slaughter animals to feed her, which is seen as helping to provide sustenance for her and the breastfeeding baby. Generally, women and girls were seen as having access to the same foods as others in the household.

Despite the emphasis on men's shopping at markets, some women were seen as deciding what to buy and cook because of their perceived responsibility over this domain within the home. Some women were seen as "breadwinners" or as "rich" if they own business and are viewed to be supporting the household's diet (Nooit MIXED male/female focus group).

Some women felt that if they had their own incomes, they would buy whatever foods they want. But the challenge is simply to find enough food every day, and women noted the mental and emotional strain of not being able to feed their children.

Women's income from firewood or charcoal is risky due to security concerns and market saturation. These jobs are often seen as insufficient in providing enough money to sustain improved dietary purchases. Overwhelmingly, livestock is seen as a man's domain, and remains the main source of income for most households.

Women's influence has been seen to improve by or when they are able to acquire livestock assets like sheep, goats, 'shoats' or poultry—it has been observed to not only improve household economy in general, but also women's influence over household decision-making. In other words, women's access to livestock assets is fundamentally transformative.

However, access to these assets is still limited for women by-and-large, as is their influence over household income and expenditures, though feedback from FMSA respondents also indicated these shifting trends, households where women had access to livestock assets, or ownership over their own businesses, were seen to be 'better off' than most households, including in their access to more diverse and nutritious foods.

Cultural constraints around food consumption: Implicit in focus group feedback is that men require 'more energy' for work with livestock and seasonal migration, which can result in inequity in food distribution. Participants also said that household members usually eat the same foods and rely on the same diets. However, when asked specifically about gender and age, certain discrepancies emerge.

Men are generally seen as *needing* to consume more food either as head of household or because of the demands of their work. Men are perceived as unaware of the benefits of nutritious foods. Men are seen as unaccustomed to buying or eating foods like fruits, which they don't see as

nutritious for themselves. Men preferred to rely on staples such as maize, beans, milk and oil. They also preferred more meat, seen as giving more energy for their labor. Blood and animal heads were often reserved for men. ***Adolescent men (morans)*** are seen as relying on meat and opposed to or uneducated about other foods.

Women are also seen as requiring nutritious food and an appropriate diet for work outside of the home and for routine household duties like childcare, pregnancy, and breastfeeding. Women are often seen as having a heavy workload and needing a substantial amount of food, even though they often give up a share of food for others. Women are also seen as limited from earning money, which limits their food choices. Women also took the blame if children were undernourished, which women and men saw as the mother's fault.

Pregnant and lactating women were viewed by respondents as needing a healthy diet, but this is often viewed as unattainable. As remarked by FGD respondents, foods seen as important for women included rice with beans, meat, or cabbage with ugali once per week, roasted liver, *kamande*, wheat flour, and potatoes. Perhaps important to reference here findings from the USAID Nawiri Gender Analysis that showed there were dietary restrictions faced by pregnant and lactating women (PLW, for both Samburu and Turkana) that were specified according to custom, tradition or local practice.[7]*

* "Narratives from Samburu pastoralists demonstrate that pregnant women are discouraged from eating eggs because '*they make the foetus big and lactating mothers can eat meat, uji, beans, rice and soup. Pregnant mothers eat meat.*' Narratives from Turkana Fisheries communities reported that girls are not permitted to eat where men are in sight, so there is the tendency for girls to shy away from eating and drinking in places where there are men. Taboos for lactating mothers in Turkana include not being permitted to eat during darkness […] they do not take milk with their tea so as to get their pre-pregnancy body back, and they only eat specific food parts of a goat. Diets for lactating mothers in Samburu include: milk, blood, *nterere* (wild vegetable) vegetables (like kale), and goat meat, while that of children under the age of five includes: milk and ngorno (this is cream made from cow milk which is very nutritious and is believed to make the baby strong) porridge and potatoes. Pregnant mothers are discouraged from eating eggs and they are provided with meat and milk as it is believed that other types of food will affect the flow of breastmilk", USAID-Nawri, Mercy Corps, *Gender Analysis of Persistent Acute Malnutrition in Samburu and Turkana Counties of Kenya*, "Food Taboos" p. 21-22, 2021.

"Food is food in our community, and women eat the same food they cook in the house. Girls are fed the same as women"

(Tuum MIXED male/female focus group).

"Boys are able to consume more milk during the rainy season, often with maize flour… and are more flexible with food and can eat anything available, but generally eat the same as men"

Young girls were viewed to need iron during menstruation and to concentrate on schooling, with access to eggs and fruits as the basis for a 'balanced diet' to contribute to growth. Girls' diets are not viewed as being substantially different from the rest of the household or women in general.

Young boys are often seen as having to cook for themselves, without enough support to have a healthy diet. Boys are viewed as needing only maize flour and oil/fat. Differences were noted by the respondents for uncircumcised[α] boys(only in Samburu county), who, respondents said, were still allowed to eat from household meals. In larger households, younger children are most affected by food scarcity, which has led to the high rates of persistent acute malnutrition in these communities.

Infants and babies are considered entirely dependent on the mother for nutrition. Men suggested that their health is the responsibility of the mother, but also said woman can't always breastfeed for six months as recommended. After weaning, foods for infants are often unavailable. This is seen as the mother's responsibility, despite the time constraints, fatigue, or poor health of pregnant and lactating women. Some families said they couldn't make separate meals for babies or the elderly, since they can't "cook different foods on two fires".

"Small infants' dietary needs are different. They only drink milk and uji, but often during the dry season milk is not available. Then small children depend on uji and maize flour"

(Ndonyo Wasin women's focus

Poor infant feeding can also occur because of the time needed to prepare food, or the lack of money to buy healthy foods. Utensils may be unhygienic ("Many babies contract ulcers", men's focus group, Angata Rongai). Emphasis is placed on soft foods for small children and infants such as: milk, porridge, rice, soya/uji, bananas, avocado, papaya, mangoes, guava and potatoes.

Elderly household members were identified as being "neglected" or not receiving proper care from their children. They were also seen as needing healthy foods like carrots because of their age. Elders are seen as dependent on their children for food, water, and an appropriate diet, such as "soft foods" that require extra time to prepare. However, the elderly often relied on the same staples, in insufficient quantities, as other household members. Focus groups cited a lack of awareness of appropriate dietary habits for the elderly. However, elders were also seen as

[α] Uncircumcised boys and men may range in age from pre-teens to their early/mid twenties—but 'right-of-passage' rituals for circumcision are not always held annually. Once a young boy or young man is circumcised, they are called "*moran*" to signify their transition to manhood/adulthood, but that they also remain unmarried without a family of their own. Sourced at: https://thesamburuproject.org/blog/2019/9/5/how-to-become-a-man

adhering to "heavy consumption of meat and milk, and therefore lack a balanced diet with nutrients from other foods" (men's focus group Angata Rongai). When possible, the elderly were offered foods that are easier to chew, like meat broths, rice (with beans and *royco*, milk and porridge, or potatoes.

Market actor constraints and challenges in nutritious food supply chains

Overall market dynamics: Generally, markets and market demand was seen as growing, with opportunities to capitalize on the improving demand and availability of more diverse food items from primary markets. Most fresh produce is transported from neighboring counties in Kenya's "green belt" of Meru, Nyeri, Laikipia and Nyandarua. Informal estimates are that up to 90% of fresh produce sold in Samburu markets is grown in these counties. Items most frequently and consistently mentioned as being sold include:

- → Maize/maize flour
- → Beans/Legumes (red beans, cow peas, lentils)
- → Cooking oil/Vegetable shortening
- → Sugar
- → Cabbage
- → Tomatoes
- → Wheat flour
- → Rice
- → Sorghum
- → Bar or powder soap for handwashing, cleaning or laundry
- → Airtime
- → Prepackaged milk (seldom)
- → Sweets, biscuits and processed snack food

Better-established traders and vendors in larger, more frequent markets have many items for sale. Smaller traders will often only sell a handful of food items, based on how many people are selling similar goods at smaller markets, and on how many customers attend them. Many traders said they struggled to grow their businesses because so many competitors offer the exact same goods.

Few traders sell fresh fruit like banana, mangoes, passionfruit or oranges. Traders who do tend to be in or near Maralal, and they noted that demand for fruit is small outside of primary and secondary markets. Additionally, fruits spoil faster than produce like cabbage and potatoes, making fruit risky to carry to more distant markets.

The short shelf life of fresh produce is a major impediment for traders and shop vendors at all points along supply chains. Also noted was the lack of permanent market stalls or storage facilities that would allow traders to buy in bulk. That could potentially smooth prices and reduce spoilage by protecting perishables from heat and weather. Longer shelf life makes it easier for traders to keep perishables.

Traders and vendors often mention cost of packaging materials, a cost passed along to customers. Plastic bags are banned, and other bags are more expensive. The cost of buying and transporting packaging add to the overall cost of doing business.

Seasonality and demand fluctuations: While vendors and business operators agree that demand varies between rainy and dry seasons, perceptions of demand varied by month and region. This may be because of micro-climates and changing weather patterns. The length and breadth of seasonal variations may also have to do with proximity to primary and secondary markets supplied by farms outside of the county.

Traders and vendors noted that prolonged droughts delay the onset of rains. Livestock and herder migrations were typically noted as starting between January and March, with less pasture and water until the long rains return between March and June. Then another dry season runs between June and September or October when seasonal livestock migration resume.

Market vendors and traders in pastoral areas typically sold more fresh foods in the dry season, as customers bought alternatives to staples. They said pastoralists would often stock up on less perishable foods before setting out on long treks with animals in search of grazing pasture, fodder, and water.

During this time pastoralists often travel far from markets. Distant traders along their routes are less likely to offer credit because they don't know the nomads well.

During pastoralist migrations, market vendors and business owners experience increased demand for fresh produce and nutritious foods, so their businesses performed much better during dry seasons. But households have less money to buy food in the dry season, causing greater food insecurity.

During the rainy seasons, demand drops for fresh produce, fruits, and vegetables – even though that's when households have more money. When incomes are up, households prefer to buy staples like maize flour, beans, and rice. Fresh produce is seen as a substitute for staples, so customers only buy them in the dry season.

Rainy seasons also are also when livestock produce more milk, which households prefer as a source of protein and micro-nutrients. When less milk is available in the dry season, households seek alternative foods in markets.

This indicates that households rely on more readily available fresh produce in the dry/lean seasons and return to eating less nutritious staples in the rainy season. Feedback from focus groups indicates that although households tend to consume more fresh produce than they have in the past, the quantities they are able to purchase are insufficient (i.e. food prices are still high);

and where household hunger still persists in the dry season as families cope by skipping meals and buying less food overall with scarce resources.

However, fresh produce can be made widely available due to the excess production and supply from outside of Samburu. And where communities grow, eat and sell their own food, fresh vegetables are often a more affordable substitute for staples.

Although dietary diversity increases during the dry season, people eat less food, so they still have poor overall diets and nutrition.

Transport and insecurity: Transport and associated costs for food were consistently mentioned as being too high and too limited. Traders and vendors must often arrange for transport individually – often by motorbikes, although some four-wheel drive trucks and other vehicles do operate. The unavailability, unaffordability or limited supply of transport is seen as a major uncertainty and a risk to businesses.

Transport fees add substantially to food retail prices. Fuel price changes substantially affect the ability of small businesses to procure goods and transport them to more distant markets. High transport costs were also blamed on the poor state of roads and communication infrastructure. Rural access and feeder roads are often in disrepair or impassable during rainy seasons.

Theft and banditry remain a risk along more remote passages, and sometimes along main access roads and highways. While safety has improved, many traders servicing more remote and weekly markets or villages are often victims of theft or intercommunity violence. Limited network coverage and mobile money agents at markets means that traders and vendors are forced to carry cash as well as unsold product, leaving them vulnerable to roadside attacks.

Credit, access to finance and capital: The need to offer customers credit during the dry season poses another challenger to traders. They struggle to manage these short and informal credit arrangements. Businesses face challenges due to the failure of customers to repay loans. Shops will cut off credit to customers who do not repay, but the losses are fixed. Retailers also land in a difficult moral position when community members are unable to feed their families but also unable to meet the repayment requirements of loans.

Access to credit and institutional finance is also limited, but many business owners are members of SACCOs or savings groups. SACCOs offer their own loan products. As they require membership dues, only members can access these financial services (at between 10-17% interest). Being a member of a SACCO also enables access to formal bank lending (KCB, Equity Bank, Co-Op Bank) but at higher rates of 13-25%. However, these services are limited to businesses near main towns like Maralal.

Even traders and vendors who can access loans report that capital constraints impede their ability to finance business expansion. Others said the loan paperwork was a challenge, worrying they might misunderstand loan terms, or become unable to make payments. Generally, these shops lack any sort of collateral.

Some vendors said they have good relationships and are trusted by distributors and wholesalers, who offer store credit. Typically, this is a function of perceived cyclical demand increases: when the demand for certain items is anticipated to go up, larger shops or wholesalers are more likely to extend credit to smaller traders.

Market competition: Small traders who work several weekly markets also cite competition from wholesalers from outside of Samburu, especially in larger town markets like Maralal, or those closer to main roads. Those markets receive traders from major production zones like Nyandarua, Laikipia, Meru and Nyeri. Regional traders said that they would try not to compete with local traders on price, but that sometimes they had to sell at lower prices to liquidate excess stock that they would otherwise have to transport back from Samburu.

Local traders said regional traders could arbitrarily lower prices on market days to sell their products more quickly, winning more customers. Traders from other counties purchase their produce at significantly lower prices, usually direct from farmers, often at one-half or one-third of the price in Maralal or markets along the main highway.

Very few if any businesses have linkages with larger or institutional buyers, nor experience with contracts. Traders with links to institutions like schools or hospitals, or with businesses like hotels and restaurants, are still small sellers. For example, they would not sell in large quantities to supply a school, but rather individual teachers and staff.

Sources of market information: Community elders are seen as a primary source of market information, as they trade themselves, frequenting sub-county secondary and tertiary markets. Other local traders are also a major source of market information. Elders and local traders are considered as trusted sources because they are often from the same community. Transporters also provide information on markets and roads, and the viability of transporting goods to more remote areas. The radio also provides market information through regular programming or news briefs.

Associations, support, and services for business development: Many respondents have belonged to associations or savings groups previously. Many groups were defunct, or only active during in the rainy season when members return from their pastoral migration. Many former members cited mismanagement, ineffective governance, and frequent disputes among members or with elected officers. Many elected officers were seen as overly political, and not necessarily acting for the group's best interests.

While some respondents belonged to formal institutions like SACCOs, most had informal or semi-formal savings groups. Unless they're integrated within county government or NGO programming, they do not receive training on group formation, governance, collective management or other skills. NGOs, government, and SACCOs were all said to provide skills training and development, group management and governance, financial literacy, business skills, accounting skills, savings, and group lending.

BOMA Project REAP grant recipients said they received business management and accounting support from REAP Mentors. These types of services were positively received and seen as vital to the success of food businesses. Without ongoing support, these groups struggled to remain cohesive or disbanded.

Plans for business expansion and growth: Most traders and vendors, particularly those with larger sales volumes, saw opportunity for growth and expansion to nearby markets, even if that meant adding staff. Road infrastructure is slowly but steadily improving, which is improving opportunities for trade across Samburu county. Trader and vendor expansion plans typically included purchasing more, and more varied, products.

In addition to bad roads and crime, businesses said outstanding loans to customers impeded hopes of expansion. The bad debts affect income, cash flow, and their standing with suppliers. Vendors typically must wait for the seasonal improvement of livestock sales or prices, during when these businesses would seek out customers to repay their debt, sometimes unsuccessfully.

Many food market actors would like to increase income for their businesses by buying livestock during the dry season for resale during the rainy season. However, they also saw risk in buying livestock during times of drought, when herd losses are more likely.

Respondents from BOMA Project REAP grant recipients: REAP grant recipients who started food businesses cited similar challenges, but said the funds were instrumental to starting their businesses. Many also said they need additional capital to improve or maintain their business, and to overcome rising costs of transport and food products. Identifying linkages with other sources of finances could provide a lifeline to these vendors and allow them to expand their businesses.

Transport costs cut deeply into profit margins. Because smaller businesses can only buy limited stock at any given time, transport costs are spread over fewer items, eating into their margins. Increased access to capital was seen as a means of reducing transaction costs for small traders through bulk purchasing and shipment.

Perishability was also a frequent challenge. Prices are dictated by outside factors, and fresh produce often arrives nearly spoiled due to the distance and time required to reach them. With no cold storage, foods are exposed to heat and weather while in transit.

REAP-supported businesses also routinely cited a lack of training on business and financial skills as well as seasonal demand fluctuations as key challenges.

Irrigation: Production, productivity & marketing challenges

Research assistants conducted focus groups at four community irrigation sites in Samburu. These sites were originally supported by the county, which installed equipment and infrastructure. County water engineers provided agricultural training and technical support. Participants included members of the adjacent communities. Focus groups were conducted at Lulu, Kurungu, and Nachola in Samburu North, and at Ngilai in Samburu East. Separate focus groups for men and women were conducted Lulu and Ngilai.

Lulu, the newest system which came online in 2019/2020, sits on 33 acres with up to 100 active members growing on apportioned plots. (The entire community has up to 200 households, depending on the season.) About two-thirds of the active, farming members are women. Lulu also has a more substantial investment in infrastructure and equipment. A solar pump pipes water from a stream into two 10,000-liter tanks placed at ground-level on a hilltop. Gravity feeds water through a piping system to the small plots. The water can be switched to spigots attached to plastic drip irrigation tubing that can channel water to each plot.

Kurungu sits on 50 acres near to a community with 500 households. Although Kurungu can accommodate plots for 400 households, only 10 have cultivated within the last year. Established in 2001 with support from the Kenya Red Cross Society, Kurunga is fed through piped water from a spring within the facing mountain.

At Ngilai and Nachola, respondents were asked to estimate the size of the sites, so their acreage remains unclear. However, irrigated plot seemed standard, with 0.1-0.25 acres allocated to each household. Across all sites, most participants were women, particularly those actively farming.

Ngilai was irrigated through a solar pump drawing water from a borehole, and Caritas helped build a greenhouse. Nachola had a similar setup but could also draw water from a stream. They don’t have a greenhouse, but were provided with netting to help protect crops.

Experience with irrigation: Without exception, at all four sites participants said growing crops transformed their lives, whether with food for their households, or to sell for extra money. Crops were seen as freeing households from total dependence on livestock for food.

All four sites also experienced several difficulties. Poor governance of groups and of active farming on the plots strained group dynamics. Droughts reduced water supplies. Broken equipment left people carrying water in jerry cans to their plots. Pests, locusts, monkeys, and elephants damaged crops, while diseases also damaged plants. Good seeds and fertilizers were hard to come by. Groups also wanted to learn best practices in irrigated agriculture.

People abandoned their plots because they didn't have time to tend them. Time needed to go to livestock or other jobs, and to household tasks. Savings and earnings from their crops aren't immediately clear, so people chose to spend time on other things.

Crop production, home consumption, and sales: Typically, the plots can support up to three planting cycles a year, yielding up to 100kgs of fresh produce for each member. At Lulu, members consumed half, and sold the other half. Quantities and yields are difficult to estimate because the plot sizes are estimates, and different produce is typically grouped as bundles or sacks that weigh 50-80kgs.

Produce is sold to neighbors, nearby communities, and markets. Restaurants and hotels bought some produce, as well as teachers. Some said they sold to NGOs and UN agencies, though the particulars were not given. The crops grown included:

- Irish potato
- Watermelon
- Sweet potato
- Spinach and sukumawiki (kale)
- Cabbage
- Onions
- Tomatoes
- Maize
- Chili pepper
- Beans
- Papaya
- Butternut squash and pumpkin

Crops Selection: Widely grown crops were selected because NGOs and county government offered training on how best to produce them. Crop choices were also based on soil, water, and climate conditions. People also chose crops for which there was perceived demand by households and markets. Respondents also said their produce was affordable and generally fresher than what arrives from more distant markets.

Respondents said their small land size informed their crop choices. Members also chose what their families would eat, or what they thought they could sell. Many were wary of labor-intensive farming practices because livestock remain their primary source of livelihood.

Desired crops: At each site, members knew which new crops they could grow to earn more money at local markets. Some of these desired crops were being grown in some areas but not in others. They included:

→ Potatoes
→ Beans
→ Onions
→ Tomatoes
→ Watermelon
→ Carrots
→ Passionfruit
→ Fruits in general (avocados, mangoes, bananas, oranges)
→ Cabbage

Beans are in high demand, but farmers often don't have enough water to grow them. Mangos and avocados were seen as desirable since they have perennial harvests and need fewer inputs once productive. Maize, beans, cabbage, and potatoes were viewed to require more water than what is available. They are also susceptible to being destroyed by wild animals. Kurungu's climate wasn't good for potatoes.

Members said they don't know where to buy seeds or seedlings for most of these crops, and they don't know how to grow them. However, they also said that growing different foods could improve their farming skills and make crops more productive, potentially easing their challenges.

Agricultural training and support: Most sites once had substantial NGO or county assistance to run the irrigation systems, provide seeds and inputs, or offer training. Without support, farmers haven't had regular access to fertilizers, pesticides, or herbicides. Training was offered by WorldVision, Arid Lands, GIZ, KRCS, ACTED, and Caritas, as well as county farm extension specialists county irrigation engineers. The types of training included:

→ Planting vegetables like maize, watering, weeding, and pest control (ACTED and Caritas).
→ Occasional provision seeds for maize, beans, kande or greens grams by the county.
→ Training on how to grow different crops, and provision of seeds for dhania, sukumawiki, managu, spinach, kale, tomato, cabbage, carrot, maize, beans, and greens grams (ACTED, Caritas, Arid Lands).
→ Donation of spades, njembe, pesticides and fertilizers (ACTED).
→ Training on kitchen gardening (ACTED).
→ Training on nutritious foods, modern farming in arid lands, cropping rotation, harvesting, and protective fencing (ACTED, Caritas, and World Vision).
→ Training on 'oasis gardening' and 'zai pits' that use nylon paper and pipes to upturn two feet of soil to improve productivity (ACTED).
→ Grafting for mangoes.
→ Cooperative formation training (GIZ-supported county programming for horticulture).

Key constraints to irrigated farming: Many challenges related to group dynamics and governance. Rivalries can lower morale and discourage members from participating. Many members feel their plots are too small to produce in sufficient quantities. Meanwhile, participation often stagnates, with many fallow plots, where according to one respondent, the members who don't support the irrigation plot make it very difficult for the ones who do. They have to work harder to fill the gaps." (Samburu East, Wamba North, Ngilai women's focus group)

In additions, in the dry season community members leave villages to support livestock herds, which reduces participation. During droughts, women turn to selling charcoal or firewood for income.

Erratic rains make it difficult to plan. Droughts forced herders to travel farther for pasture. Drought and climate conditions also deepen water shortages and dry up irrigation sources, forcing women to travel to distant water points. Farmers walk up to six kilometers round trip to carry water with jerry cans. Only Lulu has water tanks. Solar generators to power pump aren't strong enough. Water resources are regularly stretched.

"Arid Lands gave us greenhouses and tanks, but the equipment from the county broke down and there were no spares available in town"

(Samburu North, Nachola focus group).

"Any fencing that is used for the farms do not protect the produce from grazing livestock or wild animals who can often destroy the crops."

(Samburu North, Nachola, Nachola focus group)

"The poor state of roads, especially during the rainy season, also present a challenge for accessing markets when they

Communities didn't farm traditionally, and they see themselves as herders. They have to learn how to farm, but livestock often comes first. Refresher courses aren't available to improve their farming practices.

Irrigation supplies are limited. If plastic tubing breaks on drip irrigation lines, repairs are a challenge.

Without appropriate fencing, elephants, monkeys, porcupines, and squirrels can damage or destroy crops. Communities have resorted to assigning a 'watch' to protect from wild animals as well as thieves. Where sites do have fencing, it's not strong enough. Elephants trample it, and monkeys climb over.

Crop diseases are reducing yields, but the farmers don't know how to identify pests and disease. Nor do they have access to appropriate pest control. Cutworm can destroy maize, kale, cabbage, spinach, onions and tomatoes. Farmers said they need to learn pest control methods and where to access pesticides and herbicides.

Many producers feel the plots are too small. They also need capital for inputs like fertilizer and pesticides that could boost productivity. Greenhouses also require finance. Such controlled environments would better suit the climate and could also protect from animals and pests.

Producers could sell at markets, but most run only once a week and the region doesn't have many. Poor roads make transport expensive. Communities receive limited information on the market demand because they don't know many other traders or business networks. Fresh produce spoils if it isn't transported, sold, or consumed within a short period of time.

Producers find it hard to compete with traders from Maralal at the weekly markets. Even neighbors prefer to buy vegetables from Maralal or Wamba, because they don't believe the local produce is as good. Unsold goods must be transported back home.

"We have taken a KES 100,000 loan from a women's group and repaid over one year with no interest, but have not taken another since then"

Access to finance for irrigated farming: None of the members of the irrigation sites had access to formal credit from banks or SACCOs. NGOs such as ACTED have provided some support to community savings groups. Some had savings groups with revolving funds. The community irrigation members are generally responsible for maintenance and upkeep, and do not contract outside labor or technical support.

Suggestions for improvements and future expectations: Communities felt their crops were important to their food security and incomes, with ample local demand for their produce. They expect to eventually plant more crops, especially to grow food for children. They see producing food as beneficial to the community's development. Additional considerations for improvements include:

→ Expanding production and yields through increased access to finance.
→ Better roads for easier travel to market.
→ Improved linkages with other market actors, buyers and suppliers.
→ Land tenure, demarcation and distribution led by the county.
→ Increased community support for the farm, with more members farming
→ Exchange visits outside the county to gain knowledge on good agricultural practice on issues like pest/disease control and crop management.
→ Cultivating fruit trees/orchards or perennial crops like mangoes and oranges, which could be harvested over a longer period and prevent crop loss and spoilage.
→ Increasing household and community assets with goats and sheep.

These communities hope to expand the area of their farms actively and consistently under cultivation, as well as the total land that can be cultivated, and to have most if not all households in the community participate in production activities and/or to have access to food for their own consumption and food security.

Market systems challenges & enabling environment

While market actors believed the local political climate is conducive, they took issue with VAT on goods in primary and secondary markets, which they said reduces the number of vendors relative to the wholesalers. Election cycles pushed people to work with others in same political camp or clan. This dynamic also influenced the market's atmosphere, as some vendors saw marked divisions among their customers.

Measures to restrict the spread of Covid-19 hurt sales by closing markets, imposing curfews, restricting gatherings, and requiring masks. Violations resulted in fined or the closure of the business.

4. Turkana analysis and findings

Household demographic characteristics of survey respondents

Most respondents interviewed (89%) were female, with female heads of household (FHH) making up 53% of the total. Two-thirds of head-of-households (66%) had no formal education, and this increased to 74% for female-headed households. Average household size was six members, with 63% of households having 5-10 members and 13% having 11-14, which was the largest household size.

Table 6: Household Food Consumption Scores

FCS Category	FHH	%FHH	TAP	%TAP	KAP	%KAP	TBP	%TBP	TCP	%TCP	LTF	%LTF	LUZ	%LUZ	Total Count	Total %
Poor	43	46%	40	52%	7	18%	28	70 %	3	50 %	8	53%	0	0%	86	48 %
Borderline	35	37%	24	31%	17	45%	11	28 %	3	50 %	4	27%	0	0%	59	33 %
Acceptable	16	17%	13	17%	14	37%	1	3%	0	0%	3	20%	3	100 %	34	19 %
Total	94	100 %	77	100 %	38	100 %	40	100 %	6	100 %	15	100 %	3	100 %	179	100 %

Some 81% of households had “poor” or “borderline poor” FCS, indicating strained or unacceptable dietary habits and coping strategies, low dietary diversity, and a lack of food to eat during the seven days before the interview. This figure jumps to 98% for the Turkana Border Pastoral Zone (TBP). On the other hand, a relatively high 37% of households were considered to have an “acceptable” FCS in Kerio Riverine Agro-pastoral Zone (KAP).

Table 7: Income Source (option of multiple selection)

Source	FHH	%FHH	TAP	%TAP	KAP	%KAP	TBP	%TBP	TCP	%TCP	LTF	%LTF	LUZ	%LUZ	Total Count	Total %
Firewood Sales	34	36 %	22	29 %	11	29 %	18	45 %	2	33 %	7	47 %	0	0%	60	34 %
Charcoal Sales	27	29 %	14	18 %	11	29 %	19	48 %	0	0%	5	33 %	0	0%	49	27 %
Petty Trade: Handicrafts/	11	12 %	14	18 %	0	0%	1	3%	1	17 %	4	27 %	0	0%	20	11 %

Cultural Products																
Sale of Livestock Animals or Animal Products	7	7%	6	8%	6	16 %	4	10 %	0	0%	1	7%	1	33 %	18	10 %
Brewing	5	5%	10	13 %	2	5%	3	8%	0	0%	3	20 %	0	0%	18	10 %
Petty Trade: OTHER	8	9%	10	13 %	2	5%	1	3%	2	33 %	2	13 %	0	0%	17	9%
Sale of Crops from Agriculture	9	10 %	9	12 %	4	11 %	3	8%	0	0%	0	0%	0	0%	16	9%
Self-Employed/Small Business (Services)	10	11 %	5	6%	4	11 %	1	3%	1	17 %	1	7%	2	67 %	14	8%
Other (Casual labor)	5	5%	9	12 %	0	0%	0	0%	1	17 %	0	0%	0	0%	10	6%
Employment Agriculture/Farm Labor	6	6%	6	8%	3	8%	1	3%	0	0%	0	0%	0	0%	10	6%
Government Relief/Assistance Programs	5	5%	0	0%	3	8%	4	10 %	0	0%	3	20 %	0	0%	10	6%
NGO Relief/Assistance/Cash	4	4%	0	0%	3	8%	4	10 %	0	0%	0	0%	0	0%	7	4%
Employment NON-Farm Labor	2	2%	0	0%	6	16 %	0	0%	0	0%	0	0%	0	0%	6	3%
Sale of Milk from Livestock	0	0%	1	1%	1	3%	1	3%	0	0%	0	0%	0	0%	3	2%
Loans/Borrowing	2	2%	0	0%	0	0%	2	5%	0	0%	0	0%	0	0%	2	1%

Remittances	1	1%	1	1%	0	0%	0	0%	0	0%	0	0%	0	0%	1	1%
Gifts	0	0%	0	0%	1	3%	0	0%	0	0%	0	0%	0	0%	1	1%

Charcoal and firewood sales were common sources of income, cited by 34% and 27% of households. Both the border pastoral zone depended on charcoal (48%) and firewood (45%) sales, as did the lake fishing zone (47% and 33%). Agro-pastoralists relied less on firewood, cited by 29% in Kerio and 18% in the Turkwel riverine agro-pastoral zone (TAP).

Outside of firewood and charcoal, trade of handicrafts/cultural products was common (11%), as were livestock sales or the sale of animal products (10%) and brewing (10%). Handicrafts were the third-most cited source of income by the lake (27%) and in Turkwel (18%). Some 12% of female-headed households across all zones cited handicrafts. This trade was not mentioned at all in Kerio, and barely by those near the border (3%).

Related to agriculture, 12% of respondents from TAP and 11% of those from KAP zone reported that they rely on sales of crops as an income source. It is interesting to note that 8% of surveyed households in TBP also reported sales of crops as an income source. Farm labor was also mentioned by 8% of surveyed households in both KAP and TAP zones and 3% in TBP zone as an income source.

Expectedly, sales of livestock or animal products had a high incidence (10%) in TBP. Among agro-pastoralists, such sales were more commonly cited in Kerio (16%), than in Turkewel (8%).

Around 10% of households surveyed in TBP reported reliance on government relief. Another 10% mentioned that they relied on NGO relief as a source of income. Similarly, households surveyed in KAP mentioned relying on government relief (8%) and NGO relief (8%). On the other hand, no households surveyed in TAP reported reliance on government or NGO relief.

Table 8: Reported Household Assets (option of multiple selection)

LZ	FHH		TAP		KAP		TBP		TCP		LTF		LUZ		TOTAL	
Asset	# Who Own	% Who Own	# Who Own	% Who Own	# Who Own	% Who Own	# Who Own	% Who Own	# Who Own	% Who Own	# Who Own	% Who Own	# Who Own	% Who Own	# Who Own	% Who Own
Goats	34	36 %	26	34 %	30	79 %	10	25 %	2	33 %	6	40 %	0	0%	74	41 %
Sheep	12	13 %	11	14 %	10	26 %	7	18 %	1	17 %	3	20 %	0	0%	32	18 %

Poultry	14	15%	13	17%	9	24%	6	15%	0	0%	1	7%	1	33%	30	17%
Camels	0	0%	0	0%	0	0%	2	5%	0	0%	0	0%	0	0%	2	1%
Cows	0	0%	2	3%	2	5%	1	3%	0	0%	0	0%	0	0%	5	3%
Donkeys	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Land	13	14%	13	17%	10	26%	3	8%	0	0%	0	0%	0	0%	26	15%
Mobile Phone	33	35%	13	17%	28	74%	14	35%	0	0%	4	27%	3	100%	62	35%
None	29	31%	23	30%	1	3%	16	40%	3	50%	4	27%	0	0%	47	26%

Survey responses show that around 26% of households report having no assets, and significantly, if expectedly, the proportion of respondents increases for female-headed households (31%), and for households from TBP (40%). More than a third of all respondents reported having mobile phones (35%), with KAP reporting the highest mobile phone ownership at 74%, while TAP respondents were the lowest reporting at 17%.

There seems to be a significant difference in the livestock ownership of households from the two agro-pastoral zones. The majority (79%) of households from KAP reported ownership of goats, against 34% in TAP. Similarly, more households in KAP (26%) reported owning sheep, against 14% in TAP. Interestingly, poultry assets were somewhat prevalent, 17% overall and 25% among female-headed households. Most significantly, poultry ownership was reported to be highest in KAP (24%) and TAP (17%).

Nutritious food preferences

Household food preferences and food profiles: Focus group respondents in Turkana, like Samburu, pointed to a wide variety of available foods that experience seasonal and supply chain disruptions, including fluctuations in demand.

Respondents emphasized that household resources and income affect food availability and demand, but still listed a range of products that are at least seasonally available:

→ Maize and maize flour
→ Sorghum
→ Spinach, kale, sukumawiki

→ Goat meat
→ Beans
→ Milk
→ Potatoes
→ Cabbage
→ Peas
→ Onions
→ Tomatoes
→ Mangoes
→ Bananas
→ Pineapples
→ Avocado
→ Orange
→ Oil and fats
→ Rice
→ Spaghetti
→ Lentils
→ Sodas
→ Juices
→ Poultry meat and eggs

Focus groups said that until recently, animal products dominated diets, but that now more fruits and vegetables are bought and eaten. From one FGD respondent in Loima: "people no longer eat just maize. They like nutritious foods" (Turkana, Loima, Nadapal mixed focus group). Respondents attributed seasonal food availability to a lack of income, lack of knowledge of specific food products, or high prices.

As in Samburu, people tended to eat staples: maize and maize flour; sorghum (unique to Turkana); goat meat and milk; cow milk; and to a lesser extent cabbage, leafy greens, and tomato.

Table 9: Food Items Consumed by Turkana HHs (option of multiple selection)

Food item	FHH	%FHH	TAP	%TAP	KAP	%KAP	TBP	%TBP	TCP	%TCP	LTF	%LTF	LUZ	%LUZ	Total Count	Total %
Maize	66	70 %	47	61 %	37	97 %	19	48 %	3	50 %	13	87 %	2	67 %	121	68 %
Goat meat	34	36 %	29	38 %	25	66 %	11	28 %	1	17 %	0	0 %	2	67 %	68	38 %

Sorghum	27	29 %	14	18 %	25	66 %	10	25 %	0	0 %	0	0 %	0	0 %	49	27 %
Kale, spinach (non-traditional green leafy veg)	25	27 %	24	31 %	14	37 %	5	13 %	2	33 %	0	0 %	2	67 %	47	26 %
Tomato	13	14 %	18	23 %	8	21 %	3	8 %	1	17 %	0	0 %	2	67 %	32	18 %
Cabbage	16	17 %	11	14 %	11	29 %	4	10 %	2	33 %	0	0 %	3	100 %	31	17 %
Goat milk	8	9%	12	16 %	6	16 %	0	0 %	0	0 %	0	0 %	1	33 %	19	11 %
Fish (local fresh, dried without salt, fried/ preservation)	13	14 %	7	9 %	2	5 %	2	5 %	2	33 %	3	20 %	3	100 %	19	11 %
Red kidney beans (imported)	9	10 %	4	5 %	8	21 %	0	0 %	0	0 %	4	27 %	1	33 %	17	9 %
Cow milk	7	7%	7	9 %	7	18 %	1	3 %	0	0 %	0	0 %	0	0 %	15	8 %
Sujaa, managu, amaranth, dodo, kunde (kenyeji traditional green leafy veg.)	11	12 %	9	12 %	4	11 %	1	3 %	0	0 %	0	0 %	1	33 %	15	8 %
Omena (from Lake Kisumu)	8	9%	6	8 %	0	0 %	1	3 %	0	0 %	0	0 %	3	100 %	10	6 %
Cow meat	2	2%	4	5 %	3	8 %	2	5 %	0	0 %	0	0 %	0	0 %	9	5 %
Bananas	3	3%	3	4 %	3	8 %	0	0 %	0	0 %	0	0 %	2	67 %	8	4 %

Poultry eggs	7	7%	3	4%	1	3%	3	8%	0	0%	0	0%	1	33%	8	4%
Camel meat	4	4%	2	3%	4	11%	2	5%	0	0%	0	0%	0	0%	8	4%
Tree tomato	4	4%	1	1%	4	11%	0	0%	0	0%	0	0%	1	33%	6	3%
Camel milk	1	1%	3	4%	1	3%	1	3%	0	0%	0	0%	0	0%	5	3%
Poultry meat	4	4%	1	1%	1	3%	2	5%	0	0%	0	0%	1	33%	5	3%
Green grams, cow pea (locally grown)	4	4%	2	3%	0	0%	1	3%	0	0%	0	0%	1	33%	4	2%
Papaya	2	2%	3	4%	0	0%	0	0%	0	0%	0	0%	1	33%	4	2%
Orange-fleshed sweet potato	4	4%	2	3%	0	0%	0	0%	1	17%	0	0%	1	33%	4	2%
Watermelons	3	3%	3	4%	0	0%	0	0%	0	0%	0	0%	1	33%	4	2%
Mutton meat	1	1%	1	1%	1	3%	1	3%	0	0%	0	0%	0	0%	3	2%
Mangoes	2	2%	1	1%	1	3%	0	0%	0	0%	0	0%	1	33%	3	2%
Groundnuts	1	1%	0	0%	1	3%	0	0%	0	0%	0	0%	1	33%	2	1%

Most respondents (59%) indicated that households are dependent on purchasing food from markets or vendors (*Table 10*), more so in KAP and TBP (71% and 68%). In contrast to Samburu, many households do not depend on their own livestock assets for food (9%), with most zones reporting similar levels of sourcing animal products from their herds. Purchasing food from community members was more common in Turkana at 37%, and at 45% for female-headed households.

Table 10: Household Sources of Food															
Source	FHH	%FHH	TAP	%TAP	KAP	%KAP	TBP	%TBP	TCP	%TCP	LTF	%LTF	LUZ	%LUZ	Total Count	Total %

Purchased from local markets/vendors	51	54 %	42	55 %	27	71 %	27	68 %	3	50 %	0	0 %	0	0 %	105	59 %
Purchased from local community members	42	45 %	32	42 %	8	21 %	12	30 %	3	50 %	0	0 %	0	0 %	67	37 %
Own crops / garden	13	14 %	14	18 %	8	21 %	1	3 %	0	0 %	0	0 %	0	0 %	23	13 %
Own livestock (shoats, cows, camel, etc.)	8	9 %	6	8 %	3	8 %	3	8 %	0	0 %	0	0 %	0	0 %	17	9 %
Borrowing from friends/community members (debt)	3	3 %	5	6 %	4	11 %	3	8 %	0	0 %	0	0 %	0	0 %	12	7 %
Gifts from friends/community members	1	1 %	0	0 %	4	11 %	1	3 %	0	0 %	0	0 %	0	0 %	7	4 %
School feeding	4	4 %	1	1 %	1	3 %	5	13 %	0	0 %	0	0 %	0	0 %	7	4 %
NGO relief / assistance / cash programs	5	5 %	1	1 %	2	5 %	4	10 %	0	0 %	0	0 %	0	0 %	7	4 %
Other	6	6 %	2	3 %	2	5 %	2	5 %	0	0 %	0	0 %	0	0 %	7	4 %
Traded in kind with other goods or help/services given	4	4 %	1	1 %	1	3 %	5	13 %	0	0 %	0	0 %	0	0 %	7	4 %

Households that source food from own crops or gardens was also expectedly higher in agropastoral regions (Turkwel, TAP, 18% and Kerio, KAP, 21%), as well as on average for FHH (14%) as compared with other livelihood zones where the utilization of gardens or own crops was virtually nil.

Food prices and availability: Seasonal price fluctuations affect most goods equally. Both staples and fresh produce are more expensive depending on varying levels of demand, which are linked to seasonal cashflows flowing primarily from livestock sales. High food prices were seen as directly linked to fuel prices.

Table 11: Average Reported Difference of Food Prices from "Low" to "High" by HH Respondents

FOOD PRODCUT	KAP	LTF	LUZ	TAP	TBP	TCP	Total
Orange-fleshed sweet potato (OFSP)	-	-	33%	250%	-	186%	180%
Watermelons	-	-	-	167%	-	-	111%
Sujaa, Amaranth, Kunde (Traditional Leafy)	13%	-	-	89%	-	-	65%
Cow Meat	67%	-	-	58%	63%	-	62%
Omena (imported fish from Lake Kisumu)	-	-	-	92%	33%	-	58%
Green Grams, Cow Pea (Local production)	-	-	-	100%	20%	-	55%
Cabbage	40%	-	8%	78%	72%	50%	54%
Camel Milk	-	-	-	100%	-	-	50%
Fish (local)	67%	-	7%	79%	75%	-	47%
Sorghum	27%	-	-	50%	84%	-	47%
Papaya	-	-	-	58%	-	-	44%
Bananas	57%	-	-	56%	-	-	42%
Camel Meat	33%	-	-	50%	33%	-	38%
Cow Milk	31%	-	-	39%	-	-	35%
Maize	34%	40%	-	33%	38%	-	34%
Kale, Spinach (Non-traditional Leafy)	42%	-	-	23%	56%	75%	33%
Mutton Meat	-	-	-	-	100%	-	33%
Goat Meat	42%	-	-	30%	32%	-	33%
Red Kidney Beans	26%	38%	-	51%	-	-	33%
Tomato	28%	-	-	35%	-	-	27%
Poultry Eggs	-	-	-	25%	50%	-	25%
Mangoes	50%	-	-	-	-	-	25%
Goat Milk	13%	-	-	19%	-	-	15%
Tree Tomato	18%	-	-	-	-	-	12%
Poultry Meat	-	-	-	20%	-	-	5%
Groundnuts	-	-	-	-	-	-	0%

Grand Total	34%	35%	3%	47%	47%	36%	39%

In the dry/lean seasons, most fresh produce and other commodities get more expensive. Like in Samburu, prices consistently doubled in the dry season months. Unlike in Samburu, demand for food and fresh produce is seen as lower during the dry/lean months. During the rainy season, food prices decrease as animal sales increase and cash is more available, thus increasing both availability and demand for foods in local markets.

"Let me start by talking about the market for goats. For those of us selling goats, we don't have a market when food prices increase. Goat buyers do not want us to increase our selling price for goats. There is no physical market for goats around… It is from these goats we get the money to go and buy food. In such cases, we put our goats in the vehicle. You are charged transport to take them to Lodwar or Kakuma. Some of them die by the time they get to the market, or they are weak. Others become sick and they lose weight. So you will sell at a cheap price. [Meanwhile] other expenses are waiting, like my accommodation and welfare"

Households in Turkana also depend on staple foods like maize/maize flour, sorghum, beans, vegetable oil/shortening. These are sometimes combined with vegetables, typically cabbage, tomatoes, kale or spinach. Many also eat fish in along the lakeside, with growing demand in Lodwar. Fish was less commonly eaten in other areas. Focus groups said they knew about fish, but couldn't find them at market.

In contrast to Samburu, households appear to have much greater access to fresh fruits like bananas, mangoes and papaya. Papaya are locally grown, or shipped from other countries. Maize and sorghum, a traditional crop, are locally grown, as is kale.

"During droughts most farms dry up and people concentrate on their emaciated livestock. When we sell an animal, we get less money and can't afford healthy foods. This really affects the entire family's health and nutrition."

Many in the focus groups said they don't have enough places to buy or sell diverse foods, even to meet the limited demand. Respondents saw a need for education on general nutrition and how to cook healthy foods.

External attacks from South Sudan, kidnappings by Kenyan *toposas*, and *wakora* raids from Pokot posed threats to women and girls and scared people away from markets.

Households sometimes chose to eat less so they could pay school fees, medical bills, and other expenses. Livestock are often seen as an insurance plan for households to cover such costs.

"During rainy seasons, people grow their food and feed their animals. During dry seasons, everything becomes expensive, and food becomes scarce. The livestock become malnourished. During the dry season, prices go up. That used to be what happened long ago, but now the seasons are the same. Currently fuel prices have made food prices expensive. Some households go for two or three days without food, but those with food will continue eating their food."

(Turkana, Loima, Lokipetot Areng'an, mixed focus group)

"Sometimes prices are cheaper. Even those of us with small incomes can access nutritious foods. When the economy is hard, especially with Covid-19, we ration our household's food and everyone suffers. No activities are done. Government restrictions,

Firewood and charcoal offer less reliable incomes as people migrate to towns where they heat and cook with jikos and electric ovens.

Fruits, vegetables, and staples brought from other regions are seen as more expensive, especially between January and May, and around back-to-school in September. Prices tend to rise for maize, beans, sugar, oil and fat. Vegetables and fruits (kale, spinach, tomato, bananas and avocados) are more expensive during rainy seasons (September to December) due to higher transport costs.

Several focus group participants said markets are seen as unhygienic, which discourages people from buying food, especially perishables. These respondents said better management and hygiene would attract more customers.

Household feedback on access to nutritious foods

Views on nutrition and nutritious diets: Foods like milk and meat were seen as most nutritious. Most focus groups members also said that varied food – like eating meat with fruits, vegetables, and grains or legumes – was healthier.

Feedback was mixed on eating to have enough energy versus getting the right balance of vitamins. Plant-based foods were mentioned in more detail

and variety than in Samburu. But the biggest impediment to a healthy diet was lack of money. Men tended to emphasize the importance of rice and beans as an alternative to meat and dairy, or to be eaten in tandem.

Respondents also mentioned getting sick from eating certain wild fruits or foods that had spoiled due to improper storage or preparation.

Fish, poultry, and eggs were seen as good sources of protein. Fruits and vegetables were cited as providing vitamins and give 'good health to families'. Groundnuts and fruits like watermelon and papaya were viewed as good for women, with higher demand at special occasions. Beans were seen to increase blood levels while meat 'builds the body'.

Women and girl's nutrition: Both men and women said lack of money was the primary impediment to women's and girls' nutrition, especially for pregnant women. Households buy cheaper and less nutritious foods in times of scarcity.

Women have input into diets and eating habits, the groups said, but they have little purchasing power. If women had access to capital to start businesses, many respondents felt they would have more income to buy healthier foods. This echoed the sentiment in Samburu that '*women can cook whatever foods they want, as long as they cook what their husbands bring them from the market*'.

"God protects and keeps livestock alive, because we don't have any income we can depend on… Money is the only thing that can make a person improve nutrition. Without money, nothing can happen, even if you discuss nutrition in a deeper way. We don't eat these nutritious foods because they're not available and they're too expensive.

(Turkana West, Lokichogio women's focus group)

"Unhealthy foods like wild fruits, bitter lemons, and arrow roots, or eating maize every day without anything else is unhealthy. That's not a balanced diet. Local and wild fruits are not nutritious. You don't get full. You just feel constipated."

(Turkana East, Morulem women's focus group)

"Nutrition is eating all types of food that provide nutrients. For us, what we can get is sorghum and maize. We cook maize and sorghum only, which makes our nutrition level low. We depend on burning charcoal and selling firewood, which helps us make it through the day. It is difficult to attain good nutrition because I

Women and families are seen as being "overwhelmed by responsibility" meaning that women cannot buy nutritious foods, often due to unemployment, or being reliant on unstable sources of income from activities like firewood collection, but that do not "earn enough money for food and school fees, and when you prioritize school fees, the family sleeps on empty stomachs" (Turkana East, Morulem women's focus group).

Some women said men will often refuse to give women money to buy food. Some men said women are housewives who stay home without jobs, which keeps them from getting healthy foods for a balanced diet. As was implied in Samburu focus groups, some saw women, girls and children's health and nutrition as solely women's responsibility. Both men and women cited a

general lack of specific knowledge of foods' nutritional value, and how to prepare and cook them.

Respondents said women need time for other household commitments. Many, especially widows, borrow to sustain their families. If shop owners deny them credit, the household goes without food. Larger households struggle more to keep up good diets and nutrition. According to one women's focus group respondent:

"My first point is the size of the family. You will not prepare a delicious meal if you have more than six people in the household, because everything is made larger quantities. That makes it tasteless, but we can still eat. The second point is most of us grew up in remote areas, where we weren't used to some foods or cooking styles, so we don't buy them. If my school daughter knows about them, then I buy foods like chapati, spaghetti, sujaa, sukuma wiki and spinach" (Turkana North, Lowarengak women's focus group).

Cultural constraints: Unlike in Samburu, focus groups in Turkana pointed to specific foods that certain groups should not eat.

Men are viewed to eat mostly meat. A balanced diet was seen as including foods that reduce allergies and malnutrition, or that cause obesity. Such foods included maize, beans, *kunde*, kale, watermelon and milk, in addition to animal blood, beans, maize meal, rice and potatoes, and greens.

Women faced cultural constraints that included not drinking fresh milk or eating meat while pregnant or breastfeeding, which men believed caused poor fetal development, complications with pregnancy, or poor growth in children.

"If your husband is not around, and you feel like taking meat, you're restricted by customs from eating any animal without the husband's consent. When you're in your monthly periods, you're not required to drink milk, because it may bring complications in the future, like not getting pregnant"

(Turkana East, Morulem women's

Women are seen generally as needing tea, porridge, avocado, meat, watermelon, meat soup, and milk. For pregnant women, nutritious foods are considered as the ones that give energy and stimulate the body while also protecting against disease. When not pregnant or breastfeeding, women and girls are seen as generally eating rice, porridge, beans, spaghetti, potatoes, meat and milk, and soft foods like spinach, or foods prepared with maize and wheat flour.

Young girls and young boys were seen as needing specific foods to do well in school. These aligned with healthy identified generally. However, boys were seen as able "to eat anything" or to be able to find for their own food. Girls were seen as being more "selective" for foods like rice, beans, spaghetti or chapatti. Participants believed boys need to eat more than girls.

> ***"The problem is that boys and girls dress differently. When a woman has seven children, four girls and three boys, budgeting for their clothing and foods is a challenge. This is because they have different preferences. If men in this area were able to solve this problem, it would be ok but currently we" aren't able to manage.***

Boys were seen as needing milk, banana, eggs, and meat, or in near the lake, fish. That's roughly the same diet as identified for men. Young boys were seen getting a variety of foods, mainly from animal products such as fresh milk, oil and bits of cheese ("to avoid constipation").

Boys were seen as eating maize with beans, ugali and other foods 'since they require a lot of energy'. Girls in school were seen as needed nutritious foods such as ugali, meat, fish, eggs and chicken, rice, meat, chapati, milk and fruits. Girls were seen as being 'strict' when taking food or preferring 'lighter' foods.

Infants and babies were seen as needing a wide range of foods, though respondents couldn't always say why. They listed foods like porridge, rice, spaghetti, meat soup, vegetables and fruits, milk, and *matoke* (boiled bananas or plantains). Infants and babies were seen as needing nutrients from protein, carbohydrates, vitamins and minerals in small quantities and proportions. Other foods mentioned were avocado, fruit juice, enriched porridge, or other "light foods" such potatoes, beans, and milk. Nursing mothers were seen as needing similar foods that would be carried through breastmilk to help the infants grow.

Elderly members of households were not seen as needing very different diets. Respondents generally cited similar foods such as spaghetti, porridge meat, eggs and potatoes, or *uji.* Some foods were recommended for improving eyesight and preventing achy joints diseases. As in Samburu, respondents suggested foods that were easier to chew, such as milk and bananas, rice and potatoes, ugali, and beans.

Market actor constraints and challenges in nutritious food supply chains

Overall market dynamics: In Turkana most foods and fresh produce are brought from other counties in western Kenya (Kitale, Eldoret, Kisumu, Kakamega and Trans-Nzoia). Traders and vendors see substantial growth in demand, as in Samburu. Overall, vendors sold similar commodities as in Samburu, though households in Turkana said markets had more fresh and prepared fruit. In rural Turkana, traders carried very few fresh foods and packaged products: grains, beans rice, maize, maize or wheat flour; milk (both powdered and fresh); cooking oil/fats; and sodas. In interviews, market actors said they stocked the following foods most often:

→ Pre-packaged milk/milk powder
→ Fresh milk from Somali traders/Salama depot
→ Maize/maize flour
→ Wheat flour
→ Beans
→ Rice
→ Goat meat
→ Spinach, sukumawiki
→ Tomato
→ Tea leaves
→ Sugar
→ Packaged sodas
→ Cooking oil
→ Soap/detergents

Lodwar has grown rapidly due to migration from the county interior due to droughts. The population and market are larger than Maralal's. Lodwar has more regular transport, with larger volumes of goods shipped there daily.

Goods shipped from western Kenya through Kitale take 12-14 hours to arrive, as opposed to 4-6 hours from Rumuruti/Laikipia to Maralal. Highly perishable items like tomatoes often spoil in transit, often resulting in losses for the Turkana businesses who ordered them.

Produce that arrives in good condition often has a short shelf life due to the lack of refrigerated transport or storage.

Demand for fresh produce seems lower in the interior. The quality of goods or the likelihood of spoilage was often mentioned as a reason for low sales. Transport costs are also seen as the primary driver of food costs and subsequent low demand. Seasonal price fluctuations meet skeptical consumers unwilling or unable to pay higher prices. Vendors say they often have to explain their pricing.

As in Samburu, Turkana saw low market demand in the interior, little differentiation among traders, and credit needs among customers who struggle to repay.

Seasonality and demand fluctuations: Unlike in Samburu, Turkana's demand for food rises with household cashflow during the rains with increased livestock sales. Demand for diverse foods also drops during government and NGO relief distributions during dry seasons from January to June. Demand varies greatly depending by season depending on the region and the rainfall. Vendors gave varying assessments of when demand rises and falls.

Some communities can grow their own food. Prices and food supplies seem directly affected by the rainfall and seasonal harvests in western Kenya, as traders tend to buy in bulk when food prices are lower. Heavy rains and flooding also cut off roads and supplies.

Migration with livestock also hurts food sales for traders (opposed to what was observed in Samburu). Sales also drop around back-to-school when families pay school fees. Sales rise when the rains return between late September and December.

Peak season sales can be double compared to low season. Small traders report sales of KES 5,000- 10,000 per month in low season, which roughly doubles in high season. Larger traders can do KES 20,000-50,000 in low season, but up to KES 100,000 per month during the rains.

Transport and insecurity: Transport issues were similar in both counties, in terms of high costs, low availability, and poor coordination for ordering – particularly for deliveries from outside the county. Insecurity was mentioned as a problem, though not as frequently as in Samburu.

The main transport constraints were delivery times from other countries. Motorbikes were also expensive, charging KES 1,000, plus fuel, to deliver from Lodwar to Lokichar, Lokori or Kakuma.

Frequent shipment delays and transport breakdowns lead to more spoilage. Sometimes goods initially purchased and shipped at a higher price will only get delivered when costs drop. That means they're delivered alongside cheaper goods, forcing traders to sell at a loss.

Commodities like maize, beans and milk are supplied via large stores through intermediaries. That make some aspects of ordering easier, but ordering through intermediaries also the costs for resellers. They also complain that ordered can get mixed up or go missing.

Credit, access to finance and capital: Most businesses interviewed did not have any access to finance or formal credit. Equity Bank was mentioned in one instance as providing credit for a business. Other businesses were wary loan terms and worried they wouldn't be able to repay. Many said they had limited information about loans or financial products.

As in Samburu, businesses said customers couldn't always repay store credit offered to buy food during dry seasons. Traders and vendors had difficulty managing these short and informal credit arrangements.

Market competition: Competition was also high in Turkana, with many selling the same or similar goods competing on price, sometimes selling at a loss to clear stock. Traders said struggled to compete for customers, especially given the low demand, hurting their incomes.

Sources of market information: All traders or vendors sourced market information from intermediaries, distributors or suppliers via WhatsApp or mobile phone. Some traders felt that relying on intermediaries limited their access to broader networks.

Associations, support and services for business development: Business noted several associations, though these were not ubiquitous. *Together We Can* and *Mganda* are local business and savings associations with fee-for-membership dues. No mission or description of the exact types of support was provided. Asked what could improve local businesses, respondents identified: WhatsApp groups, starter kits, loans and "contributions." Possibly referring to Mganda and Together We Can, respondents did mention that business services are always available, but in fact many services stopped after the pandemic.

Kaputir Business Association (KBA) was mentioned as a membership-based group that coordinates businesses to agree on pricing and product information. KBA provides lends money to businesses, for example, to cover school fees. Kikeunae Group and Atapar Ang'ang'olei Women's Group also provide loans and look after members' welfare. Some interviewees said other groups, like Mavuno Groups, offered business and management training in addition to loans.

Businesses had basic and mostly informal record keeping. Illiterate business owners relied on relatives to help but others simply didn't keep records. Other only kept receipts or stock-in/stock-out ledgers.

Plans for business expansion and growth: As in Samburu, Turkana market actors saw steady improvements in roads and communication that would help them grow their businesses.

Many of their expansion plans involved transport, like buying their own vehicles, while others said they needed assistance in designing business and marketing plans. Some wanted to see more wholesalers opening to increase stock availability and to reduce transport costs. Better storage facilities was also mentioned as a means to protect against theft and loss. Others sought to invest in roadside hotels and restaurants to cater to construction workers.

Most businesses would finance any expansion through their own savings but admitted that access to finance would help overcome capital constraints. Many expect that any future support from USAID Nawiri would involve the distribution of grant funding for businesses.

Respondents from BOMA Project REAP grant recipients: One interviewee was a REAP Grant recipient. She had opened a shop with two other women but was now a sole proprietor. Her constraints are virtually the same as other businesses: managing customer credit and market closures caused by pandemic restrictions.

Her advice was to provide business management and marketing training. She said demand for her products had dropped and that she'd had no training on how to manage increased competition from other shops.

Irrigation: production, productivity & marketing challenges

Turkana has a much longer legacy of irrigated farming. Many irrigation sites from the early 1980's are at least partially functioning today. Focus groups were conducted at eight sites: Nanyee and Kotela in Loima, Nadoto in Turkana Central, Lokori and Elelea in Turkana East, Kanaodon and Kaputir Nakwamoru in Turkana South, and Kaikor in Turkana North.

Often the sites don't have enough water for their crops, and reported similar challenges as in Samburu: lack of inputs, destruction by wild animals and pests, poor roads and market access during the rains, as well as group dynamics and governance issues. Virtually all the sites use canal irrigation, but carry water in buckets or jerry cans when canals aren't working. Only Kapoeta 2 in Turkana North pumps water through a drip irrigation system. It's also the newest. Operations began in January 2021, with 38 of the community's 50 households.

Kanaodon is fed by a stream on 210 acres, with up to 400 households and 1,000 individual household members. Women there said that over the last year, locusts and flooding destroyed their crops, with no government intervention.

Kaputir Nakwamoru is also fed by a river on 120 acres. Established in the early 1980s the site is older than most current members, which include around 500 women and 100 men. Another 400 young men and 200 young women, aged 15-24, cultivate more than100 sub-plots for individual farmers. A Catholic mission cleared the land for the original development. Later Turkana County built the canal, but it's no longer working. The county also provided seeds and pesticides. Members whose plots are near the riverbank carry water with jerrycans to water their crops.

Nadoto was established in 1984 and has around 850 registered households. The site isn't functional because the canal is filled with silt and prosopis trees have covered the entire farmable area.

Kotela includes 266 households, with 350 individual members. Around 200 actively farmed in the past 12 months. Established in 1981, Kotela is managed by a team of farmers led by a chairperson.

Loima Nanyee is fed by a stream on 120 acres with over 100 plots.

Elelea was established in 1983 on 60 acres along the Kerio river. It is fed by canal and includes 1,200 women and 800 men who farm on 120 plots. Some 2,600 of the community's 3,100 households participate.

Lokori, started in 1984, is also fed by a stream, on around 2,500 acres.

Experience with irrigated agriculture: As in Samburu, focus groups in Turkana said farming transformed their lives – when irrigation works. Most focused on growing food for themselves, but many farmers also sold at nearby markets. This was less common and in smaller quantities than in Samburu, due to droughts.

Most sites experienced difficulties with water supplies due to the prolonged drought or the shifting course of waterways.

Turkana producers cited issues with group cohesion and getting all members to farm their plots, though generally participation seemed much higher than in Samburu – when there's water. Unprotected crops also suffered from pests, disease, locusts and wild animals like monkeys and elephants. Turkana respondents were much more upfront about their lack of access to quality seeds and fertilizers, and to agronomic support. Support had previously come through past projects, NGOs, and the county and national governments.

Crop production, home consumption and sales: In Turkana, most sites harvest maize and sorghum once a year, with yields of 100-200 kgs each of crop per member. Several sites also grow 2-3 cycles of the produce listed below. As in Samburu, the quantities are difficult to estimate because of the mixed-bag system.

→ Sorghum
→ Maize
→ Cow peas
→ Green grams
→ Beans
→ Pumpkins
→ Tomatoes
→ Onion
→ Spinach and kale, kunde
→ Watermelon
→ Biringanya (Eggplant)
→ Potatoes
→ Bananas
→ Papaya

Sales of staple grains and fresh produce are primarily to neighbors or neighboring communities—with market access being difficult for most sites. Some sites sell maize and sorghum to WFP, which has supported past production to purchase locally for refugees at Kakuma and Kolobeyei.

Crop selection: Like Samburu, crops are chosen based on availability of seeds, training, soil, water needs, and climate. Surplus sales were easier for sites closer to markets, or with better roads to Lodwar, Katilia, Lokori, Lokwii, Lorugum and Kalemunyang. Informal trade and barter occurs when goat traders pass through. Prosopis, or "woody weed," is spreading widely hurting farms.

Desired crops: If seeds and training were available, and if water supplies were more certain, focus groups indicated a desire to grow the crops below. Some are grown at some sites but not others:

→ Cabbage
→ Irish potatoes
→ Sunflower
→ Beans
→ Mangoes
→ Oranges
→ Bananas
→ Sweet potatoes
→ Groundnuts
→ Sugarcane
→ Papaya
→ Tomatoes
→ Watermelons
→ Onions
→ Green grams
→ Avocado

Many said that if canals were desilted and rehabilitated, or if additional canals could be constructed, they could produce more. Most respondents felt that the best investment would be in boreholes to pump water to storage tanks. The lack of fencing, nets or tarps was a major impediment to growing more and more varied crops.

Some respondents said seed saving made them less productive in subsequent seasons, except for maize, sorghum, green grams and kunde seeds, which are widely reused. These communities are

> ***"The vegetables that we are planting now are just a little portion. Initially, when the scheme was operating, when we used to have rains, we would plant sorghum and would eat it thrice a year. Maize we would only eat once. It was maize and cow peas. We weren't planting green grams. That was introduced recently. Because of the little rains, and the canal problem, when we planted them, they would dry up. People with generators pumped water. We used to plant even pumpkin and watermelon, because when you eats them, you're healthy***
>
> ***(Nakwamoru focus group)***

used to receiving free seeds from different organizations. Many respondents struggled to decide whether to produce excess crops because rains could cut off roads to markets or villages where they could sell their produce. Respondents had received training on the possibility of cultivating more drought-resistant varieties.

Groundnuts were mentioned because of recent interest by NGOs and private companies. At least one or two sites were growing groundnuts, which the groups said they understood were well-suited to their areas, as well as being nutritious and high value.

Agricultural training and support: As in Samburu, most sites in Turkana have received substantial support from NGOs, UN and humanitarian agencies, and county departments, including:

→ World Food Program (WFP)
→ Food and Agriculture Organization (FAO)
→ United Nations International Children's Education Fund (UNICEF)
→ National Irrigation Board (NIB)
→ National Agricultural and Rural Inclusive Project (NARIGP)
→ International Rescue Committee (IRC)
→ Furrows in the Desert
→ World Vision Kenya
→ French Development Agency (ADF)
→ Turkana County Government (TCG)
→ International World Relief

Donated inputs were seen as insufficient, leaving many producers either without or reliant on others sharing what they have received. WFP and FAO provided training on how to plant crops, intercropping, and crop rotation suitable to Turkana. Respondents also learned about crop spacing, using crop residues as fertilizer, and natural pest management.

Several sites were receiving assistance in clearing prosopis, and at least one site received support for managing locust invasions. Some NGOs used a cash-for-work approach to the land preparation and prosopis removal. Some sites had storage facilities built.

Some sites received fertilizers and pesticides, but these were rarely mentioned as being purchased by the farmers themselves. They rather came from outside organizations.

Furrows in the Desert provided training on drip irrigation and arid farming techniques, sometimes supporting the sites with free seeds, fertilizer, lipids and manure. International World Relief trained on kitchen gardening and a drip system in Lokitaung. The National Irrigation Board provided management and good governance training with FAO.

Key constraints to irrigated farming: In Turkana, many irrigated farms are quite large, but limited water doesn't allow for complete coverage. In prolonged droughts, all water dries up. Many sites are watering crops with buckets, sometimes from great distances if the nearby river is dry.

Canals are often covered with silt or prosopis. If rehabilitated, they would also need to be expanded so that water can reach all plots. Farmers also lack clean drinking water and are sometimes too hungry to work.

Where water intakes work, floods can waterlog plots or destroy them entirely with the rains. Rivers can change course, further limiting access to water. The labor required to maintain the sites also discourages participation – as opposed to using mechanized equipment to prepare land or to rehabilitate land so that it is less prone to being destroyed by flooding. The groundwater in Turkana is salty and fields often dry out.

> ***"The key challenge is the intake of water from the river. The second one is prosopis. We have no one to help us remove it. When we remove it in the morning, at night they grow again. There was a fence, but the Pokots destroyed it. We had a good fence here. The intake is our main challenge. There is no bigger challenge than this. Initially water flowed to our farms very easily because the water intake would distribute water. The water intake [for our canal] is our bigger problem.***

Markets are far away, making transport expensive, and farmers produce low volumes. Rains coincide with harvests, and make roads impassable. Irrigation sites lack storage for more perishable produce like tomatoes. Farmers also need better market information.

In Turkana, farmers at irrigation sites more often cited disinterest from local politicians, except during elections. County officials often claim that the government 'oversees' the irrigation site and promise to address farmers' concerns. On occasion they are told to stop farming because the county has other plans to assist them. But they have no transport to travel to county offices to ask about delays.

Access to finance: The farmers have no access to formal finance, even to learn about loans, Since they are growing for their own households, they were unsure if they would sell enough at market to make payments. But they were interested in learning about financial products.

Informally, a few savings groups exist and provide group members with loans. But no one mentioned if savings groups were used to access loans. At Kapoeta 2, respondents said they could borrow seeds and fertilizers on credit, repaying monthly without interest.

Loima Nanyee focus group

We want to be trained on planting. We could have beans that take three months to grow, but we don't know how to plant them. Another example is millet and sunflower. Such types of crops, if an NGO can train us, we will plant them. We can be given a tour of places where these crops are grown so that we may see it first-hand, like the one at Napuu where there are tanks that hold water.

We want more training. We want to be given more seeds, and the size of this irrigation site to grow so that many people can start planting. We have people who depend on the farmers here. If we expand the scheme, they will be self-reliant as well. We want to be given fertilizers so that our harvest will be plenty. They can take a sample of our soil and test so that they can recommend the right fertilizers for us to use. NGOs can empower the little farms that do not belong to Nanyee Irrigation Scheme because when I was in Ukambani I saw such farms producing foods.

The county government which oversees the farmers should buy produce from the farmers and not buy maize from Kitale or Webuye. They do not have to buy millet flour from Webuye when we have our own here. We have boarding schools here. The government should inform them of the foods available for purchase.

The county government should give us tenders to supply food to other areas.

The right way of improving farming here is by using new technologies. We saw in Kaitese a machine that was ploughing the land instead of women using their energies. The machine uses one liter of fuel and it plows so easily.

The government should [conduct] training-of-trainers or teachers who will in turn train other farmers. Because we have few extension officers, the TOTs will work with them to teach

Suggestions for improvements and future expectations for sites: Producers say improvements would require improved training and access to inputs, with heavy support to protect farms from flooding, pests, and animals, and to improve water access. Most sites see potential for marketing produce if they can grow surplus crops. Most sites view the possibility of mechanization of water resources and land preparation as key to improving productivity. Additional requests include:

→ Canals need drudging. Boreholes and solar pumps are needed to store and desalinate water to irrigate more land.
→ Homestead gardens with community-led training and support.

→ Improved agricultural training on new/different or expanded varieties of crops, particularly those that could be sold to market, as well as more planning help from extension workers and specialists.
→ Improved roads and transport.
→ Learning through exchange visits with top agricultural sites.
→ Mechanized land preparation, ploughs and clearing of prosopis. Making farming easier would encourage more people to farm.
→ Access to loans and financial services to but seeds, fertilizers and pesticides, as well as other implements.
→ Governance support to promote unity and joint decision-making among members.
→ Cash and food for work, or cash transfer programs for farmers as a financial cushion during droughts.

Market systems challenges & enabling environment

Turkana market actors say that the rules and regulations that affect their businesses the most are largely set by communities, such as when market days are scheduled and how markets are managed or governed. Taxes are present, but concern was raised around how taxes were calculated against sales. If sales are good, it is easier to pay taxes than when sales are poor and tax may make up a larger proportion of revenues. Government fees are not consistently excised at all local markets, bat small traders may struggle to pay them if they work in more than one market.

Trading licenses are not always received on time, and Turkana has raised license fees. The licensing process was seen as costly and slow. Trading without a permit risks additional fees or closure of the business.

In Turkana, sales dropped the county provided food relief. Covid restrictions also closed markets, imposed curfews, and limited gatherings.

5. Market-Based Programming Response and Design Recommendations:

Overview

The final report's recommendations are summarized here. This section provides an overview of strategies for market-driven interventions to improve the availability and accessibility of nutritious foods. Targeted programming areas within these recommended intervention areas provide a framework for a USAID Nawiri Market Systems Approach built around key actors who are sufficiently market-engaged.

Food systems and market strengthening through transport and wholesale

Strengthen food system supply chains through aggregation/distribution, transport, vendor, and wholesale networks by focusing and leveraging investment and access to finance in the transport sector

- Reduce the atomization of ordering, distribution, and transport costs by supporting food systems actors to network and improve operations as well as business networks for improving coordination business-to-busines (B2B).
- Support transporters and wholesalers in primary and secondary county markets to improve business management skills and to prepare them to access finance, loans, and credit facilities.
- Link transport and wholesale businesses with credit facilities that provide working capital and capital investment loans to increase purchasing power, upgrade facilities or equipment, and adopt appropriate technologies for more efficient transport. That could mean more and larger transport vehicles in service, and better storage to reduce spoilage.
- Support MSME associations in both counties to build networks among remote trader and markets at all levels.

Facilitate capital investment in appropriate storage facilities for primary markets and wholesalers, while looking for right-sized storage solutions so MSME food traders and vendors can smooth supply constraints through more regular bulk purchasing and transport

- Commission a technical study to identify opportunities for capital investment in appropriate storage throughout the supply chain to reduce spoilage and make bulk ordering practical.
- Partner with finance sector to create a lending portfolio and pilot products that transport, wholesale or logistics businesses could use to deliver food more efficiently and cheaply.

Leverage BOMA Rural Entrepreneur Access Project (REAP) model

Improve market coordination among established MSMEs to organize associations through business development support, increased investment, and access to finance. Leverage potential leadership capacities of REAP beneficiaries.

- Provide incentives for MSMEs to register themselves formally to associate formally under the registration of business associations or Chama/Village Savings and Lending (VSL) groups to link them with SACCOs or other (formal) financial institutions. Advocacy around the assistance for business and group registration will be crucial to navigating complicated bureaucratic requirements for entrepreneurs who may likely have literacy challenges.
- BOMA Project REAP grant-funded business recipients can anchor registration and incorporation of these associations, and can lead on planning, marketing, and support for similar food businesses—including the bulk purchasing and ordering of inputs, materials and supplies.
- Leverage and/or improve the BOMA-REAP "business graduation" model to further assist and target grant recipients in improving local business skills and market readiness among more market-ready entrepreneurs who can potentially anchor and lead business groups.
- Link MSME traders with business support services that allow for improved ordering, purchasing and logistics to remote areas.
- Facilitate any additional or needed capacity development support through local private sector, finance sector and/or public services to improve business management and readiness to access more formal finance support from bank, SACCOs—including supporting the improvement of access and relevance of Digital Financial Services (DFS).
- Facilitate linkages with sources of finances and/or grants (e.g. LMS small grants, NARIGP, etc.) to expand access to capital and loans beyond REAP startup funds.
- Leverage integration of REAP and non-REAP businesses into the *REAP for Nutrition* design focused on scale up interventions around demand aggregation by small businesses.

Dryland irrigated agricultural production and local market supply

Link farmer groups and agro-pastoral communities with improved agronomic extension, marketing support, and access to finance. Ensure that extension services are modeled as a cost to doing business, or through agreements with among agribusiness/input service providers, credit/finance services and farmer groups.

- Invest in a selection of sites to improve irrigation through:
  - Borehole/well construction; desilting, clearing and reconstruction of canals; reconstruction of sites for better flood management and drainage
  - Installation of solar pumps and large raised storage tanks
  - Installation of piping systems
  - Installation of controlled environment enclosures (e.g. raised netting, screens or plastic tarps)

  - Installation of solid barriers to prevent intrusion of wild animals, livestock, or vandals or thieves
  - Training on management and good governance through community engagement platforms
- Support development and expansion of local public extension and private agribusiness services
- Demonstrate the viability of commercial farming at "model" irrigated plots *in tandem* with commercial services that can provide training on climate-smart agriculture practices using local services:
  - Input supply, soil testing and appropriate production modeling applications
  - Mechanized services for land management/preparation and conservation agriculture
  - Training on fertilizers and pest management
  - Training on cropping systems, crop rotation, cropping plans/calendars, budgeting, and marketing

Access to Finance (A2F) partnerships and USAID Nawiri resource positioning

Work with finance sector partners to build a management structure, due diligence and governance systems under a USAID Nawiri Access to Finance (A2F) Facility to create new products and services for MSMEs, businesses, groups/associations and producers.

- Create a competitive public tender application for a finance sector partnership that will design and manage any future USAID Nawiri Access to Finance (A2F) component to be awarded to viable organizational partner like AceliAfrica; Palladium/Kenya Investment Mechanism, KIM; Oikocredit; SNV, or AgriTerra.
- Conduct landscape mapping exercise of relevant finance sector organizations, institutions, projects and programming.
- Use that mapping to identify other actors who might complement or participate in leveraging their finance portfolios into USAID Nawiri's market-based programming.
- Decide what financial products would work for USAID Nawiri target groups and markets, such as: first-loss position funds, revolving funds, grant or challenge funds, or co-investment funds.
- Decide how to teach financial literacy and business management to MSMEs to lower their risk profile to access grants, loans, revolving funds or capital investment grants.
- Use a pre-positioned challenge fund, finance facility, or other financing opportunities through USAID Nawiri A2F programming for larger businesses to co-invest in dairy, poultry, groundnut/contract farming, livestock feed formula processing; and livestock fodder.

Market demand creation and promotion of nutritional foods

Developing ‘smart vouchers’ to stimulate year-round buying of both fresh produce and other essential foods

- USAID Nawiri’s educational efforts should include both men and women to address food purchasing dietary decision-making within households.
- Focus on foods already grown locally or available in markets.
- “Smart vouchers” could accompany education through local food supply networks and give households the ability to buy more fresh produce and necessary staples in the dry seasons. The system should ensure that people can buy a mix of foods, and that vendors can redeem vouchers for cash from USAID Nawiri.

6. Conclusions and the way forward

In answering the research questions, some assumptions in those questions were not as relevant as initially thought. In particular, the structure of value chains for individual foods is not as significant as looking at how commodities are bundled, transported, marketed, and distributed.

→ What are the preferred and less preferred affordable nutritious diets within target populations in the different target zones/sub-zones disaggregated based on the preferences of women versus those of men?

Households have a basic and functional understanding of healthy diets and good nutrition. Indeed, diets have shifted away from traditional diets heavy with animal products and now incorporate a broader range of fruits, vegetables and fresh produce, including grains and legumes. This is largely due to improved roads, communication, and linkages to outside markets.

People know about diverse foods and are willing to eat them. The obstacle is low purchasing power and strained incomes due to the severe impact of drought on livestock and a lack of alternative livelihoods.

→ Is there a viable business case to strengthen supply chains for preferred and less preferred nutritious foods?

In short, yes there is. Households and market actors see supply chain constraints as an important issue. Supply chain inefficiencies and a lack of finance mean that these nascent yet growing markets struggle to grow and compete. Better supply chains would lead to better prices. That would also expand the distribution throughout county interiors to meet the growing demand.

Food supply in Samburu and Turkana depends on transport from other counties. Even though supplies are readily available, transport problems and ineffective wholesale markets make it expensive to ship and distribute goods. Spoilage and waste are high, shrinking margins for supply chain actors and driving up consumer prices.

Improved storage and warehousing within better functioning wholesale markets could capitalize on bulk transactions that lower prices. Wholesale and transport businesses need finance to make bulk purchases. That could lower prices locally. Farmgate prices in western and central Kenya can increase by up to 1,000% by the time foods reaches remote markets in the interior of Turkana and Samburu. Fresh produce there is more expensive than in high-end retail shops in Nairobi.

→ What are the nutrient dense food value chains, the structure, key actors, coordination challenges, opportunities, and constraints to the competitiveness of the value chains in improving year-round availability of affordable and nutritious foods?

Nutritious foods don't have a distinct, isolated value chain. Rather, foods are delivered from other counties, usually in mixed shipments from the Green Belt in central and western Kenya. An abundance of foods is available through these networks, but availability of specific foods depends on how much households can spend and how close they are to markets near towns. Grains like maize and wheat flour are standard consumables. But buying of legumes (beans, lentils) or fresh vegetables (leafy greens, cabbage, tomato) and fruits (banana, mango, watermelon, avocado) largely depends on household cashflow. Overall, low household incomes lead to low demand for these products, which discourages traders from stocking them.

→ What is driving the high prices of staple food? What is the impact of high prices on women's and men's purchasing power?

High food prices are driven by a confluence of factors, namely: high transport costs due to increasing fuel prices and poor logistics due to inefficient wholesale markets. Demand is inconsistent outside of Lodwar and Maralal due to limited and seasonal purchasing power tied to livestock sales. If local businesses could order in bulk, they could smooth supplies and lower prices. To do that, they would need working capital and better storage solutions.

While women are experiencing more social mobility and influence over households, they still don't have much income or assets, leaving them subordinate in household decision-making. That includes decisions on food and diets. Men tend to take livestock to the markets where food is sold, so they also tend to buy the food. Where women hold more assets and earn their own money, they can have more influence over food and diets. Feedback suggests that while everyone in the household can eat the same foods, women, girls and children don't always get enough.

→ What tools, technologies or practices most effectively reduce consumer purchasing price and elasticity of demand?

Technologies within the transport and wholesale sectors could significantly improve price elasticity. Reducing waste, improving bulk ordering, and cold-storage shipments could greatly reduce the atomization of transactions for wholesale and retail businesses alike. Improved logistics with small/rural traders could improve efficiency.

If the general *smoothing* within supply networks could occur while increasing competition on price, this could also encourage changes in networking and coordination. That could go a long way to making foods more affordable and available year-round. This approach could address demand without significant increases in net household income. At a minimum, it could meet existing demand from remote areas for more nutritious foods.

Even with major investments in irrigation, existing farms can't produce enough food to lower local prices. Food prices are most affected by prices in western and central Kenya. However, investments in irrigation would increase local food availability and household food security.

→ What are the key systemic market constraints that present critical bottleneck to nutrition within each specific geography and how do the systemic constraints affect women and men in different age and life stages?

Households can't afford to buy more diverse and nutritious foods, even though they want to.

Supply bottlenecks occur because of logistics problems, high transport costs, and lack of access to capital, finance, and credit facilities. These inefficiencies result in higher food prices and lower demand. Diminished food availability for households does not seem to vary based on age or gender.

→ What are the current social/cultural norms and institutional structures of markets and nutrition dense value chains that contribute to disparities of women and men in access and utilization of nutritious foods?

Cultural norms centered on specific foods and specific times, such as during pregnancy or breastfeeding. They do not limit demand for nutritious foods. Feedback from respondents shows that communities have a basic understanding of nutrition and have a range of alternatives that could make up any deficits caused by cultural prohibitions. Incomes, rather than culture, prevent people from buying nutritious foods.

→ What, if any role, does the Boma Project's Rural Entrepreneur Access Project (REAP)model, an adaptation of poverty graduation model that has been tailored specifically to the unique needs of the ultra-poor in the drylands of Kenya currently play in last mile supply of affordable nutritious foods and how might this be improved or complemented with other activities?

BOMA Project REAP grant recipients demonstrate that access to startup capital can lead to the establishment of viable micro and small businesses. These improve household incomes and grow economic opportunities for women. REAP-supported businesses could improve their businesses with additional training and support. They could serve as a model for non-REAP businesses by piloting an accreditation program that would help businesses accessing finance for capital investment and credit. REAP-supported businesses could anchor the formation of business associations. Membership and shared resources could be used to access banks, SACCOs and other formal institutions.

→ Is there a viable business case, including social enterprise, for use of previous dryland irrigation efforts to be used for local market supply? Why have attempts to expand

irrigated micro-, small- and medium-scale production, such as Turkana's and Samburu irrigated gardens not achieved the desired acreage and food production potential? Is the business case viable for women and youth when considered against their specific constraints?

When communities grow their own food, they eat better and earn more. Farming at any scale can significantly reduce dependence on livestock.

Most irrigation sites are in disrepair and unproductive due to water shortages and broken-down equipment. Group dynamics limit participation, and poor governance makes maintenance and planning difficult. Irrigated farms need access to seeds, fertilizers, pest control measures or basic farm tools, as well as agronomic support on farm management and climate-adaptive farming,.

These farms simply don't have enough water, and communities need to spend their time caring for livestock. Irrigation sites require massive investment to overcome their challenges. The recommendations above stand for improving the performance of these longstanding projects aimed at building community resilience.

Next Steps

USAID Nawiri should lead in forming and formalizing an engagement strategy for public and private sector partnerships to refine, develop, and expand on strategic approaches around the interventions outlined above. Crucially, tendering and/or developing a formal agreement or MOU/LOA for engaging with an Access to Finance partner will ensure that the capital requirements and finance are tailored to the contexts of both counties—and that products and services can come online with the right timing to target critical actors and target groups under the USAID Nawiri approach to sequencing and layering interventions. Formal financial institutions may be able to expand lending portfolios or provide critical linkages to SACCOs and banks, or to other organizations providing training and support.

Research into supply chain logistics, storage, and finance should be commissioned and contracted, potentially as a sub-component of the A2F programming agenda. This research would find solutions for storage and warehousing, including equipment or technology that can improve purchasing and shipments.

Feasibility studies led by the private (agribusiness) sector looking specifically at government-supported irrigation sites should determine potential commercial viability of investing in irrigation infrastructure rehabilitation and renovation to support recommended commercial farming systems. This should involve site-specific soil testing and soil ecology mapping to determine suitable regimes for crop rotation/intercropping systems, conservation and climate smart agriculture techniques, input use and applications for other mechanized implements or services—including farm management around crop production scheduling, budgeting, and marketing.

Further engagement with county governments should look at available resources and programming for supporting MSMEs and irrigated agriculture sites. The project should also leverage public extension resources in collaboration with private agribusiness service providers. USAID Nawiri public and private partnerships should aim to develop and improve availability of agronomic services and technical support to targeted irrigation sites under.

As was clear from the December 2021 validation workshops, county government are keen and eager to engage in or see partnerships formed that can stimulate private sector growth and investment in agriculture and local markets. County governments also have a critical role to play in establishing and enforcing the regulatory enabling environment for food markets and for commercial agriculture to proliferate and improve performance in both counties. Reducing insecurity around markets and trade can not only bolster economic growth and increase investment but can also serve as a lynchpin to sustained peacebuilding efforts in both counties.

USAID Nawiri programming interventions should also aim to build public sector engagement and support for the improved management and governance of markets and businesses (e.g. licensing and registration, fees, taxation and penalties, etc.) in the two counties; where processes should also accompany or inform decision-making around public investment in market infrastructure (roads, physical markets or aggregation centers, storage/warehousing facilities, etc.). A strong policy and advocacy component in this respect could provide additional evidence-based support to local government to identify opportunities for improving the business-enabling environment around a potentially more favorable and targeted regulatory regime that would also improve market system functions around food supply.

Annexes

Annex 1: List of Key Stakeholder Consultations

Samburu		
Public Sector		
#	Name	Organization/Position/Title
1	Francis Nganga	Deputy Director Department of Livestock
2	Ronald	Department of Livestock (Poultry Program)
3	Frank Leshoro	Director Trade Department
4	David Lekunke	Depurty Director Office of Revenue
5	Mr. Engasia	Department of Agriculture
6	Daniel Lempei	Department of Revenue, Office of Budget
7	Miramu Lethuntu	Department of Revenue, Wamba
Private Sector		
#	Name	Organization/Position/Title
8	Bila Kupe	Agrovet Dealer, Maralal
9	Edwin Chesire	Samburu Dairy Farmers Cooperative
10	Joseph Kamaru & Veronica Wajira	Subukia Green Grocers
11	Husein Burale	Isiolo Trader/Supplier
12	Mary Nguguna	Wamba Wholeseller
13	Mannash	Wamba Retailer/Shop Vendor
14	Antony Kimani	Owner Billionaires Food Palace (Poultry, Dairy, Feed/Miller)
NGOs/Humanitarian Orgs		
#	Name	Organization/Position/Title
15	Watson Lepariyo	ILRI Monitoring and Evaluation Program Officer

Turkana		
Public Sector		
#	Name	Organization/Position/Title
1	Okata Gubewd	County Crops Officer
2	Karani Murumlia	County Agribusiness Officer
3	Samuel Kigen	Kerio Valley Development Authority Regional Manager
4	Nicolas Rono	National Cereals & Produce Board Department Manager

5	James Ekuwom	Sub-County Livestock Production Officer
6	Wilson Ejiye	Deputy Director, Dept Trade (Trade, Gender & Youth Affairs)
7	Philip Ebei	CEC, Ministry of Agriculture
8	Dr. Jacob Lolelea Natade	Chief Officer, Ministry of Agriculture
9	Pius Ewoton	Executive Chair, Turkana Chamber of Commerce
10	Benson Akol	Director Cooperatives
Private Sector		
#	Name	Organization/Position/Title
11	Nikita Chandaria	Deputy Executive Officer Insta Products
12	Esther Lokisa Lokwangale	Lowdar Fresh Market Shop Owner
13	Andrew Long'ori	Secretary Lodwar Fresh Market / Shop Owner
14	Pius	JP Ventures & Logistics
15	Mickline Ebei	Nateleng Poultry Coop - Committee Treasurer
16	Angeline Ekipetot	Nateleng Poultry Coop - Committee Member
17	Harun Kimani	Owner/Mgr, Ziwani Poultry Enterprises Ltd., Nairobi
18	Lincoln Mbogo	Project Manager Full Spoon (Groundnut), Nairobi
19	John Manyasi	Sidai Agrovet
20	James Ambani	Value Villages (Loropio Feeds)
21	Brizen Were	Learning Lions Loropio
22	Francis Lochuch	Ngamia One Mills, Maize Flour Fortification
23	Victor Juma	Natoot Farmers Group (Vegetable and Fruit Cooperative Lodwar)
NGOs/Humanitarian Orgs		
#	Name	Organization/Position/Title
24	Humphry	ACDI/VOCA-LMS Program Officer Turkana
25	Kaari Benido	FAOKE M&E Manager
26	David Kanda	BOMA Project
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Annex 2: Samburu Commodities Ranking Matrix

Table 1. Samburu Commodities Ranking

(Scale of 1 -10)	*Potential to increase HH*	*Potential to increase HH*	*Potential to reduce HH food*	*Potential to increase supply*	*Ties into County health/nutrition/*	*Leverage private investment*	*Potential to tie into women's*	*Positive influence on women's,*	*Existing practice to scale up*	*High level of existing demand*	*High potential for influencing*	*High potential to reduce prices*	*AVG*
Commodit													
1. Cow Milk	8	7	8	7	8	8	9	7	8	6	8	7	7.6
2. Kale / Spinach (Swiss Chard)	7	8	9	8	8	2	9	9	7	8	8	7	7.5
3. Poultry Eggs	9	7	3	9	8	8	9	9	8	8	6	5	7.4
4. Cabbage	7	7	8	8	8	2	8	8	7	9	9	8	7.4
5. Maize	8	8	8	8	8	8	6	7	8	8	5	6	7.3
6. Poultry Meat	9	7	3	8	8	8	9	9	7	8	4	5	7.1
7. Camel Milk	7	8	7	6	8	8	9	7	7	4	8	5	7.0
8. Goat Milk	6	8	7	6	8	6	9	7	8	4	8	6	6.9
9. Tree Tomato	8	8	5	7	6	4	6	8	7	7	6	8	6.7
10. Tomato	7	8	8	8	6	3	7	6	4	8	6	7	6.5
Goat Meat	7	7	3	8	8	3	5	5	8	8	5	5	6.0
Irish Potatoes	6	4	4	6	7	7	7	4	6	8	5	8	6.0
Pulses/Legumes (Biofortified Beans)	5	7	5	4	8	3	7	8	7	8	6	2	5.8
Bananas	7	7	3	7	6	4	6	6	6	7	5	6	5.8
OFSP	2	7	5	2	8	2	7	8	8	7	8	5	5.8

Papaya	6	7	4	6	5	4	6	8	4	4	5	8	5.6
Mutton Meat	5	5	3	7	6	3	6	6	7	7	5	5	5.4
Cow Meat	6	5	3	7	8	7	3	5	4	4	2	2	4.7

Annex 3: Turkana Commodities Ranking Matrix

Table 2. Turkana Commodities Ranking

(Scale of 1 -10)	*Potential to increase HH*	*Potential to increase HH*	*Potential to reduce HH food*	*Potential to increase supply*	*Ties into County health/nutrition/*	*Leverage private*	*Potential to tie into women's*	*Positive influence on*	*Existing practice to scale*	*High level of existing demand*	*High potential for influencing*	*High potential to reduce prices*	*AVG*
Commodities													
1. Sujaa,Managu, Amaranth, Dodo, Kunde (Kenyeji traditional veg.)	8	8	9	8	6	4	8	8	9	7	5	7	7.3
2. Goat Meat/Liver	8	5	7	9	8	9	5	6	9	9	6	3	7.0
3. Maize (Whole Grain, Larger Maize Milling/Flour)	4	7	8	7	7	8	7	8	8	9	6	5	7.0
4. Kale, Spinach (non-traditional veg)	7	8	8	7	6	5	6	8	7	8	6	7	6.9
5. Poultry Meat	7	7	8	7	7	5	9	8	7	6	5	6	6.8
6. Goat Milk	6	9	7	7	5	5	9	8	7	6	6	5	6.7
7. Groundnut	7	6	5	5	8	9	7	7	6	5	7	8	6.7
8. Tomato	8	8	8	7	6	5	6	8	7	8	4	5	6.7

9. Sorghum	6	7	7	8	7	6	6	7	8	7	6	4	6.6
Watermelon	7	8	5	7	6	4	6	7	7	8	4	8	6.4
Green Grams, Cow Pea (Local production)	5	6	7	6	6	4	6	7	6	5	6	7	5.9
Poultry Eggs	5	8	5	8	4	5	8	7	5	5	4	5	5.8
Fish (local fresh, dried without salt, fried/preservation)	7	6	5	3	4	7	7	5	7	6	4	5	5.5
Mangoes	6	8	4	5	4	4	3	7	5	4	4	4	4.8
Camel Milk	4	5	6	6	7	5	5	3	4	4	3	4	4.7
Camel Meat	6	4	5	6	5	5	2	4	7	4	3	3	4.5
Omena (imported fish from Lake Kisumu)	5	4	6	4	5	2	4	5	5	4	3	5	4.3
Cabbage	0	8	3	5	6	0	3	7	0	8	5	5	4.2
Red Kidney Beans & Lentils (imported)	0	0	0	5	4	3	4	7	6	6	5	7	3.9

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