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Desk Review Report

Understanding Nutrition and Health System Drivers of Acute Malnutrition in Arid and Semi-Arid Lands Kenya - Marsabit and Isiolo Counties

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Acronyms

ANC	Antenatal Clinic
ARI	Acute Respiratory Infection
ASAL	Arid and Semi-Arid Land
AWP	Annual Work Plan
BFCI	Baby-Friendly Community Initiative
CHS	Community Health Strategy
CHU	Community Health Unit
CHV	Community Health Volunteer
CIDP	County Integrated Development Plan
CMAM	Community Management of Acute Malnutrition
CNAP	County Nutrition Action Plan
CS-CDRR	Central Site Consumption Data Report and Request
CU	Community Unit
CWC	Child Welfare Clinic
DHIS	District Health Information System
FBO	Faith-Based Organization
F-CDRR	Facility Consumption Data Report and Request
FP	Family Planning
GAM	Global Acute Malnutrition
GDP	Gross Domestic Product
GOK	Government of Kenya
HMIS	Health Management Information System
iCCM	Integrated Community Case Management
IFAS	Iron and Folic Acid Supplementation
iHRIS	Integrated Human Resource Information Systems
IMAM	Integrated Management of Acute Malnutrition
IYCN	Infant and Young Child Nutrition
KAP	Knowledge Attitude and Practice
KDHS	Kenya Demographic Health Survey
KES	Kenyan Shillings
KNAP	Kenya Nutritional Action Plan
LNS	Lipid-Based Nutrient Supplement
M&E	Monitoring and Evaluation
MAM	Moderate Acute Malnutrition
MCH	Maternal and Child Health
MIYCN	Maternal Infant and Young Child Nutrition
MoH	Ministry of Health

MUAC	Mid-Upper Arm Circumference
NGO	Non-Governmental Organization
ORS	Oral Rehydration Solution
OTP	Outpatient Therapeutic Program
PEM	Protein Energy Malnutrition
RUTF	Ready-to-Use Therapeutic Food
SAM	Severe Acute Malnutrition
SBC	Social Behavior Change
SDG	Sustainable Development Goal
SFP	Supplementary Feeding Program
SMART	Standardized Monitoring and Assessment of Relief and Transition
UNICEF	United Nations Children's Fund
URTI	Upper Respiratory Tract Infection
WHO	World Health Organization
WFH	Weight-for-Height

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Executive Summary

Background

Despite global efforts to alleviate hunger and improve nutrition, malnutrition remains a global challenge. 144 million children under 5 years suffer from stunting, 47 million are wasted and 14.3 million are severely wasted. Malnutrition is persistent in Arid and Semi-Arid Lands (ASALs) with children of pastoralists demonstrating the highest forms of acute malnutrition compared to agrarian communities. Malnourished children, particularly those with severe acute malnutrition, have a higher risk of death from common childhood illness such as diarrhea, pneumonia and malaria. Evidence shows positive health and nutrition outcomes using the integration of nutrition-specific interventions, including nutritional counseling into health systems; however, evidence shows that sustaining this type of integration is limited. There is also limited knowledge as to how the health system and issues of coverage, access and quality of nutrition services are contributing to persistent levels of acute malnutrition in ASAL settings. While many studies have focused on identifying general and contextual drivers of acute malnutrition, few include investigation into how health systems could be effective in improving nutrition outcomes. During this study, Nawiri conducted a scoping review to determine the extent to which the functionality of the nutrition/health system in Kenya's northern ASALs has influenced persistent acute malnutrition rates. Based on that information, we identified a number of weaknesses—along with corresponding solutions—that can be addressed through Nawiri's programming to strengthen the nutrition/health systems and use the learning to inform Nawiri Phase 1 and 2 activities.

Study Design and Methods

The desk review (i.e., scoping review) set out to examine emerging evidence on how poor functionality of the health system in the ASALs of Kenya may be contributing to persistent child malnutrition. Data was derived from two main sources. First, Nawiri reviewed a range of secondary information, including peer-reviewed articles, reports, policies and grey literature on the drivers of malnutrition. Second, we conducted secondary analysis on existing health system and survey data sets. The document review was guided by prepared research questions, based on the health system building blocks and a relatively new framework on the drivers of malnutrition in Africa's drylands,1 which builds on the existing United Nations Children's Fund (UNICEF) causal framework on causes of malnutrition.[2] Articles published in peer-reviewed journals that met the relevant inclusion criteria were identified by searching multiple databases: PubMed, PROSPERO, COCHRANE Library, Google Scholar and the Google search engine. All retrieved references were managed using endnote.

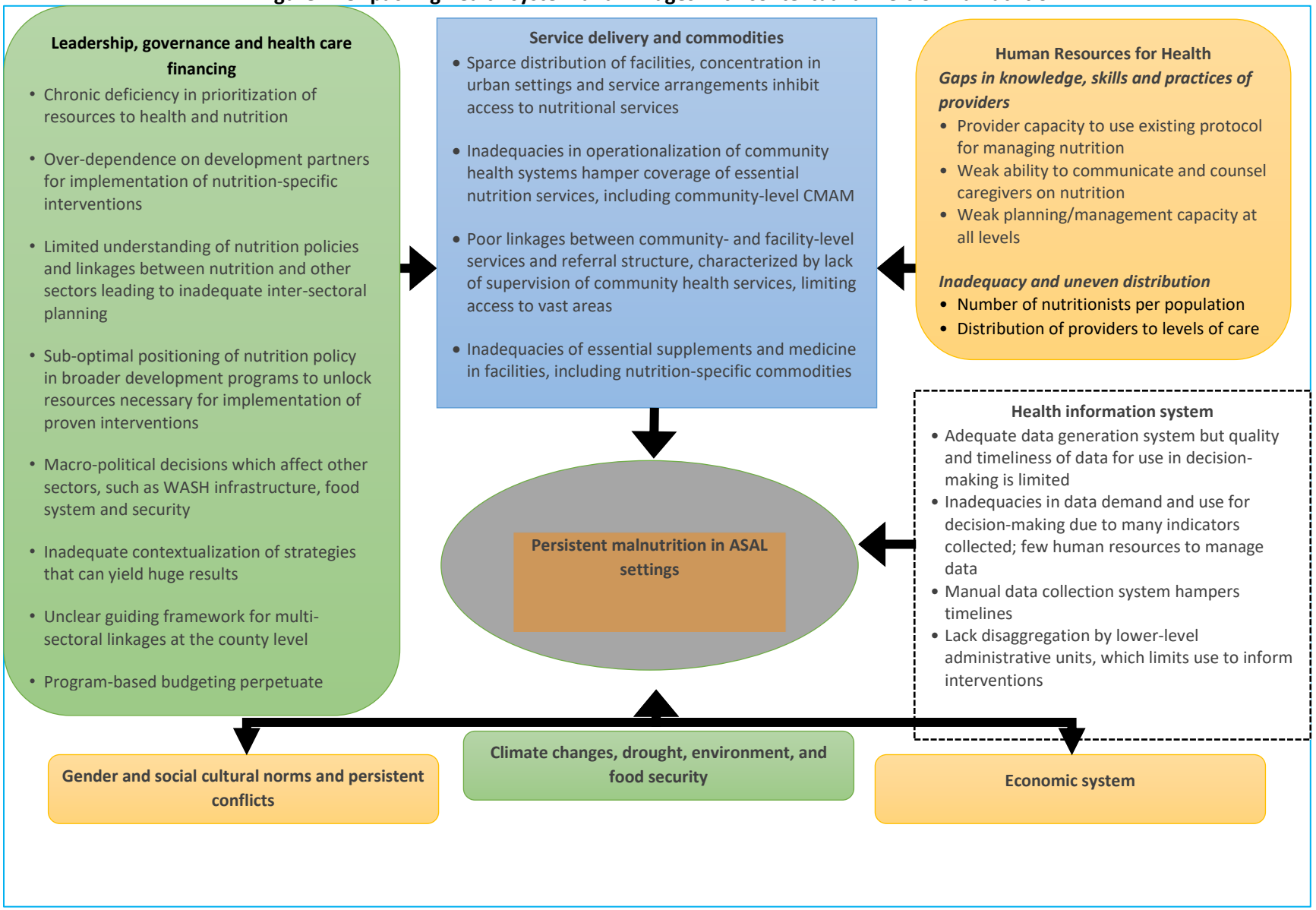
Secondary analysis of key nutrition/health system data was conducted to assess trends in the prevalence of acute malnutrition, caseloads and coverage of nutritional and health services among children under 5 years. Data from Standardized Monitoring and Assessment of Relief and Transition (SMART) surveys, Maternal Infant and Young Child Nutrition (MIYCN) assessments, coverage surveys and other studies. Data trends for the past 10 years were summarized for the following: prevalence, admissions and relapse rates of severe acute malnutrition (SAM); Global Acute Malnutrition (GAM); moderate acute malnutrition (MAM); performance indicators for the integrated management of acute malnutrition (IMAM) according to Sphere standards for cured, died, defaulted or nonresponse; child consultations at health facilities for

1 Nutrition in Drylands: Updating the framework to address acute malnutrition Tufts—Feinstein International Center.

2 The UNICEF conceptual framework provides a basis for assessment, analysis and action to improve child nutrition and development and is an effective tool for mobilizing communities and designing programs.

morbidities known to influence acute malnutrition (including malaria, pneumonia, diarrhea and Acute Respiratory Infection [ARI]); health facility staffing levels and their distribution; and geographic coverage of health facilities and community health units.

Figure 1: Unpacking health system and linkages with contextual drivers of malnutrition



Key Findings

We present five key findings on the burden of acute malnutrition in Marsabit and Isiolo Counties and the extent to which the functionality of the health system in Kenya's northern ASALs may be influencing the persistent levels of acute malnutrition. We also outline some recommendations for the Nawiri project.

Key Finding 1: Acute malnutrition is persistently high in Marsabit and Isiolo Counties.

- In Isiolo County, the prevalence of GAM has been 13 percent on average over the past 10-year period, which is above the threshold of 10 percent considered "critical."[3] The average SAM prevalence was 1.7 percent and stunting prevalence was 18.5 percent.
- In Marsabit County, prevalence of GAM has been above 10 percent on average over the last 10-year period, which is above the threshold of 15 percent considered an emergency. The average SAM was 2.7 percent and stunting prevalence was 31.3 percent.
- Environment and seasonality play a role in malnutrition and underpins factors that exacerbate nutritional problems. Environmental factors—such as harsh climatic conditions coupled with diminishing and degradation of natural resources, poor rainfall patterns, water stress and poorly coordinated management of water resources—shatter livelihoods, influence availability of food, and depress economic activities that contribute to persistent malnutrition.
- Poor water sanitation and hygiene precipitate comorbidities—such as diarrhea, pneumonia, malaria and intestinal parasitic infections—and underlie malnutrition. These are often associated with the confluence of the rainy season, which increases women's labor difficulty/length and adds to the prevalence of malaria infections, diarrhea and dwindling food reserves.

Key Finding 2: Acutely malnourished children admitted to outpatient therapeutic and supplementary feeding services in both Counties remained consistently high over the 10-year period and face a seasonal pattern.

- In Isiolo, the 5-year average for admissions (2016–2020) was 510 in the OTP and 3270 in the SFP. The highest admissions were seen in 2018, with 839 in the OTP and 5,779 in the SFP. Over the same 5 years, the main peak was January–March 2018. The period January–March is the quarter with consistently highest admissions: the 5-year average is 179 in the OTP and 1,127 in the SFP.
- In Marsabit County, a similar trend is seen. The average admissions for the same 5-year period were higher, given the larger population: 2,449 in the OTP and 14,494 in the SFP. Like Isiolo, the highest admissions were recorded in 2018 for SFP (17,734) but the highest for OTP (3,341) was in 2017. Also, like Isiolo, January–March was the quarter with the highest admissions, with a 5-year average of 961 in the OTP and 5,264 in the SFP. October–December was the quarter reporting the lowest average admissions at 632 in the OTP and 4,100 SFP. The largest peaks over the last 5 years were observed in January–March in both 2017 and 2018.
- Admission trends to IMAM services correspond to the seasonal factors' acute malnutrition, with the highest admissions occurring during the short dry season (January–March) and the lowest occurring during the short rainy season (October–December). This demonstrates the importance

3 A GAM value of more than 10% indicates an emergency. Commonly used thresholds for GAM/wasting include prevalence of 5% being acceptable, 5–9.9% considered poor, 10–14.9% as serious and >15% as critical.

of the short rains to the pastoralist's communities and that the failure of the short rains may have a greater impact on malnutrition compared to failure of the long rains. This may need further analysis to understand it better.

- Performance indicators for SAM and MAM treatment generally met Sphere standards for percent of exits recovered (above 75 percent), but the percent of exits who defaulted (dropped out of treatment) was often below the Sphere standard (e.g., above 15 percent).

Key Finding 3: The number of children under 5 years being brought to health facilities for treatment of common illness has also been generally high over the past ten years.

- In Isiolo, the number of child diarrhea cases presenting at health facilities has fluctuated over time, with a peak in 2019 at close to 10,000 cases. The number of child pneumonia cases presenting has followed a similar pattern but with the peak spreading over 2019 and 2020 with more than 10,000 children presenting in 2020. Malaria cases, meanwhile, have generally decreased in recent years from a peak in 2013 close to 10,000 to less than 4,000 cases in 2020.
- In Marsabit County, the total child diarrhea cases presenting at health facilities has been roughly double that of Isiolo but has followed a similar pattern, with cases remaining steadily between 16,000 and 24,000 since 2014 and a peak of just over 24,000 in 2019. The rate of children under 5 years with pneumonia cases accessing services mirrored that for diarrhea, with a peak of 19,000 in 2018. Confirmed malaria cases are proportionally much lower in Marsabit compared to diarrhea or pneumonia, and absolute numbers were lower than in Isiolo for many years, despite Marsabit having a much higher population.

Key Finding 4: Government resources are generally not prioritized for health, particularly nutritional services.

- While County budgets have overall been increasing since 2013, they remain quite low:
  - Marsabit has increased its County budget from KES 2.8 billion in 2013 to 8.02 billion in 2020/2021—a fourfold increase over eight years.
  - Isiolo has increased it County budget from KES 2.7 billion in 2013 to 5.2 billion—nearly double over the same period.
- While the portion of County budgets allocated to the health sector has also increased and now meets the Abuja commitment of 15 percent,[4] the national allocation to health does not, meaning the total value of County-level budgets remains low:
  - Marsabit's allocation increased from 17 percent in the 2015/2016 financial year, to 21 percent in 2017/2018, to 24 percent in 2018/2019 and 26 percent in 2019/2020.
  - Isiolo's allocation started off much lower at 1.8 percent in 2015/2016 and 1.9 percent in 2017/2018, but it has increased to levels similar to Marsabit in recent years—to 25 percent in 2019/2020 and above 23 percent in 2020/2021.
- The vast majority of funds allocated to the health sector are used for recurrent expenditures, specifically staff salaries. There is, therefore, very little infrastructure development budget, meaning the possibility to finance additional facilities to improve access in more remote areas of the counties is limited.

4 The Abuja Declaration of 2001 committed heads of state of African Union Countries, including Kenya, to allocate at least 15% of their annual budget to improve the health of sector (https://www.who.int/healthsystems/publications/Abuja10.pdf).

- Nutrition services are generally not covered by county budgets and thus suffer from an over-dependence on development partners, affecting the sustainability of nutrition services.
- Understanding of nutrition policies and linkages between nutrition and other sectors is limited, leading to inadequate inter-sectoral planning. Many approaches that could yield significant public health results are also not being adequately contextualized to the ASALs.

Key Finding 5. Nutrition staff are insufficiently allocated to and distributed across the two Counties, constraining access to quality nutrition services in many locations.

- In Marsabit County, 115 nutritionists continue to provide nutrition services across the county; however, there is a disproportionate distribution with most of them located in Saku and Moyale sub-counties where malnutrition rates are lower compared to Laisamis and North Horr.
- In Isiolo, 7 nutritionists (2 nutritionists, 5 nutrition technologists) against a target of 153, a shortfall of 146 officers and no nutrition technician in the County.
- Health service delivery approaches are not very contextualized to the ASALs; for example, there were reports that some assigned health workers do not speak the local language or appreciate the cultural dynamics and norms of the catchment population.

Key Finding 6. The quality and timeliness of nutrition data generated via the health management information systems is limited, constraining its use in decision-making.

- Routine data collection via the District Health Information System is in place, but the quality of data is likely being compromised by the sheer number of indicators data being collected, particularly because the number of health information officers available in the two Counties is low.
- Manual data collection hampers timely use of data for decision-making.
- Broader nutritional indicators generated from routine surveys often lack disaggregation by lower-level administrative units, which limit estimates that could inform interventions.

Key Finding 7: Insufficient and poor spatial distribution of health facilities and service arrangements—particularly outside of towns—inhibit access to nutritional services.

- Isiolo has 71 facilities—62 percent are owned by government, 22 percent are managed by private entities, 14 percent managed by faith-based organizations and less than 1.5 percent managed by non-governmental organizations (NGOs). Most facilities are concentrated in urban settings, with Isiolo sub-county with 42, Garbatulla sub-county with 17 and Merti sub-county with 12.
- Marsabit has 138 facilities—68 percent are managed by government, 21 percent managed by private entities and 10 percent managed by faith-based organizations. The coverage by sub-county followed a similar pattern to Isiolo with the bulk in the urban hub of Moyale sub-county with 48, Saku sub-county with 38, Laisamis sub-county with 28 and North Horr sub-county with 22.
- Not all facilities were open the whole day, making it difficult for users to access services. In Isiolo, less than 25 percent of facilities were open the whole day, while in Marsabit it was much better at 83 percent.

Key Finding 8: Functionality of the community health system is hampered by vast geographical areas, persistent conflict and low deployment of community health volunteers (CHVs)

- In Isiolo, there are about 760 CHVs. The majority are assigned to the more urbanized sub-county of Isiolo (42 percent), Garbatulla (35 percent) and Merti (22 percent). Of the 52 community units, only 60 percent are reportedly functional.
- In Marsabit, there are 1,884 CHVs. The majority are assigned to more urban sub-county of Moyale (33 percent), North Horr (27 percent), Saku (21 percent) and Laisamis (19 percent). Of the 102 community units, 87 percent are reportedly functional.

Recommendations

Health financing and health workforce

- Use financial and service data to advocate for increased allocation of budgets for the health sector at the national and county levels. The aim will be to increase the allocation for health at the national level to at least the Abuja commitment of 15 percent. At the county level, health budget allocations need to be at least sustained while increasing overall budgets.
- Support county-level governments to gradually take on more of the costs of the nutrition services from non-governmental and UN partners to improve sustainability.
- Increase the number of CHVs for both Counties and recruit and assign them equitably across CHUs.
- Budget for, recruit and equally distribute key health staff (including nutritionists) across facilities in both Counties. This may require revising staff motivation systems, especially for those working in more remote, “hardship” areas. Develop and implement strategies that attract and build the capacity of health staff from the local areas or those who speak the local language and appreciate the cultural dynamics of the population they are serving.

Community-level health services

- Increase resources, capacity building and other support to improve the functionality of CHUs, particularly in hard-to-reach areas.
- Improve outreach services covering a wider range of health services closer to the populations in need—particularly those who are far from static health facilities.
- Develop and sustain effective platforms and information products that support CHVs to advise the caregiver of the sick child on nutritional counseling and home treatment of illness (e.g., how to give Oral Rehydration Solution [ORS], zinc, antibiotics, antimalarials).

HMIS

- Support digitization of the paper-based health information systems to reduce cost and improve timeliness of data for managers and decision-makers.
- Explore opportunities to strengthen the data quality assurance process to ensure data collated from different sources are of good quality and can be promptly used for action and decision-making.
- Strengthen tools that support data collection at the community level (e.g., MoH 515) which are currently not well integrated into the HMIS. Use of community tools may need to be aligned well with other measurement approaches.

Nutrition services

- Promote joint planning and resource allocation across sectors for nutrition-sensitive interventions, including agriculture/food systems, social protection/ safety nets and women's/girl's empowerment.
- Support county governments to develop a clear strategy to take on responsibility for nutritional services in the health budget. This could be, for example, through operationalization of county nutrition action plans (CNAPs).
- Strengthen supply chain management for key commodities such as RUTF and supplementary feeding rations to ensure a continuous supply to improve access and adherence to treatment and reduce defaulting.

Conclusions

There is persistent acute malnutrition, as illustrated by GAM and SAM levels in both Isiolo and Marsabit Counties during the 10-year period between 2011 and 2020. It continues to be an ongoing and alarming problem. The levels of malnutrition mirror prominent childhood infections—such as diarrhea, pneumonia, and malaria. These are largely driven by the current health system (e.g., ineffective leadership in managing healthcare in ASAL settings), human and financial resources to manage nutritional services (including the capacity of providers at all levels of care) and service arrangements (requiring adaptation to the local context). A deliberate effort should be made to improve the quality of nutritional programs, including adoption of simplified and combined protocol to reduce the need to procure two separate products (e.g., SAM and MAM treatments). This will streamline program logistics and staff training and enable a more holistic continuum of care for children with acute malnutrition. Additionally, focused communication and messaging strategies should target girls, women and males with effective/timely nutritional counseling and appropriate/timely services that are contextually relevant.

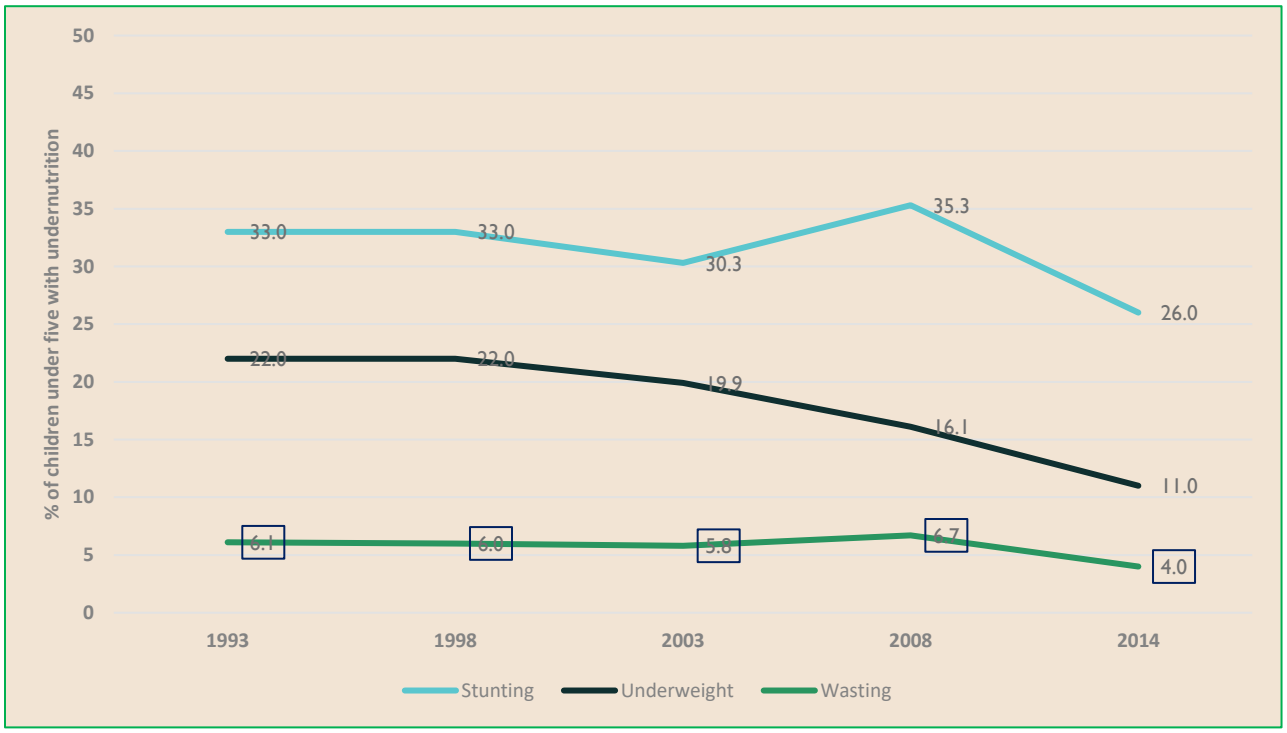
Another crucial link is strengthening the functionality of the community health system, which is influenced by vast geographical areas and persistent conflicts that hamper effective deployment of CHVs. Inadequate linkages between communities and facilities precipitate sub-optimal community-level programs and would require strengthening to ensure success of existing approaches—such as Community Management of Acute Malnutrition (CMAM). Since acute malnutrition has complex drivers that go beyond the healthcare system, understanding how the vulnerabilities of ASAL settings perpetuate challenges of the health system requires collaborative and interdisciplinary approaches to systematically address the drivers, interactions and pathways of acute malnutrition. Effective programming in the health system domain will require efforts that link with social programs and form better/practical strategies to ensure multisectoral approaches are optimized. This could be designed around a social and cultural system in order to encourage divergence of services at the community level in line with the livelihoods of ASAL communities.

Chapter One: Introduction

Background and Context

Despite global efforts to alleviate hunger and improve nutrition, malnutrition remains a global challenge. 144 million children under 5 years suffer from stunting, 47 million are wasted, with 14.3 million being severely wasted [3]. This, together with the emerging trend of children being overweight (estimated at 38.3 million) [3], illustrates the challenge of the "double burden of malnutrition" [4].5 Malnourished children, particularly those with severe acute malnutrition (SAM), have a higher risk of death from diarrhea, pneumonia and malaria. Nutrition-related factors contribute to 45 percent of deaths in children under 5 years and more than 50 percent of child deaths after the first month of life [5, 6]. In the Horn of African region, the median stunting prevalence is 31 percent, the median anemia prevalence in pregnant women is 47.3 percent and the median anemia prevalence for non-pregnant women is 39.8 percent [7]. In Kenya, there has been slow improvement of malnutrition trends among children under 5 years over the last 15 years (Figure 2—Source: Kenya Demographic and Health Survey [KDHS] 2014). The KDHS,6 shows that 26 percent of these children under were stunted, 11 percent were underweight and 4 percent were wasted [8]. The national prevalence of children under 5 years being overweight was 4.1 percent, which has decreased slightly from 5 percent in 2009. Conversely, Kenya's children under 5 years wasting prevalence of 4.2 percent was less than the developing country average of 8.9 percent [8].

Figure 2: National level trends of malnutrition in Kenya



5 Coexistence of overweight and obesity alongside undernutrition.
6 There is no nationwide data posted in 2014.

Malnutrition is persistent in ASALs areas characterized by seasonal and intermittent drought, which triggers food insecurity and culminates in high malnutrition rates [9]. ASAL settings are inhabited by pastoralists whose children demonstrate the highest forms of acute malnutrition compared to agrarian societies [10]. A study conducted in the Greater Horn of Africa showed the average prevalence of wasting level was 6–7 percent higher than the rates among populations with mixed livelihoods [11]. The ASAL areas constitute 88 percent of the total land area of Kenya [12], covering 23 counties [13]. ASAL counties are classified into five clusters: 1) the Agro-Pastoral cluster (West Pokot, East Pokot, Baringo, Kajiado, Laikipia, Nyeri North and Narok Counties); 2) Coastal Marginal cluster (Taita Taveta, Lamu Kilifi and Kwale Counties); 3) Northeast Pastoral cluster (Wajir, Mandera, Garissa, Tana River and Isiolo Counties); 4) Northwest Pastoral cluster (Turkana, Marsabit and Samburu Counties); and 5) South Eastern Marginal cluster (Meru North, Tharaka Nithi, Mbeere, Kitui and Makueni Counties) [14]. The prevalence of acute malnutrition has been consistently high in these settings for a long time. In Isiolo and Marsabit Counties, acute malnutrition has remained above emergency levels, despite significant efforts to tackle the challenge [14]. In both Counties, the quality and coverage of Integrated Management of IMAM services has been below the Sphere standards [15, 16] coupled with high rates of related morbidities [17].

Kenya has initiated several policy and programmatic efforts aimed at addressing nutrition problems in line with global evidence and anchored in global and regional frameworks including the African Regional Nutrition Strategy 2015–2025, World Health Assembly 2025 nutrition targets and the Sustainable Development Goals (SDGs) [18]. Country-level efforts are rooted in the 2012 National Food and Nutrition Security Policy which has been used to develop the National Nutrition Action Plan 2012–2017 [19] and subsequently the Kenya Nutrition Action Plan (KNAP) 2018–2022 [18]. This current KNAP spells out the investment required for Kenya to address malnutrition in all its forms and for all ages and promotes cross-sectoral collaboration to sustainably address the social determinants of malnutrition. It also provides an umbrella framework and guidance to counties, which in turn are supposed to develop CNAPs, in line with the constitution requirements [18].

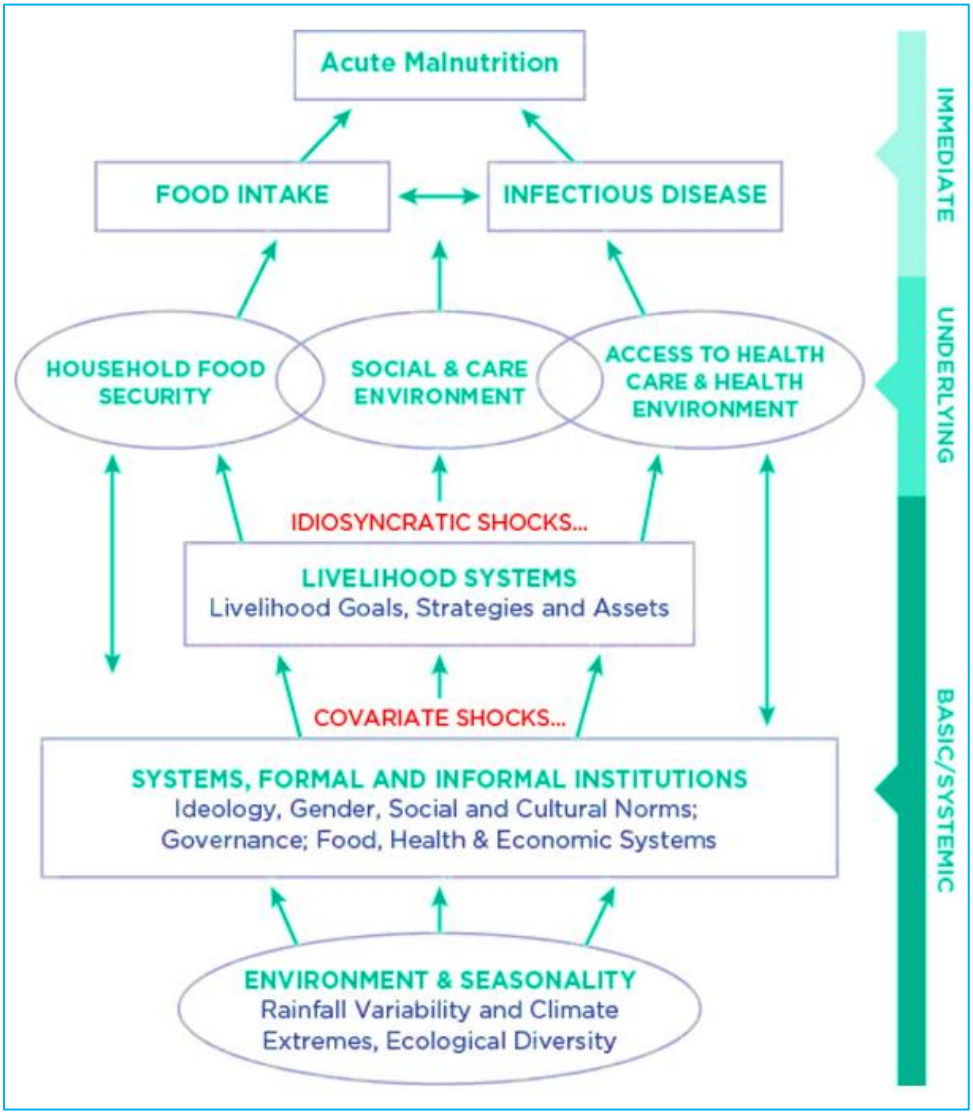
Understanding Drivers of Malnutrition

In the 1990, UNICEF developed a conceptual framework of elaborating the drivers of acute malnutrition; this framework remained the starting point for understanding the causes of malnutrition for three decades [20]. It recognized the need to understand causality at the micro- (individual or household) and macro-levels (local communities and society). The immediate causes of malnutrition capture the physiological reasons for an individual child to become malnourished (related to food intake and disease), which in turn are driven by the underlying causes (inadequate household food security, care of women and children, the health environment and access to health care). These reflect the institutional or administrative level at which drivers of malnutrition operate [21].

In 2002, a revised version of the UNICEF framework was introduced by Young and colleagues for the dryland contexts such as in the ASALs [21]. This adapted framework provides synergy between immediate and underlying causes and further develops the basic and more systemic drivers of acute malnutrition in drylands. The framework includes three interlinked areas: environment, seasonality and livelihood systems [21]. The framework recognizes the transformative impact of conflict and climate shocks on systems and institutions, livelihood resilience and adaptation. In order to reduce vulnerability and build resilience, the role of formal/informal social and political systems (including governance) are emphasized. Gender is highlighted as a cross-cutting issue and a fundamental aspect of social norms and values heightens its importance, as an underlying cause of acute malnutrition (Figure 3).

More recently, the 2020–2030 UNICEF Nutrition Strategy introduced a Conceptual Framework on the Determinants of Maternal and Child Nutrition, which builds on UNICEF's 1990 Conceptual Framework on the Causes of Child Malnutrition [20]. The new framework acknowledges the evolving face of child malnutrition, which manifests itself as a triple burden: undernutrition (including stunting and wasting), deficiencies in essential vitamins/other micronutrients and overweight/obesity. These forms of malnutrition, which often coexist, are driven by poor diets and poor care practices and services. The framework also highlights the role of diets and care as immediate determinants of maternal and child nutrition. Good diets are driven by adequate food and feeding while good care is driven by adequate services and practices. The co-occurrence of good diets and good care leads to adequate nutrition for children and women across the course of one's life. It also describes what contributes to good nutrition in children and women, providing conceptual clarity about the enabling, underlying and immediate determinants of adequate nutrition; their vertical and horizontal interconnectedness; and the positive survival, growth, development, performance and economic outcomes resulting from improved nutrition [22].

Figure 3: Nutrition in Africa's drylands—a conceptual framework for addressing acute malnutrition



Study Rationale

Globally, there is considerable evidence of positive health and nutrition outcomes resulting from the integration of nutrition-specific interventions into health systems [23, 24]; however, evidence is limited, including how to integrate nutrition services without negatively affecting the delivery of other essential health services [25, 26]. In addition, the importance of multisectoral actions to address the underlying determinants of undernutrition has been emphasized [26]. However, there is limited knowledge as to how health system weakness—particularly access to and the quality of nutrition services—are contributing to persistent levels of acute malnutrition in ASAL settings. While many studies have focused on identifying general and contextual drivers of acute malnutrition, few include investigation into how the health and nutrition systems could be more effective in improving nutrition outcomes. The desk review was commissioned by Concern Worldwide, who provided technical leadership in the Nawiri consortium, a 5-year program implemented in Isiolo and Marsabit counties. Information gleaned from the desk review—together with other studies on market and private sector potential and the analysis of the temporal and spatial distribution of acute malnutrition and its underlying and immediate causes—will inform the design of Nawiri interventions for years 3–5.

Objectives and Purpose of the Review

The objectives of this review are to:

1. Determine the extent to which the functionality of the nutrition and health system in Kenya's northern ASALs has influenced persistent acute malnutrition rates.
2. Propose how identified weaknesses can be addressed through Nawiri's programming to strengthen the nutrition and health systems and gather information to develop more comprehensive activities for Nawiri Phases 1 and 2.

Chapter Two: Desk Review Methodology

We conducted a scoping review to examine evidence on how a health system contributes to persistent malnutrition [27]. The focus was on access, coverage, utilization and quality of health and nutrition services in ASALs. Data for the scoping review was derived from the synthesis of reports, policies and grey literature; analysis of secondary data; and peer reviewed articles on the drivers of malnutrition. The scoping review was guided by the research questions presented in Table 1.

Project Sites: Isiolo and Marsabit Counties

Isiolo County lies within ASALs of Kenya covering 25,350 km^2 with an estimated population of 268,002 [28]. It has three main livelihood zones: Pastoral (67 percent), Agro-Pastoral (26 percent) and Casual Waged Labor (7 percent). It consists of three sub-counties—Isiolo, Garbatulla and Merti. The County has four seasons. The *dry season* between January and February is characterized by brief rains with reduced milk yields, migration to a dry season area and land preparation. The *rainy season* between March and April is characterized by migration to wet grazing areas during the long rains and has a high calving rate with increased milk yields and reduced pasture/water stress. The *dry spell* between May and the end of October consists of little rainfall, increased distances to water/pasture sources and reduced water levels. During the *short rains* between November and December, agro-pastoral activities take place with migration from the dry season area to another area with increased milk yields and reduced pasture/water stress [29].

Marsabit County is located in the upper eastern region of Kenya covering 70,961 km^2 with an estimated population of 459,785 [28]. The County has four sub-counties—North Horr, Moyale, Saku and Laisamis. April is the wettest month; June, July, August, and September are the dry periods. On average, August is the driest month with an average amount of annual precipitation of 693 mm (27.28 inch). The County has four seasons. The first agro-ecological zone has rainfall and is suitable for horticultural and food crop production—such as maize, beans, fruits and vegetables. It comprises only 1 percent of total land area in the County. The second agro-ecological zone covers 2 percent of the total land area and is suitable for raising livestock and some mixed farming with dry-land crops. The third agro-ecological zone covers 28 percent of the total land area with landmasses 700–1,000 meters above sea level. The vegetation includes acacia tortillis woodland on stony soils and acacia bush land on deeper soils, suitable for small animals, such as goats. The County has four major livelihoods including: pastoralists, agro-pastoralists, fisheries and urban. Pastoralists represent 81 percent of the population, agro-pastoralists 16 percent, and others (formal employment, casual wage labor, petty trade and fisheries) 3 percent. Pastoralists dominate almost all parts of the four sub-counties with agro-pastoralists mostly in Saku and some parts of Moyale sub-counties while others are primarily in urban county and sub-county capitals [30].

Data Synthesis Method 1: Review of Grey Literature

The review entailed a collection of relevant materials ranging from project documents, reports, national- and county-level policies, county-specific reports from Marsabit and Isiolo Counties and the wider ASAL region. The review covered four main categories of documents: formal reports of various programs, including policy briefs, existing policies, guidelines, standards, assessment tools and clinical protocols that address nutrition; global, national and regional/county documents that may reflect ASALs or similar marginalized settings; analysis of county government budget and work plans for Isiolo and Marsabit, including budget and operational planning documents from 2013–2021; and government sectoral reports, including economic reports, financial investment from the public sector and donors on interventions aimed at reducing acute malnutrition in Isiolo and Marsabit Counties.

Table 1: Summary of research questions and methods

Health System Pillar	Research Questions	Data Source/Collection Method	Data Analysis Method
All building blocks	What documented health system-related barriers and opportunities influence the demand for and accessibility of quality health and nutrition services in remote, pastoralist communities of the ASAL regions? What documented strategies/approaches have worked to address the barriers? What are the documented cultural and ethnic or health systemic issues that preclude households in the ASALs to access health and nutrition services?	Knowledge attitude and practice (KAP)/Infant and Young Child Nutrition (IYCN)/SMART assessment/survey reports, Ministry of Health (MoH) and partner reports, published and grey literature	Literature Review—published and grey
Service delivery/ Health information systems/ Medical products, vaccines and technologies	What are trends in geographic and treatment coverage for acute malnutrition and related morbidities (e.g., pneumonia, malaria, diarrhea) and key services (e.g., vitamin A supplementation, IFAS supplementation, community-level outreach services) over the past 10 years in the ASAL counties? What factors have contributed to these changes?	Published and grey literature, MoH assessments/evaluations/ survey reports, secondary health data on District Health Information System (DHIS-2), Master Facility List database, etc.	Literature review and secondary data analysis from DHIS-2 and KDHS, Master Facility List database
Health system financing	What is the financial allocation for health in Isiolo and Marsabit Counties?	County Budgetary reports, County Annual Operations work plans and budgets for the period of devolution, Auditor General audit reports	Desk review, secondary data analysis
Service delivery	What is the estimated population with geographical and social access to health and nutrition services in Isiolo and Marsabit (i.e., communities living within 5 kms of a health facility)? How many health facilities are operational in the County and how are they distributed? What is the documented number of community health units (CHUs) in Isiolo and Marsabit Counties? How functional are they?	MoH County Community health system policies/reports, partner reports	Desk review

Health System Pillar	Research Questions	Data Source/Collection Method	Data Analysis Method
Leadership and governance	What mechanisms exist in Isiolo and Marsabit for community participation in the provision of nutrition-related activities and health services? What are the documented strategies/approaches—including positive deviants—to promote demand and access to health and nutrition services considering different contexts, such as nomadic versus sedentary (pastoralist versus agro-pastoralist), distance to health services and why certain communities access care while others do not?	MoH/Partner Community outreach reports and assessments/surveys, health facility exit interviews and suggestion box reports, other existing Accountability and Feedback mechanism documentation	Desk review
Service delivery	What is the documented coverage and uptake of healthcare services and nutrition programming (including fortified foods, food transfers, IFAS, Lipid-Based Nutrient Supplements [LNS], micronutrient powders) in the counties?	MoH and partner reports, published and grey literature	Desk review
Health information systems	What are the documented promising strategies and approaches to improve coverage and utilization (including health-seeking behaviors) of health and nutrition services in remote, pastoralist populations? What lessons can be learned from related literature (on coverage and utilization), including from other countries who have large pastoral or hard-to-reach communities? What critical health service coverage and utilization information is missing (evidence gaps)? Are there promising models for increasing access and utilization of health and nutrition services that could be tested in Kenya?	Published literature, MoH/Government of Kenya (GOK/WHO/Partner reports, KAP surveys, etc.	Desk review
	To what extent do key health and nutrition services in the ASAL counties meet globally acceptable quality standards (e.g., Sphere standards, World Health Organization [WHO] standards)? How consistent or inconsistent is this adherence to standards? If the latter, what key factors affect consistency or otherwise?	MoH reporting tools, CMAM, surge dashboards	Secondary data analysis on DHIS, Integrated Human Resource Information System (IHRIS), desk review

Health System Pillar	Research Questions	Data Source/Collection Method	Data Analysis Method
	What documentation exists showing if and how routine monitoring and reporting data is being used for decision-making and corrective action by county/sub-county/health-facility/management teams? What do service providers/health workers/health facility managers feedback reports at different levels say about their experience or lack thereof?	MoH/Government of Kenya (GOK) reports	Desk study/budget analysis, secondary data analysis
	What key observations and trends can be deduced from indicators on SAM/MAM/GAM and key morbidities that influence malnutrition in Kenya's ASALs in the last 10 years? What can be inferred or is known about the same in particularly vulnerable and marginalized communities and locations? Are there any documented factors explaining these trends?	DHIS-2	Secondary data analysis—DHIS-2/KDHIS
Health information systems/Health workforce	What is the number and distribution of the nutrition and health workforce in Marsabit and Isiolo Counties, including in far-flung sub-counties and administrative units, such as wards? Are there documented strategies taken to address the workforce challenges? What are the challenges in addressing the workforce issues?	iHRIS, MOH-Integrated Personnel payroll database, County Personnel payroll returns, staff returns	Secondary data analysis of health workforces, including community CHVs, nutritionists, nurses

Data Synthesis Method 2: Analysis of Secondary Data

The review focused on generating summaries of data and trends on key nutritional indicators and health system components to assess coverage of nutritional services. This included past surveys, such as nutrition coverage surveys, Standardized Monitoring and Assessment of Relief and Transition (SMART) surveys, Maternal Infant and Young Child Nutrition assessments and studies, KAP studies and other relevant data sets, e.g., health management information systems (HMIS). The secondary data analysis included a review of data trends for the past 10 years for the following morbidities and indicators: acute malnutrition admissions (SAM, MAM, GAM); IMAM performance indicators (Sphere standards for cured, died, defaulted, nonresponse); SAM relapse rates; patterns of rates of key morbidities known to influence acute malnutrition such as malaria, pneumonia, diarrhea and acute respiratory infection; health workforce staffing levels and their distribution; geographic coverage of health facilities and community health units; and trend analysis on IMAM service provision.

Data Synthesis Method 3: Review of Published Literature

Articles published in peer reviewed journals with relevant inclusion criteria is summarized in Table 2. For published literature, all English language articles were identified by searching multiple databases: PubMed, PROSPERO, COCHRANE Library, Google Scholar, and the Google search engine. In addition, articles that were shared by colleagues and the reference lists for included articles and reports were hand searched to identify additional relevant studies. All retrieved references were managed using endnote. The search terms or key words used were developed collaboratively using the Boolean principles “AND, OR” during the search. We prioritized free and open-source databases (e.g., Zotero and PubMed) but additional programs—such as endnote—were used to access subscription databases when open-source results were found to be limited

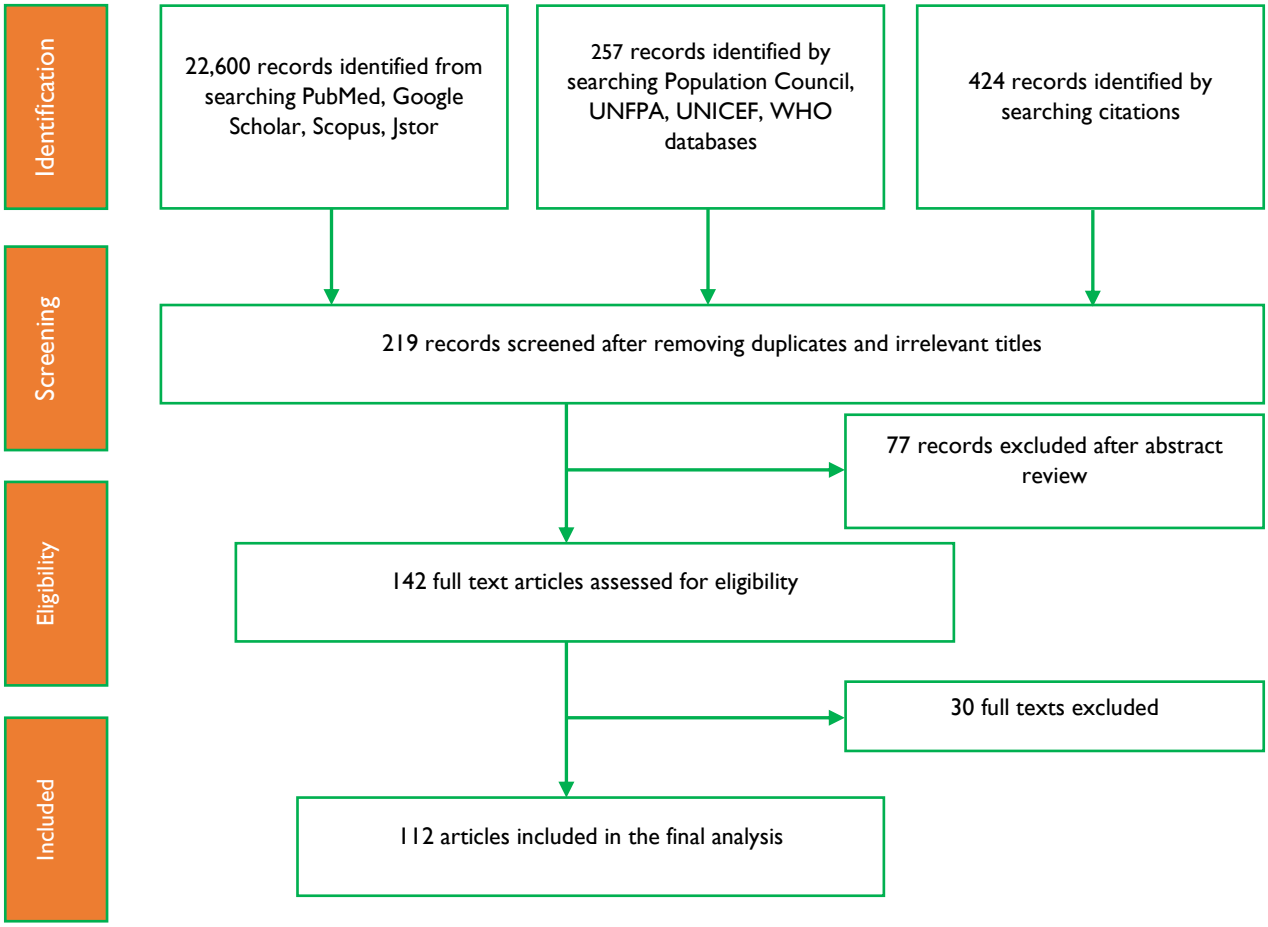
Table 2: Inclusion, exclusion criteria and search terms used

Item	Inclusion Criteria	Exclusion Criteria
Geographical location	Studies investigating nutrition interventions regionally in countries with similar settings like ASAL, Kenya (such as Sahel—Chad, Niger), Ethiopia, Somali, parts of Uganda (Karamoja), South Sudan studies	Any other studies not looking at nutrition interventions
Language	English	Non-English, French and Arabic literature
Publication date	January 1, 2010–August 31, 2020	Pre-January 2010 literature
Publication format	Evaluation papers, reports, descriptive research studies, student thesis (MSC/PhD)	Theoretical notes, personal narrations
Aim of study	The studies must have focused on nutritional aspects in ASAL settings of all kinds—including implementation papers and reports that address the research questions in Table 1	Studies that focus on other settings unless they compare them with the ASAL settings

Item	Inclusion Criteria	Exclusion Criteria
Study design	All study types, designs and methodologies—including primary and secondary studies with clear methodologies to enable an assessment of quality	Studies without a clear methodology to enable assessment of the study design
Search terms	Nutrition “AND” “OR” ASAL “AND” “OR” health system “AND” “OR” care access; nutrition “AND” “OR” SAM (Severe Acute Malnutrition) “AND” “OR” diarrhea “AND” “OR” acute respiratory infection; nutrition “AND” “OR” pneumonia “AND” “OR” malaria “AND” “OR” community participation “AND” “OR” IMAM Nutrition “AND” “OR” health-seeking behaviors “AND” “OR” marginalized communities “AND” “OR” food fortification “AND” “OR” coverage; nutrition “AND” “OR” interventions “AND” “OR” supplementation “AND” “OR”; program nutrition “AND” “OR” region “AND” “OR” country “AND” “OR” county	

The process of reviewing published literature followed the PRISMA diagram and yielded results presented in Figure 4 after the search words were refined and tested.

Figure 4: Process of review using PRISMA diagram



Chapter Three: Results

Persistent Levels of Acute Malnutrition

This section utilizes the framework on causes of malnutrition in Africa's drylands and outlines trends in geographic and treatment coverage for acute malnutrition and related morbidities, including respiratory infection, pneumonia, malaria and diarrhea. We also consider what factors may have contributed to these changes and the impact of these changes in terms of demand, utilization and coverage considering vastness, livelihood zones and remoteness of the counties, including an equity perspective. Key indicators used for assessing trends are presented in Box 1.

Box 1: Defining Key Indicators

Low Weight-for-Height (WFH) indicates recent and severe weight loss (wasting). It occurs when the child has not had food of adequate quality and quantity and/or they have had frequent or prolonged illnesses.

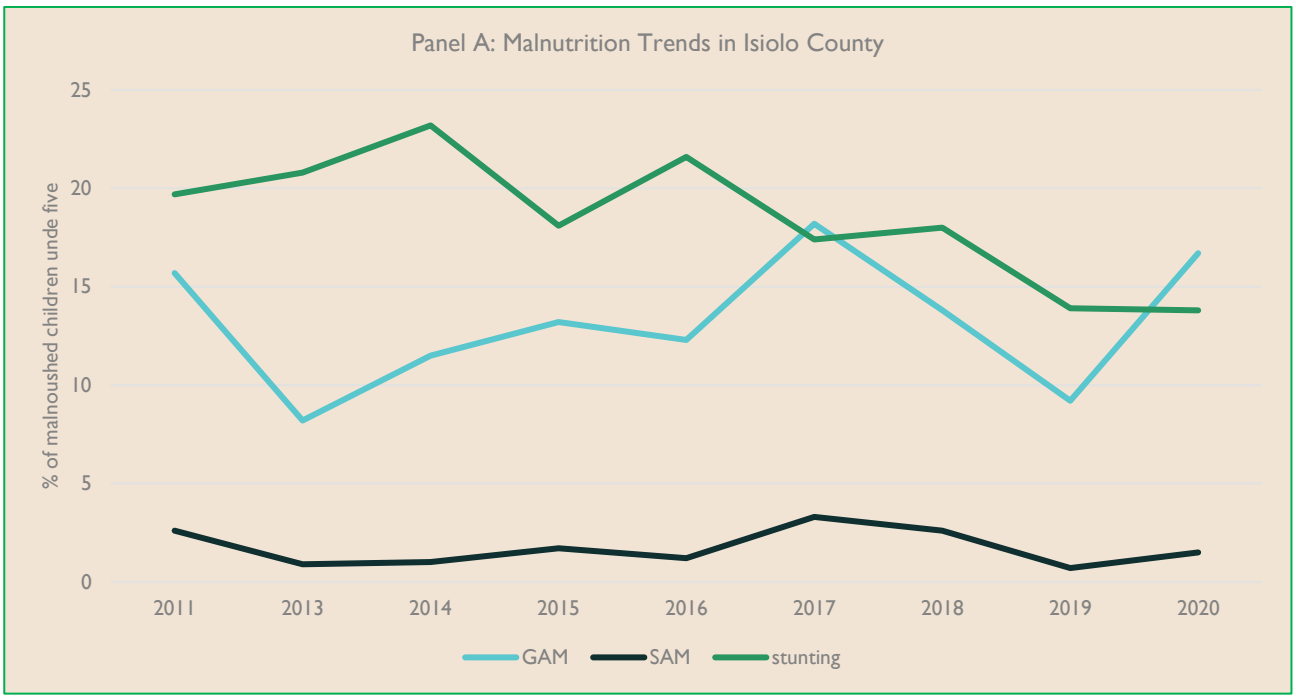
MAM is identified by moderate wasting WFH < -2 z-score and > -3 z-score for children 0–59 months (or children 6–59 months, mid-upper arm circumference [MUAC] <125 mm and > 115 mm).

SAM is identified by severe wasting WFH < -3 z-score for children 0–59 months (or children 6–59 months, MUAC <115 mm) or the presence of bilateral pitting edema.

GAM is the presence of both MAM and SAM in a population. It is a measure of the food and nutritional situation at the population level and an indicator of the severity of an emergency in children 6–59 months. A GAM value of more than 10 percent indicates an emergency. Commonly used thresholds for GAM/wasting include prevalence of 5% being acceptable; 5–9.9% considered poor; 10–14.9% as serious; and >15% as critical.

The desk review observed persistent levels of acute malnutrition, as illustrated by GAM and SAM levels in both Isiolo and Marsabit Counties over the 10-year period between 2011 and 2020. In Isiolo County, the prevalence of GAM was above 15 percent and was categorized as an emergency in 2011, 2017 and 2020. The levels were below 10 percent in 2013 and 2019. However, they fell into the emergency category (between 10 and 15 percent in 2015, 2016 and 2018. Over the 10-year period, the average prevalence was 13.2 percent. SAM averaged 1.7 percent and stunting averaged 18.5 percent (Figure 5—Source: SMART Surveys).

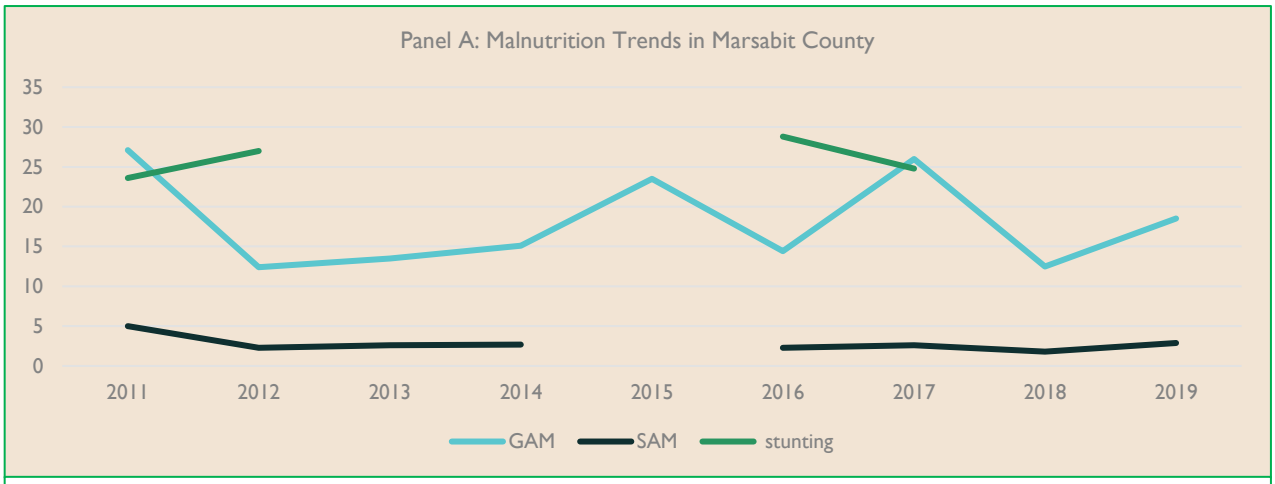
Figure 5: Trends of malnutrition in Isiolo County



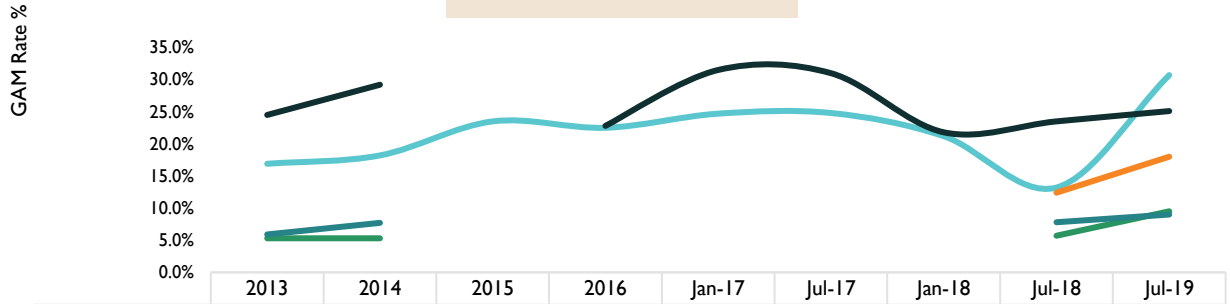
In Marsabit County, the prevalence of GAM was above 10 percent across all the years assessed. The GAM levels were above 20 percent in 2011, 2015 and 2017 and were 18.5 percent in 2020—all representing emergency. The rest of the years saw GAM rates between 12 and 15 percent, which are considered serious. Over the 10-year period, the average prevalence was about 19 percent, illustrating prevalence levels far above the emergency threshold levels (see Box 1). In terms of SAM, the trend averaged 2.7 percent for the period where data was available. Stunting levels averaged around 31 percent for the period where data was available (Figure 6, Panel A). We disaggregated data by sub-county levels for Marsabit County but not Isiolo due to lack of data. Panels B and C show SAM and GAM levels for Marsabit by sub-county. Although there were data gaps, they show that North Horr and Laisamis had the highest levels consistently for both MAM and SAM (Figure 6—Source: SMART Surveys),[7] which may require targeted programmatic attention. The considerable variations by sub-county underscored the value of investing in quality data at sub-county levels to allow nutrition prevalence trends to be tracked and to ensure targeted interventions that are often masked by county-level aggregates.

7 These nutrition surveys were conducted by the MoH with support from UNICEF and NGOs to assess malnutrition levels. They were accessed through the MoH Nutritional Portal and contacts from county-level stakeholders.

Figure 6: Trends of malnutrition in Marsabit County

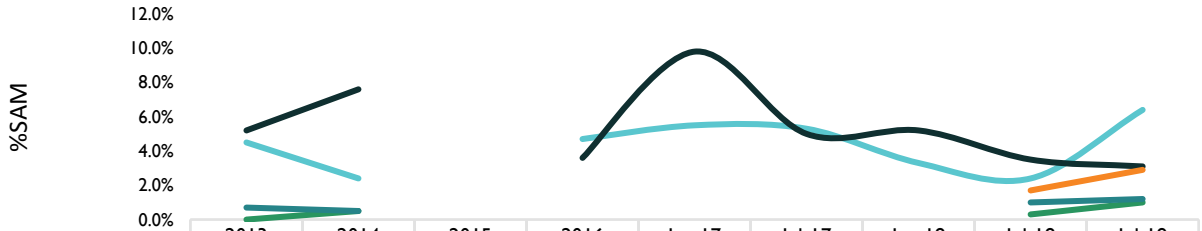


Panel B: GAM Rate Trends 2013–2019



	2013	2014	2015	2016	Jan-17	Jul-17	Jan-18	Jul-18	Jul-19
Laisamis	16.9%	18.2%	23.5%	22.5%	24.7%	24.8%	21.2%	13.20%	30.70%
North Horr	24.5%	29.2%		22.8%	31.5%	31.0%	21.8%	23.50%	25.10%
Saku	5.3%	5.3%		7.4%		7.5%		5.70%	9.50%
Moyale	5.9%	7.7%		7.5%		5.4%		7.80%	9.00%
County				14.40%		16.90%		12.40%	18.00%

Panel C: SAM Rate 2013–2019



SAM Rate	2013	2014	2015	2016	Jan-17	Jul-17	Jan-18	Jul-18	Jul-19
Laisamis	4.5%	2.4%		4.7%	5.5%	5.3%	3.3%	2.4%	6.4%
North Horr	5.2%	7.6%		3.6%	9.8%	5.0%	5.2%	3.5%	3.1%
Saku	0.0%	0.5%		1.4%		0.0%		0.3%	1.0%
Moyale	0.7%	0.5%		0.5%		0.3%		1.0%	1.2%
County				2.3%		2.9%		1.7%	2.9%

IMAM caseloads: OTP and SFP admissions. Figure 7 (Source: Heath Facility Records) show trends in admissions for OTP and SFP. In Isiolo, the 5-year average for admissions (2016–2020) was 510 in the OTP and 3,270 in the SFP. The highest admissions were in 2018 with 839 in the OTP and 5,779 in the SFP.

Over the same 5 years, the main peak was January–March 2018. January–March is the quarter with consistently highest admissions: the 5-year average is 179 in the OTP and 1,127 in the SFP.

In Marsabit County, average admissions for the same 5-year period were higher, given the larger population: 2,449 in the OTP and 14,494 in the SFP. Like Isiolo, the highest admissions were recorded in 2018 for SFP (17,734) but the highest for OTP (3,341) was in 2017. Also, like Isiolo, January–March was the quarter with the highest admissions, with a 5-year average of 961 in the OTP and 5,264 in the SFP. October–December was the quarter reporting the lowest average admissions at 632 in the OTP and 4,100 SFP. The largest peaks over the last 5 years were observed in January–March in both 2017 and 2018.

Admission trends to IMAM services correspond to the seasonal factors of acute malnutrition, with the highest admissions occurring during the short dry season (January–March) and the lowest occurring during the short rainy season (October–December). This demonstrates the importance of the short rains to the pastoralist's communities and that the failure of the short rains may have a greater impact on malnutrition compared to failure of the long rains. This may need further analysis to understand it better.

Figure 7: Number of admissions for Isiolo and Marsabit Counties

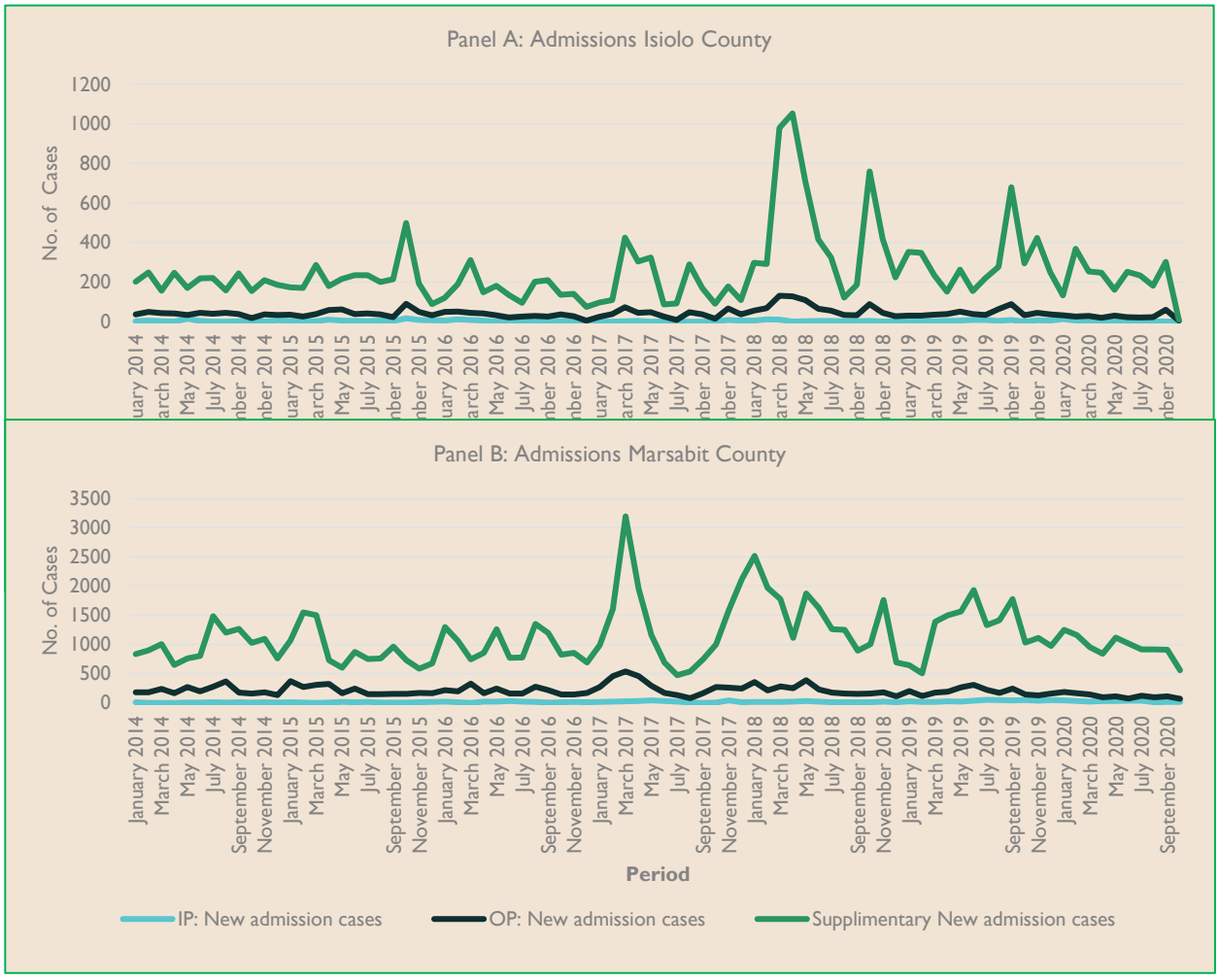
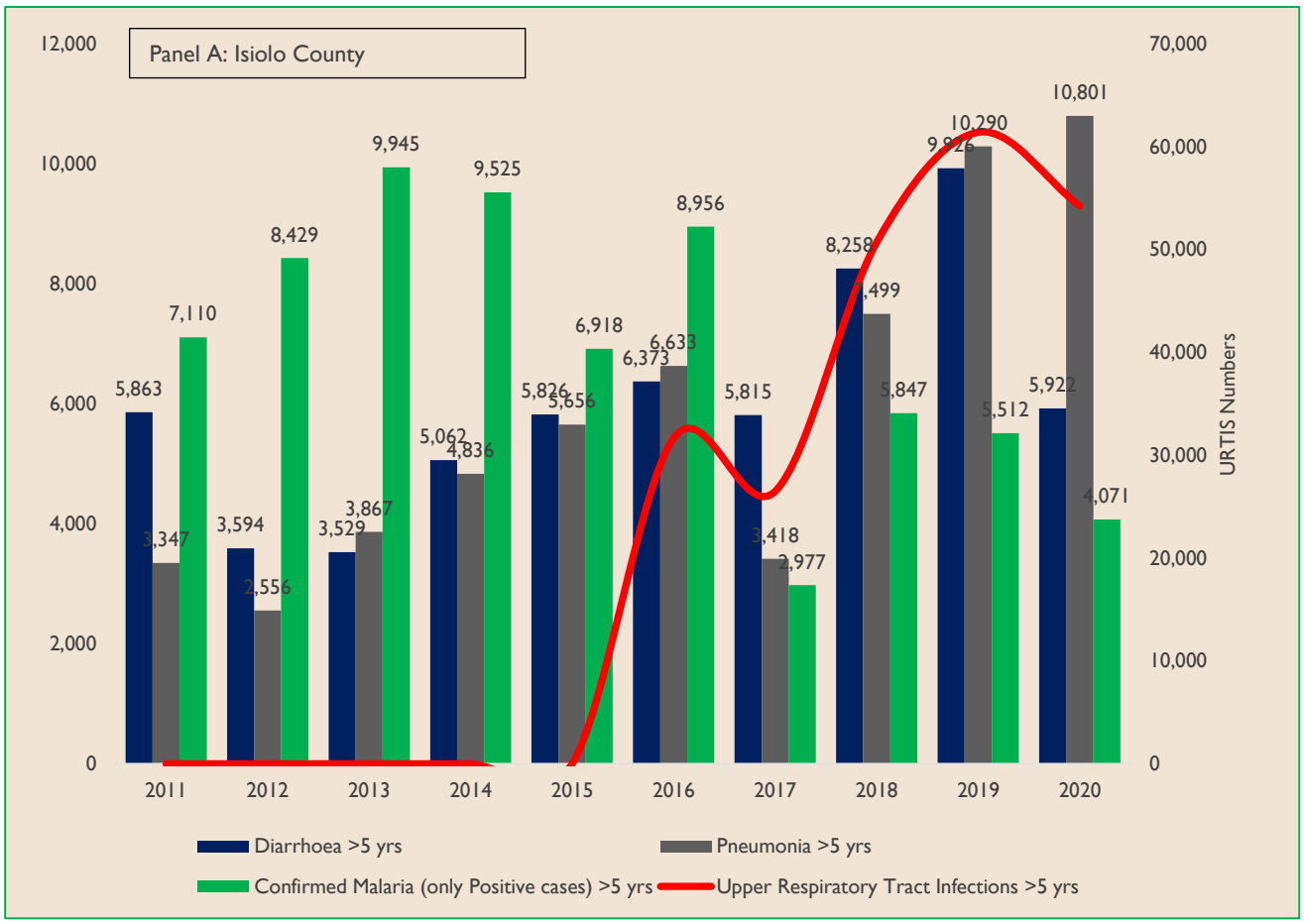
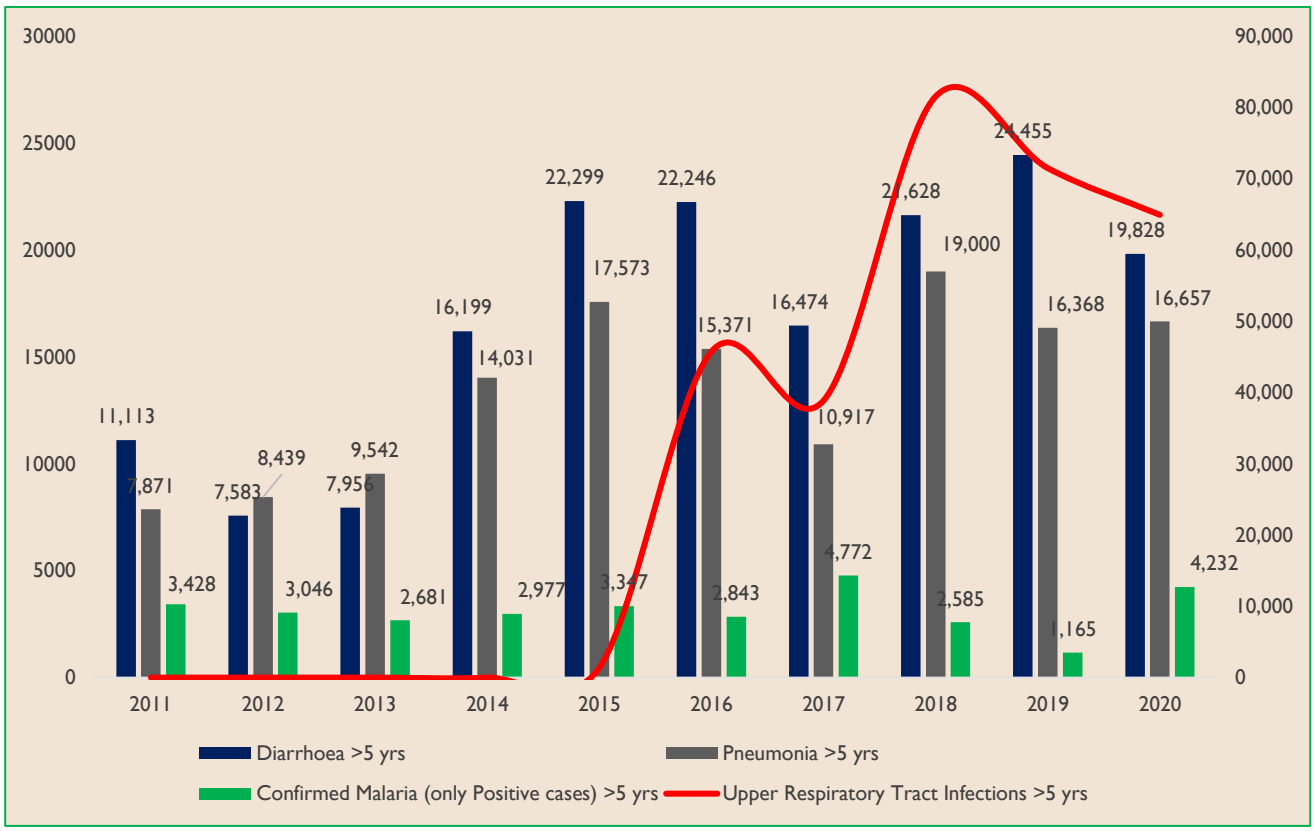


Figure 8: Morbidity of children under 5 years



Panel B: Marsabit County



Trends in child illness consultations at health facilities

In Marsabit and Isiolo between 2011 and 2020 are also noted (Figure 8, above—Source: SMART Surveys). In Isiolo between 2011 and 2013, the number of child diarrhea cases seeking treatment decreased and picked up again in 2014 through to 2019 with a drop to the 2011 rates in 2020. The rates of child pneumonia cases seeking treatment increased from about 3,000 cases in 2011 to about 10,000 cases in 2020. The rates of pneumonia cases seeking treatment also reflect a fluctuating rate of child URTIs over the years. Between 2011 and 2016 there were increasing rates of malaria infections with a drop between 2017 and 2020. In Marsabit County between 2011 and 2013, there was a decreasing pattern of diarrhea cases, which then picked up in 2014 through to 2020. The rate of children under 5 years with pneumonia who accessed services over the period shows an increase between 2011–2016, fluctuated in 2017 and picked up again between 2018–2020. Generally, few cases of malaria were confirmed over the period of assessment, which was attributed to the distribution of bed nets (confirmed during the dissemination meeting). The trend for URTI signals a similar fluctuating pattern like Isiolo.

Environment and seasonality

Play a central role in malnutrition in the ASALs and underpin factors that exacerbate nutritional problems. In most ASAL settings, seasonal variations and extreme climate conditions often precipitate drought and other weather patterns that influence access to food and social-economic prosperity. In 2011, an estimated 4.5 million people were affected—3.8 million in ASALs and 700,000 in non-ASAL areas [33]. The underlying drivers of drought in ASALs included harsh climatic conditions coupled with diminishing natural resources, water stress, poor rainfall patterns and poorly coordinated management of water resources. There is a strong association between observed malnutrition and temperature. A one-digit increase in temperature was associated with a 31 percent increase in malnutrition, indicating the value of spatial modeling to inform a

targeted nutrition program [33]. Other studies have illustrated that, due to a relatively high social and environmental vulnerability in Kenya, even minor shifts in climatic conditions can contribute to major effects on food security, leading to food scarcities on a general basis and famines that return much more frequently, as seen in recent years [34]. This is often affected by other factors—such as heightened food prices—which played a crucial role in the Kenyan famines of 2009. Many corn farmers in Kenya's agricultural areas were displaced following post-election violence, contributing to the hunger crisis; additionally, a poorly used early warning system was not linked to resource mobilization in order to facilitate rapid responses [34].

The impact of drought on the economy is massive. A nationwide estimate showed that the 2008–2011 drought cost Kenya $12.1 billion in damages and losses and slowed the Gross Domestic Product (GDP) an average 2.8 percent per annum. Drought shatters livelihoods and causes hunger, nutrition-related disease and death [35]. Droughts lead to a decline in food production, affect the migratory patterns of pastoralists, contribute to competition over pasture and water—all which exacerbate resource-based conflict. It also causes substantial loss of assets. For example, the 2011 drought accounted for 72 percent of total damages and losses, triggering acute food insecurity among vulnerable households [33].

Studies conducted in Marsabit describe the role seasonality plays in undernutrition for children and pregnant/lactating women. Malnutrition peaks in the months of July and August during the long dry season and February and March for the short dry season, which correlates with the percentage of children with MUAC measurements of less than < 135 mm. These measurements may remain low during the initial period of the dry season until the start of rains, when the numbers begin to rise again. Among children, the prevalence of diseases—such as the common cold, diarrhea, vomiting and pneumonia—was high during the dry cold season (July–August), whereas diarrhea and malaria were observed more in the rainy season (March–April) [36].

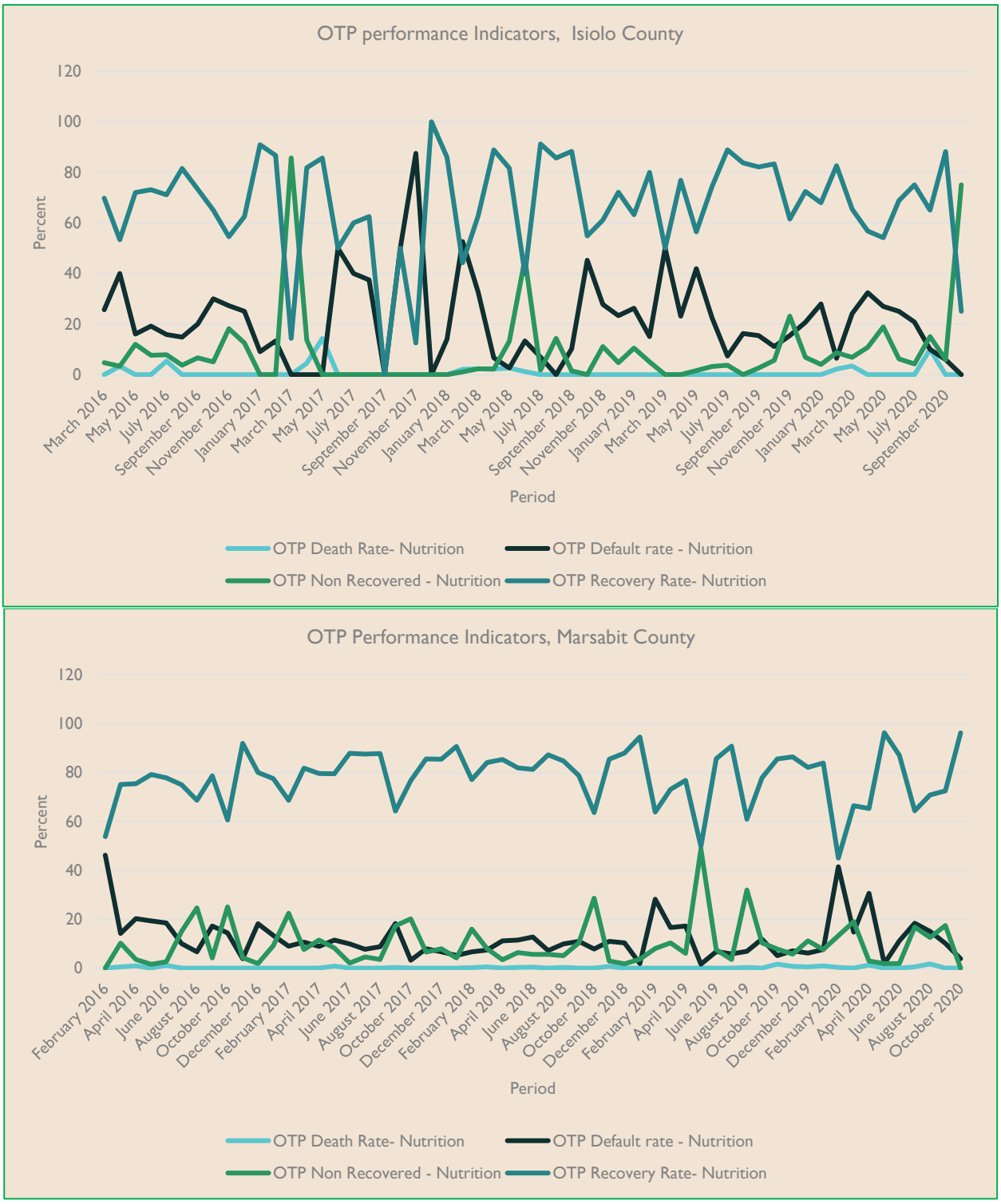
A synthesis of the climate risk profile shows that absolute poverty in Marsabit County stands at 80 percent while 83 percent of the County population experiences food poverty. Food insecurity is caused by an over-reliance on rain-fed agriculture, which is erratic [37]. The effect of seasonality is further evidenced by a study that shows that between 1980–2012, there was a decreasing trend of yearly and seasonal rainfall totals and an increasing trend of yearly temperatures. This led to reduced yields in rain-fed agriculture, vegetation cover and food production. Poor dietary diversity during these periods may have led to higher levels of malnutrition (due to many households consuming less nutrient-dense food) and food insecurity (due to many households practicing one or more coping strategies, e.g., purchase on credit, reduction in meal size, borrowing from relatives and selling of productive assets) [36, 38].

Other sources of vulnerability include the high unemployment rate of 65 percent; literacy levels of 24 percent; and frequent/prolonged droughts, poor infrastructure, insecurity, environmental degradation and underdeveloped markets [39]. In Isiolo, female-headed households are those most affected by food shortages and malnutrition, due to low access to productive inputs and land, lack of adequate access to clean drinking water and increased workload—all which affect maternal and child health. Due to climate hazards, Isiolo County's poverty rate is 72.6 percent, and it has an over-reliance on relief food rather than self-produced food; the County is also characterized by low literacy levels. Food insecurity in the County is largely driven by marginal agricultural productivity, prolonged drought, high temperatures, minimal/erratic rainfall, periodic outbreaks of livestock pests/diseases, poverty and conflicts [40].

IMAM performance: OTP recovery rates.

As illustrated in the two Counties (Figure 9—Source: Health Facility Records), the OTP program cure rate over time surpassed the 75 percent threshold in most years, in line with the international Sphere standard of above 75 percent. However, the study noted that the default rate was generally above 15 percent—especially in Isiolo—which is significantly higher than the standard's target set at below 15 percent. In Marsabit, the default rates were high in February 2016, averaging about 40 percent and above 20 percent in February 2019 and February 2020. The trends in both Counties suggest a fluctuating pattern, likely related to several factors. Some of those factors may be due to a lack of supplies at the facility, lack of encouragement to return to outpatient treatment, distance to travel to the therapeutic sites (especially during the search for pasture and water), family illness or other commitments—including household priorities, poor community sensitization and household follow-up. The review also suggested that important clinical practices—such as triage, screening of all children for malnutrition, history taking, detailed examination, diagnosis of SAM and MAM, individual counseling, complementary treatment and assignment of exit outcomes—are not being performed according to the IMAM guidelines [31, 32] and also contribute to the defaulter rates. Children enrolled in IMAM programs may also fail to recover due to the sharing of RUTF among siblings, out-of-stock RUTF, poor organization of services (including irregular working hours and long waiting times) and weak community linkages [31]. Variations in recovery and default rates in both Counties may also be indicative of seasonality patterns. For example, from the 2019 SMART Survey, there were poor rains throughout 2019 in Isiolo County, which coincides with high OTP default rates.

Figure 9: OTP performance indicators



The seasonal calendar (Figure 10, below—Source, SMART Survey 2019) for Isiolo includes a short dry season (January–March) and a long dry season (June–October) as shown in Panel A. Our synthesis also shows a spike in OTP and SFP default rates during these dry spells in both Counties, perhaps coinciding with when families migrate in search of pasture and water, death of animals (due to drought) and loss of their source of livelihood—since they depend on livestock for their livelihoods. When rains fail, cows do not calve, causing the milk supply to decrease. Moreover, distances to OTP sites increase and children already enrolled in OTP are likely to default due to changed priories for the families.

Figure 10: Seasonal calendars for Isiolo and Marsabit Counties

Panel A: Isiolo

Jan Feb	Mar Apr May June	July Aug Sep Oct	Nov Dec
• Land preparation • Reduced milk yields • Migration	• Migration to wet grazing areas • High calving rates • Milk yields increase • Reduced pasture stress	• Long rains harvest • Increased distance to water and pasture • Reduced water levels • Kidding • Community/household coping measures taken	• Planting in agro-pastoral livelihood zones • Migration from dry grazing areas • Increased milk yields • Reduced pasture stress
Short dry period	**Long rains period**	**Long dry spell**	**Short rains**

Panel B: Marsabit

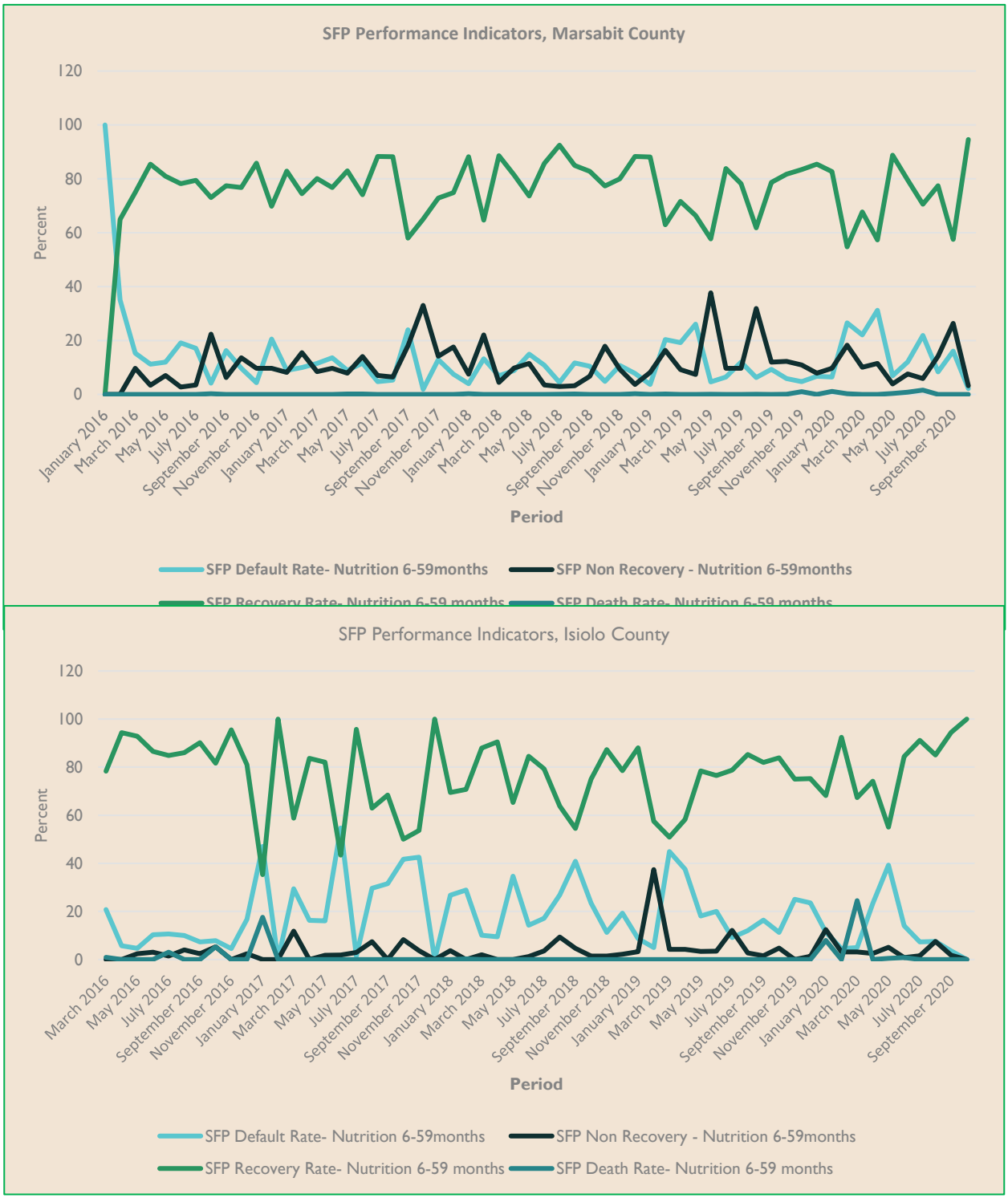
Jan Feb Mar	Apr May June	July Aug Sep	Oct Nov Dec
• Short rains harvests • Reduced milk yields • Increased household food stocks • Land preparation	• Long rains • Planting/weeding • High calving rate • Milk yields increase	• Long rains harvests • Long dry spell • Land preparation • Increased household food stocks • Kidding (September)	• Short rains • Planting/weeding

IMAM performance: SFP recovery rates.

IMAM is a strategy that focuses on the integration of management of acute malnutrition into on-going routine health services at all levels of the health infrastructure. IMAM has four components, namely: community outreach, inpatient therapeutic care, OTP and supplementary feeding programs (SFPs). While examining a program exit using SFP (Figure 11—Source: Health Facility Records), it shows the trends over time. The program performed in line with the Sphere threshold of above 75 percent in both Counties. The number of children admitted for supplementary feeding in both Counties remained consistently high with spikes in between. Panel A shows that in Isiolo County, there were two main peaks for new supplementary admissions in September 2015, March 2017 and a large peak between January–March 2018—which was repeated in September 2018 and September–November 2019. In Marsabit County, the trend was similar with a peak in 2014 and another between January–March 2015. A large peak was also observed between November 2016–

July 2017. Between November 2018–December 2020, the trends are generally above 2017 rates. Program defaulting is a major barrier to both the therapeutic and supplementary feeding programs. In both Counties, program defaulter rates might be linked to various factors including: the deterioration in the security situation, leading to reduced access and availability of services; and the impact of climatic conditions (e.g., droughts) that affect how populations can access services or patterns of labor demand.

Figure 11: SFP performance by County



Health System Factors Contribute to Persistent Acute Malnutrition

This section addresses the question of documented health system-related barriers/opportunities that influence the demand for and accessibility of quality nutrition services in ASAL regions. In addition, we address the issue of what documented strategies or approaches have worked to address these barriers. The drivers are structured around health system pillars, including community-level issues of access and coverage of nutrition services.

Box 2: Key drivers of leadership and governance for health and nutrition service delivery

- **Chronic negligence of resources** for health/nutrition and linking county-level strategies to the national framework
- **Limited understanding of nutrition policies,** leading to inadequacies of integration into annual work plans (AWPs)
- **Limited understanding of linkages** between nutrition and other sectors, leading to inadequate inter-sectoral planning and integration
- **Macro-political decisions** which focus on infrastructure in ASAL settings instead of a software system that will increase coverage and quality of nutrition services
- **Broader political and economic decisions** that affect other sectors—such as WASH, infrastructure, and food security

Leadership and governance

Key gaps in leadership and governance are outlined in Box 2. The synthesis points to ***chronic inadequacies in the prioritization of resources and efforts towards health care in general and nutritional services in particular.*** For example, an analysis of the National and County Accounts for fiscal year 2018/2019 indicates that Kenya's allocation to health expanded from the KES 78 billion allocated in fiscal year 2013/2014 (the first fiscal year post-devolution) to KES 207 billion in fiscal year 2018/2019 (a 165 percent increase). However, the total funding level remains below the Abuja Declaration target of 15 percent.

The increase was primarily attributed to county health budgets expanding more rapidly than the national MoH budget; however, the expansion was often used for personnel compensation. Therefore, the MoH needs to increase efficiency in health sector resource allocation and focus on reducing personnel compensations in order to increase allocations to capital development activities [41]. Between 2017–2019, both Counties increased their per capita budget allocations for health from KES 5400–6200 in Marsabit and KES 6200–6800 in Isiolo [41]. Although this is a positive step, ASAL counties would need to prioritize and ensure they can sustain this trend and earmark resources for nutrition, since implementation of nutritional interventions often depend on development partners—a common modus operandi in ASAL areas which often rely on humanitarian food aid [42]. County governments will need to develop a clear strategy to gradually assume responsibility for nutritional services; a sudden shift in strategy, however, could prematurely reduce the capacity to deliver aid before there is sufficient resilience in crisis-prone counties [42].

There also seems to be ***limited understanding of nutrition policies by policy makers at both the county and national levels,*** leading to inadequacies in its integration into county-level health system plans and strategies, as reflected in the AWPs. Limited understanding leads to inadequate linkages between county-level nutrition plans and the national framework, which then reduce effective implementation of nutritional policies. Any gaps in nutritional policies are manifested at the county level, illustrating misalignment of nutrition programs with those articulated in the national nutrition action plans. To address these gaps, there are ongoing opportunities to further build on CNAPs with the 32 counties (out of 47) that have already developed CNAPs. These counties have faced implementation challenges—perhaps a reflection of limited commitment by county leadership to implement policies articulated in the national strategy. These findings illustrate programmatic

opportunities to develop data-driven advocacy strategies both at the county and national levels to articulate the benefits of nutrition as a development goal, which incorporates a multisectoral approach and gender lens. The advocacy could also target county assemblies that have the mandate to allocate funds at the county level.

Limited efforts are in place to plan and integrate nutritional interventions with other sectors—such as food security, basic education and water/sanitation.

These are reflected by limited platforms; even within the health sector, nutrition is not well-integrated with service delivery at all levels of care. This may mean that county-level sector leadership could harmonize their planning process and commit resources to specific activities that speak to nutrition in all sub-sectors. For example, the IMAM Surge approach is not fully optimizing community mobilization and outreach, leading to low SAM coverage levels and missed opportunities [42]. This is likely due to vast distances and/or livelihoods as reflected by pastoralist or semi-nomadic lifestyles. In addition, nutrition as a "program" is not able to wield influence on other sectors or programs—such as social protection and cash transfers for stronger nutrition-sensitive programming—which means that such strategies are not well implemented. There is a need to proactively strategize on how to reduce the tension between nutrition-specific and nutrition-sensitive investments in ASAL settings that balance humanitarian support and sustained investments to ensure that nutrition-sensitive programming in ASALs reach levels of coverage and geographical convergence to impact the overall population [42].

Macro political decisions and leadership beyond the health sector also play a role since the political process and decision-making dynamics occur outside the health sector.

These influence how resources are managed and allocated. In ASAL settings, road infrastructure has not been well prioritized for a long time. Key routes linking Kenya to international markets in Ethiopia, South Sudan and Somalia were poorly maintained and periodically closed by flooding or other damage [33]. Several airstrips were recently upgraded in the northern region—such as Wajir and Isiolo—which began to open markets for that region. The significance of the road infrastructure for drought resilience can be seen in the impact of the completed 136 km stretch between Isiolo and the Merille River, which is already expanding and stabilizing markets. Poor roads are critical determinants of access to healthcare services, including coverage of nutrition services at the community level. Opening road networks will increase opportunities for access to health services and reduce persistent nutritional challenges. Access to commodities in health facilities, food and business opportunities will confer better exposure to information and necessary auxiliary services that will facilitate better nutritional outcomes [33].

Broader political decisions also influence what is prioritized in the health sector.

Even though devolved management of health service has enabled more health facilities to be established, there are still gaps in coverage of service delivery—especially in terms of facilities that can offer comprehensive nutrition services (see health services section). Additionally, the democratic leadership style at the county and sub-county levels of ASAL settings has a significant moderating effect on the relationship between management of devolved health services and health service delivery [43]. This means that investments could be targeted to improve leadership, which would influence transformational service delivery in ASAL settings to adapt with changing times.Leadership also influences other sectors, which indirectly impacts nutrition. The first sector is water and sanitation, which is a direct driver of malnutrition [44]. Sanitation infrastructure in most arid counties is absent or inadequate. Challenges of access to water and sanitation services at both household and healthcare facilities in ASAL settings lead to common infectious disease. This necessitates strategies that focus on hygiene behaviors at the community level [45], a component that can be integrated into a community health system service delivery. A study in northwest Ethiopia showed that the use of an

unprotected source of drinking water, along with fewer than three times daily intake of food, were associated with undernutrition among children under 5 years [46]. Malnutrition is increased through low dietary intakes, inappropriate feeding practices, food insecurity and inequitable distribution of food within the households that depends on a traditional farming system [47].

Health system financing

Table 3 is a summary of overall budget allocations for the two Counties and the expenditure pattern for recurrent and development expenditure over time. We also present allocations to health relative to the total budget to illustrate the progress toward reaching the Abuja target of 15 percent allocation to health. Overall, the two Counties progressively increased their total budget estimates between financial year 2013/2014–2020/2021. For example, Marsabit had an increased budget estimate from 2.8B in 2013/2014 to 8.02B in 2020/2021—a fourfold increase over this period. Isiolo increased the budget estimates from 2.7B in 2013/2014 to 5.2B in 2020/2021—a 1.9-fold increase over the same period. This means that the Counties had additional resources added to their Country treasury, perhaps attributed to increased sharable revenue from the national government, which was from 2.4B in 2013/2014 to 6.87B and 4.2B in 2020/2021 for Marsabit and Isiolo Counties, respectively.

In Marsabit, during the 2015/2016 financial year, the County budgeted 17 percent of its budget to health— 2 percent above the 15 percent Abuja target. It increased to 21 percent in 2017/2018, 24 percent in 2018/2019 and 26 percent in 2019/2020. In Isiolo, these figures were mostly lower, going from 1.8 percent in 2015/2016 to 1.9 percent in 2016/2017. In 2017/2018, this increased to 25 percent and remained above 23 percent over the period up to 2020/2021. Recurrent expenditures compared to development were significant, which means that in the context of ASAL settings with sparsely populated communities and large distances to health facilities, infrastructural development for new facilities would be slower to achieve over time. The consequence would be to rely either on donor funding (threatening sustainability) or an innovative service delivery approach (focusing on community-based service delivery for equitable coverage of health/nutrition services and ensuring integrated delivery of treatment services for SAM and MAM within health services).

Table 3: Budget projections for Marsabit and Isiolo Counties

Marsabit County	**2013/14**	**2014/15**	**2015/16**	**2017/18**	**2018/19**	**2019/20**	**2020/21***
Approved budget	2.8B	5.75B	6.3B	7.6B	8.65B	7.6B	8.02B
Recurrent budget	1.7B	2.74B	3.2B	4.1B	4.1B	4.15B	4.34B
Development budget	1.04B	3.0B	3.1B	3.5B	4.5B	3.4B	3.68B
Local revenue sources	360M	48.8M	130M	130M	140M	150M	150M
National equitable share	2.4B	4.42B	5.1B	6.58B	7B	6.63B	6.87B
Health services vote		862M	1.1B	1.6B	2.1B	2.01B	2.2B
Health service expenditure		715M	955M	959M	760M	303M	382.8M
Development expenditure health		104M	270M	99.1M	139.8M	10M	117.1M
Recurrent expenditure on health		611M	685M	860.1M	621.4M	293.6M	265.7M
Isiolo County	**2013/14**	**2014/15**	**2015/16**	**2017/18**	**2018/19**	**2019/20**	**2020/21***
Approved budget	2.78B	3.37B	3.6B	4.34B	5.2B	4.9B	5.2B
Recurrent budget	1.74B	2.05B	2.27B	2.7B	3.1B	3.2B	3.26B

Development budget	1.04B	1.32B	1.45B	1.5B	2.1B	1.8B	1.94B
Local revenue sources	360M	133.7 M	360M	182.8M	150.8 M	155.8M	113.69 M
National equitable share	2.4B	2.6B	3.06B	3.78B	3.9B	4.1B	4.18B
Health services vote		633M	715M	1.1B	1.2B	1.2B	1.2B
Health service expenditure		548M	680M	555.1M	429M	221.4M	62.2M
Development expenditure health		473M	92M	43.8	-	-	-
Recurrent expenditure on health		74M	588M	505.3M	429M	221.4M	62.2M

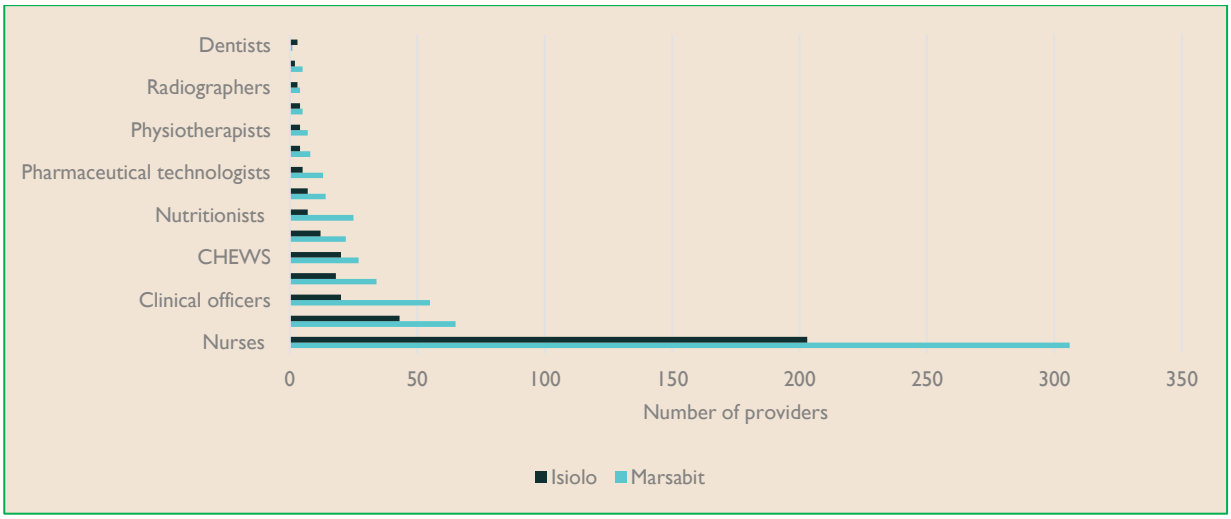
Note: B=Billion shillings; M=Million shillings. Budget analysis for quarter

Health workforce and its influence on access to quality nutrition services

Under current service arrangements, basic standards of care are classified as community health centers, dispensaries and hospitals which comprise primary, secondary or tertiary referral units. Nutritionists are expected to permeate all levels of care with the current norms requiring 20 nutrition/dietetic officers, 10 at a county-level hospital and 2 at a health center. There are to be 12 nutrition/dietetic technologists at the referral level, 8 at county hospitals, 4 at health centers, 2 at dispensaries and 1 at the community level. There are to be 4 nutrition/dietetic technicians in county and tertiary hospitals, 2 at health center dispensaries and 1 at the community level [48]. Considering distribution of all staff teams—including nutrition—Kenya currently has an average of 19 doctors, 25 clinical officers, 8 pharmacists, 6 pharmaceutical technologists and 173 nurses per 100,000 persons compared to WHO's recommended minimum staffing levels of 36 doctors and 356 nurses per 100,000 persons. There are a total of 146 healthcare workers per 100,000 persons, which is far below the WHO threshold of 250 healthcare workers per 100,000 persons [49]. Nutritionists are expected to directly address the nutritional needs of patients in conjunction with other health workers; currently the national estimate of nutritionists is 1,290 with less than half in public health facilities. This translates to one nutritionist for every 31,000 people.

ASAL settings in Kenya suffer disproportionately with regard to inequities in national healthcare worker distribution; the human resource element of the health crisis is particularly acute in this region and hinders innovative mechanisms to provide nutritional services. The underlying driver is inadequate investment in human resources and insufficient information on their skills/knowledge level; this is due in part to ineffective and/or insufficient monitoring and evaluation (M&E) processes to guide planning and decision- making. The result is evidenced by an insufficient number of providers who manage facilities at primary healthcare levels in both Counties and who also have expertise in nutritional aspects. For example, in Marsabit County there are 93 nutritionists against a target of 96 (a shortfall of 3 officers), most of whom work in referral or in sub-county hospitals. In Isiolo there are 7 nutritionists against a target of 153 (a shortfall of 146 officers); these include 2 nutritionists, 5 nutrition technologists and no nutrition technician in the County (Figure 12—Source: County Integrated Development Plan [CIDP] for Isiolo and Marsabit Counties). Other than improving the number of providers, County teams voiced the need to ensure contextualization of the health system to response to the social dynamics of communities. Two potential solutions are: 1) health workers who speak the local language and appreciate the cultural dynamics, and 2) health workers who correct the uneven distribution of the workforce and build effective staff motivation systems (e.g., recognition mechanisms)—especially for those working in hardship areas.

Figure 12: Number of providers in Isiolo and Marsabit Counties



Health information system

A review of 22 policy documents and 14 MoH tools used for data generation revealed that the country has an adequate data generation system that provides relevant information for nutrition indicators. Nutrition-related data is managed using 14 registers that cover inpatient, outpatient and commodity management for different age cohorts (Table 4). The registers provide data sources for key nutrition indicators; however, the quality of data might be compromised by a lack of many indicators that are usually collected and with understaffed human resources to collate the data.

Table 4: MOH registers and how to relate with nutrition indicators and HMIS

Child Welfare Clinic (CWC) Register MoH 511	**Proportion of children 6–59 months with SAM and/or who received vitamin A supplement, proportion of children 2–5 years dewormed**	**MCH, child health, nutrition indicators**
Inpatient Nutrition Care Register MoH 368	Proportion of children 6–59 months with SAM	Child health, nutrition indicators, pharmaceutical supply
Ministry of Medical Services/Ministry of Public Health Facility Daily Register for Nutrition Services (407A-Adults)	Facility Register	Nutrition indicators

Child Welfare Clinic (CWC) Register MoH 511	**Proportion of children 6–59 months with SAM and/or who received vitamin A supplement, proportion of children 2–5 years dewormed**	**MCH, child health, nutrition indicators**
Ministry of Medical Services/Ministry of Public Health Facility Daily Register for Nutrition Services (407B-Children)	Treatment outcome for management of SAM in children 6–59 months, proportion of children with acute malnutrition	MCH, child health, nutrition indicators
Outpatient Therapeutic program Health Facility Register MoH 409	Proportion of children 6–59 months with SAM, treatment of SAM	MCH, child health, nutrition indicators, pharmaceutical supply
Supplementary Feeding program for children 6–59 months, Health Facility Register MoH 410A	Proportion of children 6–59 months with SAM, proportion of children 2–5 years dewormed	MCH, child health, nutrition indicators, immunization, pharmaceutical supply
Supplementary Feeding program for Pregnant and Lactating women, Health Facility Register MoH 410B		MCH, nutrition indicators, pharmaceutical supply
MoH 704 CWC Tally Sheet	Percent of children under 5 years underweight, treatment outcome for management of SAM in children 6–59 months	MCH, child health, nutrition indicators
Integrated Management of Acute Malnutrition Program MoH 713	Treatment outcome for management of SAM in children 6–59 months	MCH, child health and immunization, nutrition indicators
Facility Daily Activity Register for Nutrition Commodities (Dar-Nutrition Commodities) MoH 409	Treatment outcome for management of SAM in children 6–59 months	MCH, child health, nutrition indicators, pharmaceutical supply
Facility Prescription Form for Nutrition Commodities for Satellite Sites, Central Site Dispensing Points and Standalone Sites (MoH 732)	Percent of newborn low birthweight, percent of children under 5 years underweight	MCH, nutrition indicators
Central Site Consumption Data Report and Request (CS-CDRR) For Nutrition Commodities (MoH 734A)	Treatment outcome for management of severe acute malnutrition in children 6–59 months, proportion of children 6–59 months who received vitamin A supplementation	MCH, nutrition indicators
Facility Consumption Data Report and Request (F-CDRR) for Nutrition Commodities (MoH 734B)	Treatment outcome for management of severe acute malnutrition in children 6–59 months, proportion of children 6–59 months who received vitamin A supplementation	MCH, nutrition indicators

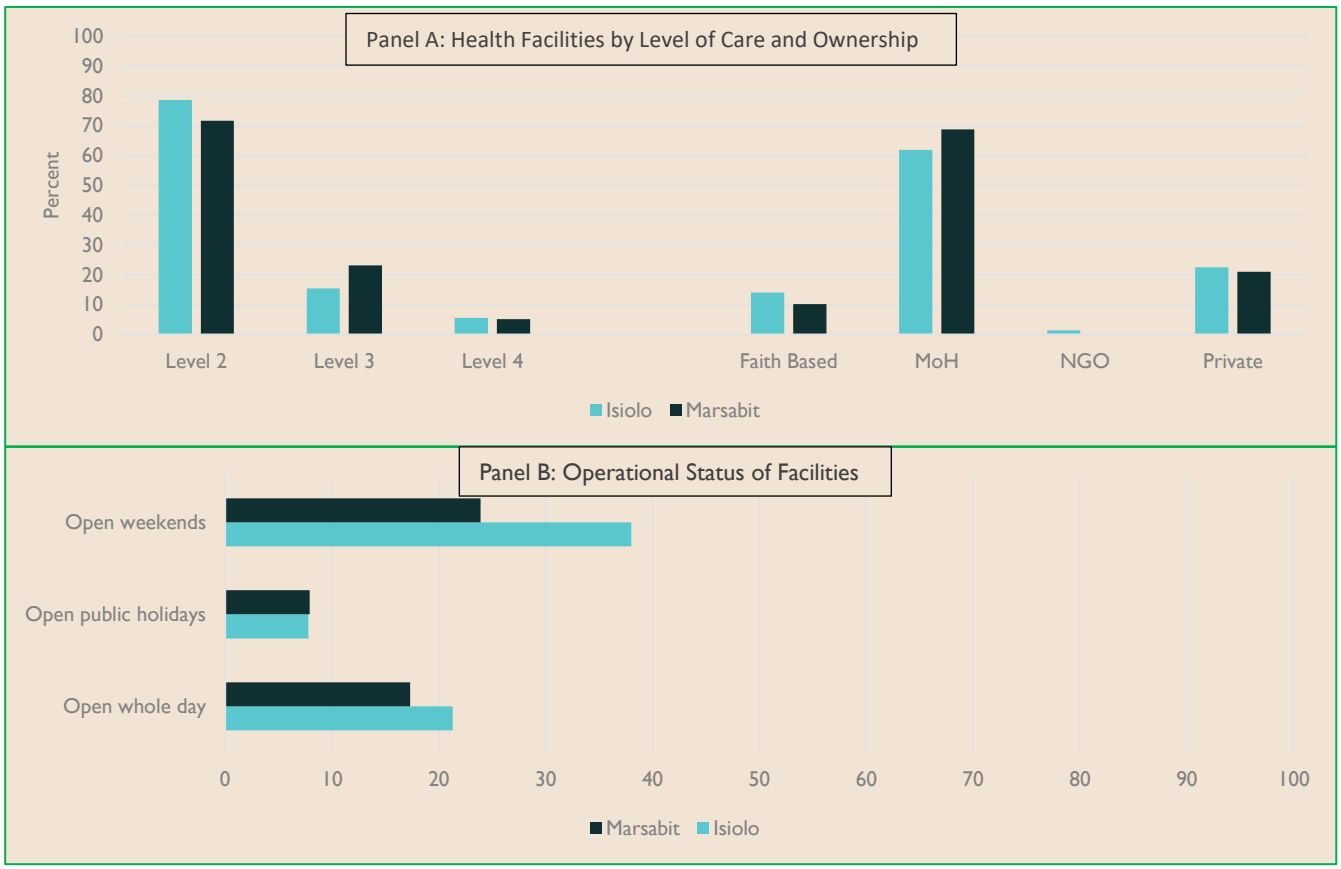
From the synthesis of data on nutrition, three opportunities exist to improve use of data and create synergies for action. Although there are adequate data collection tools at the facility level for generating information for key indicators, the quality of data is often compromised by several factors. For example, health systems in many sub-Saharan African countries continue to use paper-based reporting and storage systems for health data, despite evidence showing that this contributes to poor data quality and compromises health service delivery [50–52]. Since reporting is also mostly paper-based in these two Counties, initiatives to reform these systems through digitalization may reduce costs and improve the timeliness of data use for managers and decision-makers. However, to realize this, programs will have to contend with inadequate financing, weak infrastructure, limited human resource capacity and diverse stakeholder interests—all which pose challenges to digitalization of health information systems [53]. This finding illustrates an opportunity to strengthen data quality assurance processes to ensure data collated from different sources are of good quality and can be promptly used for action and decision-making.

Geographic access and management of health facilities

First, we consider coverage of health services and issues of availability. Figure 13 shows that Isiolo has 71 facilities: 62 percent owned by government, 22 percent managed by private practitioners, 14 percent managed by FBOs and less than 1.5 percent managed by NGOs. Coverage by sub-county indicates that most facilities are concentrated in urban settings: sub-county Isiolo—42, Garbatulla—17 and Merti—12. In Marsabit there are 138 facilities: most are managed by government, 21 percent private and 10 percent owned by FBOs. The coverage by sub-county followed a similar pattern to Isiolo with Moyale—48, Saku— 38, Laisamis—28 and North Hor—22.

An important element of access is the availability of services in times/places that are convenient for users. In Isiolo, less than a quarter of facilities are open for a whole day compared to 83 percent in Marsabit. In both Counties, the ability to provide services at night, on public holidays and over the weekend was less than a third—perhaps due to security issues, vastness of region or human resources—issues that may limit access to services when needed. Overall, the synthesis indicates that the number and distribution of health facilities in the two Counties may contribute to limitation of access, conceivably propagating persistent malnutrion over time. In Marsabit, for example, the average distance to the nearest health facility is 60 km. Locations such as North-Horr, Loiyangalani and Laisamis have the longest distances to healthcare facilities, complicated by a lack of transportation. People resort to walking or using camels, donkeys or humans to transfer the critically ill to healthcare facilities [63].

Figure 13: Health facility in Isiolo and Marsabit Counties



Other health service factors potentially influencing child malnutrition

Health provider knowledge and adherence to protocols in the diagnosis and management of malnutrition can be a significant factor. A study in Uganda showed that although the knowledge of health workers on Protein Energy Malnutrition (PEM) was adequate, their practice led to missed opportunities to diagnose and manage PEM among children who present with acute illnesses at the health centers, limiting early prevention of SAM [54]. Another practice-oriented driver is provider adherence to guidelines on management of SAM. In a teaching hospital in Kenya, the adherence level of treatment of SAM was 4.5 percent, which was associated with inadequacies of supply of the essential commodities required in the management of SAM [55]. There were also gaps in provider identification of predictors of mortality, such as impaired level of consciousness and development of comorbidity among children [56].

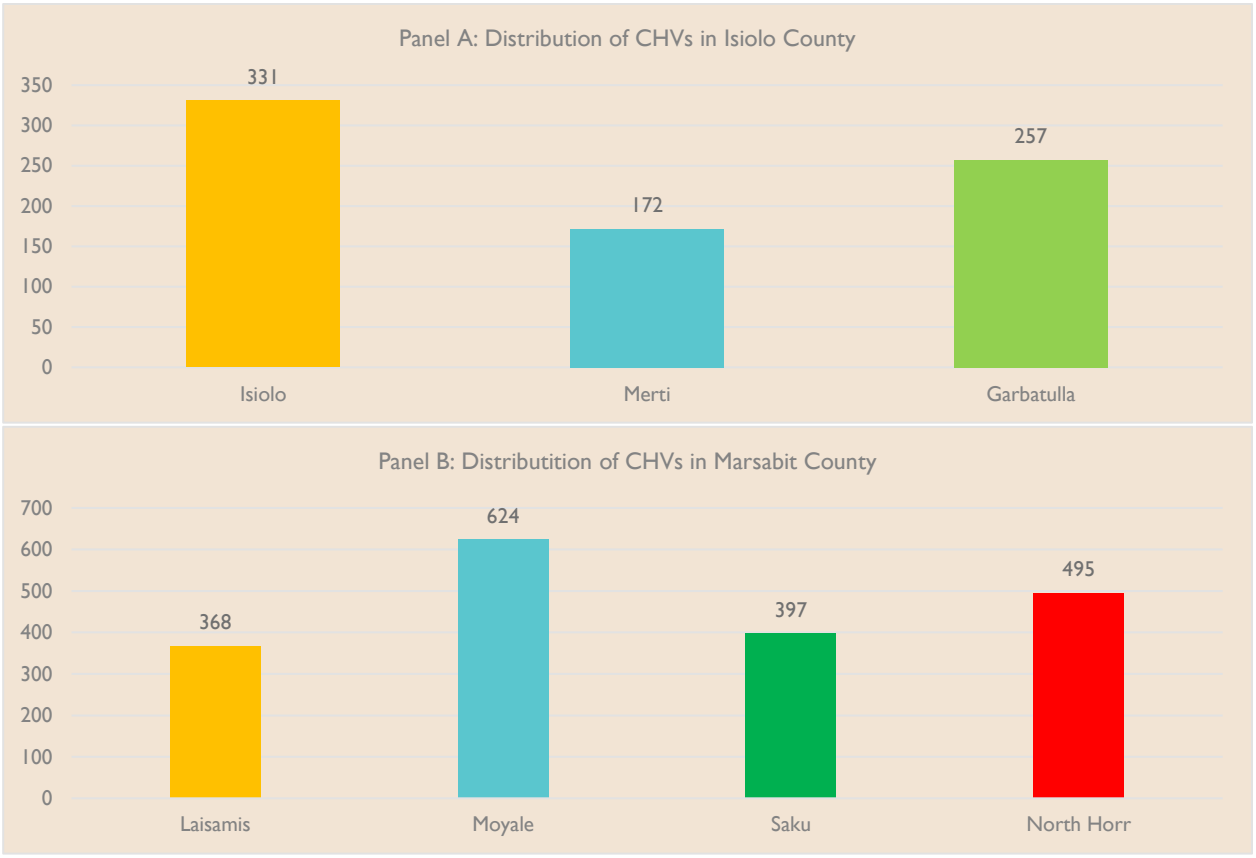
The ability of the health staff to counsel and communicate effectively to caregivers has also been shown to be a factor in service quality and coverage. Providers as key custodians of health information have a role to play in communicating effectively to improve the practice of caregivers on appropriate infant and young child feeding [57]. Communication and provider attitudes are likely to drive persistent malnutrition and deter communities from adherence to guidance, translating to negative demand-side responses.

Stigma—particularly around having a malnourished child—may also affect service uptake. One study in the ASAL showed that access to CMAM was constrained by stigma associated with acute malnutrition and was greater than stigma associated with malaria [58]. Shame and discomfort at health clinics have been reported among mothers of children with MAM or SAM compared with those with children of normal status.

Access: Community-Level Factors

At the community level, operationalization of the community health strategy (CHS) is limited by vast geographical areas and persistent conflict, both which hamper effective deployment of CHVs. In Isiolo, for example, there are about 760 CHVs, the majority being in the more urbanized sub-county Isiolo—44 percent, Garbatulla—34 percent and Merti—23 percent (Figure 14, Panel A). CHVs are relatively young with varied gender distribution. In Marsabit County there are 1,884 CHVs, 33 percent from Moyale, 26 percent from North Horr, 21 percent from Saku and 20 percent from Laisami.

Figure 14: CHV distribution in Isiolo and Marsabit Counties



In terms of functionality of the CUs, Isiolo has 52 CUs while Marsabit has 102. In Isiolo, about 60 percent (31) of the CUs are operational with 57 percent (18) of them offering nutritional services; of those 18, 50 percent offer IMAM services and only 6 percent offer BFCI services (Table 5—Source: Community Health Division, MoH). Isiolo has 703 CHVs for a population of 161,773 persons (2020, projected); if each CHV were responsible for 20 households (estimating six members per household), the County would need 1,347 CHVs—a deficit of 644 CHVs.

In Marsabit, of the 102 CUs, 87 are operational and provide nutritional services; only 9 do not. Marsabit has 1,884 CHVs for a population of 328,774 persons (2020, projected); if each CHV were responsible for 20 households (estimating six members per household), the County would need 2,739 CHVs—a deficit of 855 CHVs. The coverage of CHVs may be a factor that limits wider coverage of community nutrition services, as was illustrated by coverage of IMAM services in Isiolo. Since this review could not establish the quality of services provided, synthesis of literature reveals that there needs be a strengthened approach to effective implementation of CMAM, including the quality of community engagement through community dialogues in ASAL settings and to ensure that timeliness, coverage and access are taken into account [64].

Table 5: Community units providing nutrition services

Sub-County	# Community Units	# Functional	# Providing Nutritional Service	# Providing IMAM	# Providing BFCI
Isiolo County					
Garbetulla	18	17	17	15	2
Merti	12	11	10	6	1
Isiolo	22	3	3	5	0

Total	52	31	30	26	3
Marsabit County					
Laisamis	25	20			
North Horr	27	29			
Moyale	26	20			
Saku	24	23			
Total	102	92			

Promising approaches

Box 3 summarizes examples of promising approaches to improve the quality of nutrition services. Aspects that require focus are the availability of CHVs and nutritional services at the community level and the role of CHVs in ensuring that supplements are used. Studies have shown that perception affects use. Despite sensitization sessions and household support, sharing nutritional supplements with household members or gifting them to people outside the household contribute to a reduction of actual amounts of supplements consumed by the target children [65]. Similarly, the practice of sharing RUTFs is associated with slower recovery from SAM [66, 67]. An Ethiopian study showed that mothers who did not use family planning were twice as likely to be wasted compared to children under 5 years whose mothers used family planning (FP) [68].

Box 3: Promising approaches to improving quality of nutrition services

- Facilitating providers to adhere to management protocol
- Ensuring health facility staff understand and appreciate the value of data collection/reporting and feel empowered to act by using their data
- Linkages between communities and health facilities, particularly when communities are involved in the evaluation steps of CMAM set-up and follow-up of children
- Preventing MAM through nutrition-sensitive interventions by focusing on high-impact "windows of opportunity" (e.g., pregnant women; children under 2 years; food- and nutrition-insecure households; and those who lack adequate sanitation, care or social protection)

Although the use/non-use of FP is comprised of many factors—including inadequate supply of FP services—frequent pregnancies may be linked to mothers not eating extra food during pregnancy and lactation, predisposing them to poor nutrition and subsequent poor pregnancy and delivery outcomes—including low birthweight or stillborn infants. Access to and use of FP products requires localized solutions to social norms, such as religion or other beliefs that drive malnutrition.

CUs can also be an avenue to address gender and social norms that affect nutrition. Generally, boys suffer more from undernutrition and are at a significantly higher risk of stunting and being underweight in comparison to girls [69–71]. Although conclusive studies should explore why this is so [72], a number of barriers already hinder the community-at-large from consuming nutritious foods—such as fish, eggs and tubers—and are linked to cultural practices which limit dietary diversity that the community can consume, perhaps explaining how gender differences [38] subsequently affect the diversification of diets. (e.g., boys may be seen and valued more by the community and given better diets at the household level) [69]. Related issues are how traditional beliefs, perceived insufficiency of breast milk and psychological problems play important roles in feeding choices [73]. In ASAL settings, these influences are likely to be propagated given the harsh climatic and environmental challenges that limit access to basic amenities—including food, health and nutritional services. Studies show that poor breastfeeding and child feeding practices—augmented by early introduction of nutritionally inadequate and contaminated complementary foods—are contributors to persistent child malnutrition. In this case, complementary foods that are generally cereal-based with few/no vegetables and animal proteins are used [74]; a lack of knowledge on the part of parents and unavailability of

adequate foods in ASAL settings [75, 76] may well be key influencers. Empowering women; improving the knowledge/practice of caregivers on appropriate infant and young childcare practices; and addressing traditional beliefs, myths and misconceptions about exclusive breastfeeding [73, 76] could potentially reduce child malnutrition [77].

Improving nutrition services between communities and facilities

This section details existing mechanisms in Isiolo and Marsabit Counties for community participation in the provision of nutrition-related activities and health services. It also shows if or how well these mechanisms for community participation have been documented and what has been learned to-date on their effectiveness and value. Keeping the ASAL context in mind, we provide a summary of documented approaches, including positive methods that promote demand and access to health and nutrition services. We start by addressing critical gaps that exist while seeking to integrate nutrition services into the community. At the interface between the current health system and communities, there are lessons that can be used to promote community-based management of acute malnutrition. The goal of the IMAM Surge approach is to support the health system and empower health workers to better anticipate, prepare for and manage fluctuations in the demand for wasting treatment services [78]. Lessons already learned following a successful IMAM Surge pilot in Marsabit [79] help us examine what is already known in order to improve demand for nutrition services at the community level (Box 4).

Box 4: Approaches to strengthen and implement IMAM Surge and CMAM

- Work with government leadership during initial planning and roll-out, giving them a greater sense of ownership
- Utilize wider consultative approaches, including nutritionists and other health sector personnel
- Enhance capacity-building process through the development or adaptation of IMAM Surge guidelines and tools and on-the-job training at the facility level
- Establish an M&E system that incorporates health staff in real-time monitoring of IMAM Surge data
- Use digital data solutions, which are vital when monitoring multiple indicators that include illness

A number of factors will influence successful implementation/outcomes of the IMAM Surge and CMAM. The first is the inclusion of government leadership, involvement of decision-makers at the sub-national level and integration of expectations into key national/sub-national strategic-planning documents. The second is mentoring, on-the-job training and use of data that will empower actors and showcase the progress being made (of note: the process will experience challenges during the drought season when priorities need to shift to health system strengthening in acute situations). Third, weak community-facility linkages and resource constraints limit the capacity for surge action. Developing formal linkages to more wide-spread early warning systems and using facility data to trigger seasonal preventive actions may help capture potential challenges early. Finally, weak community-facility linkages in areas with non-functional CUs (where CHVs are not actively involved in preventive activities, screening or referral) indicates that a deteriorating nutritional situation will not be detected early at a health facility—due to children not being referred or seeking treatment; the result is low coverage of services. Workers could be more effective in finding and referring active cases of children with acute malnutrition [79] by strengthening CUs and connecting them more firmly into the IMAM Surge process. Ensuring that nutritional programs link with broader social and cultural outlets can improve the multisectoral process.

Chapter Four: Recommendations and Implications for Programming

Key Finding 1: Acute malnutrition is persistently high in Marsabit and Isiolo Counties.

- In Isiolo County, the prevalence of GAM has been 13 percent on average over the past 10-year period, which is above the threshold of 10 percent considered "critical."[8] The average SAM prevalence was 1.7 percent and stunting prevalence was 18.5 percent.
- In Marsabit County, prevalence of GAM has been above 10 percent on average over the last 10-year period, which is above the threshold of 15 percent considered an emergency. The average SAM was 2.7 percent and stunting prevalence was 31.3 percent.
- Environment and seasonality play a role in malnutrition and underpins factors that exacerbate nutritional problems. Environmental factors—such as harsh climatic conditions coupled with diminishing and degradation of natural resources, poor rainfall patterns, water stress and poorly coordinated management of water resources—shatter livelihoods, influence availability of food, and depress economic activities that contribute to persistent malnutrition.
- Poor water sanitation and hygiene precipitate comorbidities—such as diarrhea, pneumonia, malaria and intestinal parasitic infections—and underlie malnutrition. These are often associated with the confluence of the rainy season, which increases women's labor difficulty/length and adds to the prevalence of malaria infections, diarrhea and dwindling food reserves.

Key Finding 2: Acutely malnourished children admitted to outpatient therapeutic and supplementary feeding services in both Counties remained consistently high over the 10-year period and face a seasonal pattern.

- In Isiolo, the 5-year average for admissions (2016–2020) was 510 in the OTP and 3270 in the SFP. The highest admissions were seen in 2018, with 839 in the OTP and 5,779 in the SFP. Over the same 5 years, the main peak was January–March 2018. The period January–March is the quarter with consistently highest admissions: the 5-year average is 179 in the OTP and 1,127 in the SFP.
- In Marsabit County, a similar trend is seen. The average admissions for the same 5-year period were higher, given the larger population: 2,449 in the OTP and 14,494 in the SFP. Like Isiolo, the highest admissions were recorded in 2018 for SFP (17,734) but the highest for OTP (3,341) was in 2017. Also, like Isiolo, January–March was the quarter with the highest admissions, with a 5-year average of 961 in the OTP and 5,264 in the SFP. October–December was the quarter reporting the lowest average admissions at 632 in the OTP and 4,100 SFP. The largest peaks over the last 5 years were observed in January–March in both 2017 and 2018.

8 A GAM value of more than 10% indicates an emergency. Commonly used thresholds for GAM/wasting include prevalence of 5% being acceptable, 5–9.9% considered poor, 10–14.9% as serious and >15% as critical.

- Admission trends to IMAM services correspond to the seasonal factors' acute malnutrition, with the highest admissions occurring during the short dry season (January–March) and the lowest occurring during the short rainy season (October–December). This demonstrates the importance of the short rains to the pastoralist's communities and that the failure of the short rains may have a greater impact on malnutrition compared to failure of the long rains. This may need further analysis to understand it better.
- Performance indicators for SAM and MAM treatment generally met Sphere standards for percent of exits recovered (above 75 percent), but the percent of exits who defaulted (dropped out of treatment) was often below the Sphere standard (e.g., above 15 percent).

Key Finding 3: The number of children under 5 years being brought to health facilities for treatment of common illness has also been generally high over the past ten years.

- In Isiolo, the number of child diarrhea cases presenting at health facilities has fluctuated over time, with a peak in 2019 at close to 10,000 cases. The number of child pneumonia cases presenting has followed a similar pattern but with the peak spreading over 2019 and 2020 with more than 10,000 children presenting in 2020. Malaria cases, meanwhile, have generally decreased in recent years from a peak in 2013 close to 10,000 to less than 4,000 cases in 2020.
- In Marsabit County, the total child diarrhea cases presenting at health facilities has been roughly double that of Isiolo but has followed a similar pattern, with cases remaining steadily between 16,000 and 24,000 since 2014 and a peak of just over 24,000 in 2019. The rate of children under 5 years with pneumonia cases accessing services mirrored that for diarrhea, with a peak of 19,000 in 2018. Confirmed malaria cases are proportionally much lower in Marsabit compared to diarrhea or pneumonia, and absolute numbers were lower than in Isiolo for many years, despite Marsabit having a much higher population.

Key Finding 4: Government resources are generally not prioritized for health, particularly nutritional services.

- While County budgets have overall been increasing since 2013, they remain quite low:
  - Marsabit has increased its County budget from KES 2.8 billion in 2013 to 8.02 billion in 2020/2021—a fourfold increase over eight years.
  - Isiolo has increased it County budget from KES 2.7 billion in 2013 to 5.2 billion—nearly double over the same period.
- While the portion of County budgets allocated to the health sector has also increased and now meets the Abuja commitment of 15 percent,[9] the national allocation to health does not, meaning the total value of County-level budgets remains low:
  - Marsabit's allocation increased from 17 percent in the 2015/2016 financial year, to 21 percent in 2017/2018, to 24 percent in 2018/2019 and 26 percent in 2019/2020.

9 The Abuja Declaration of 2001 committed heads of state of African Union Countries, including Kenya, to allocate at least 15% of their annual budget to improve the health of sector (https://www.who.int/healthsystems/publications/Abuja10.pdf).

  - Isiolo's allocation started off much lower at 1.8 percent in 2015/2016 and 1.9 percent in 2017/2018, but it has increased to levels similar to Marsaibt in recent years—to 25 percent in 2019/2020 and above 23 percent in 2020/2021.
- The vast majority of funds allocated to the health sector are used for recurrent expenditures, specifically staff salaries. There is, therefore, very little infrastructure development budget, meaning the possibility to finance additional facilities to improve access in more remote areas of the counties is limited.
- Nutrition services are generally not covered by county budgets and thus suffer from an over-dependence on development partners, affecting the sustainability of nutrition services.
- Understanding of nutrition policies and linkages between nutrition and other sectors is limited, leading to inadequate inter-sectoral planning. Many approaches that could yield significant public health results are also not being adequately contextualized to the ASALs.

Key Finding 5. Nutrition staff are insufficiently allocated to and distributed across the two Counties, constraining access to quality nutrition services in many locations.

- In Marsabit County, 115 nutritionists continue to provide nutrition services across the county; however, there is a disproportionate distribution with most of them located in Saku and Moyale sub-counties where malnutrition rates are lower compared to Laisamis and North Horr.
- In Isiolo, 7 nutritionists (2 nutritionists, 5 nutrition technologists) against a target of 153, a shortfall of 146 officers and no nutrition technician in the County.
- Health service delivery approaches are not very contextualized to the ASALs; for example, there were reports that some assigned health workers do not speak the local language or appreciate the cultural dynamics and norms of the catchment population.

Key Finding 6. The quality and timeliness of nutrition data generated via the health management information systems is limited, constraining its use in decision-making.

- Routine data collection via the District Health Information System is in place, but the quality of data is likely being compromised by the sheer number of indicators data being collected, particularly because the number of health information officers available in the two Counties is low.
- Manual data collection hampers timely use of data for decision-making.
- Broader nutritional indicators generated from routine surveys often lack disaggregation by lower-level administrative units, which limit estimates that could inform interventions.

Key Finding 7: Insufficient and poor spatial distribution of health facilities and service arrangements—particularly outside of towns—inhibit access to nutritional services.

- Isiolo has 71 facilities—62 percent are owned by government, 22 percent are managed by private entities, 14 percent managed by faith-based organizations and less than 1.5 percent managed by non-

governmental organizations (NGOs). Most facilities are concentrated in urban settings, with Isiolo sub-county with 42, Garbatulla sub-county with 17 and Merti sub-county with 12.

- Marsabit has 138 facilities—68 percent are managed by government, 21 percent managed by private entities and 10 percent managed by faith-based organizations. The coverage by sub-county followed a similar pattern to Isiolo with the bulk in the urban hub of Moyale sub-county with 48, Saku sub-county with 38, Laisamis sub-county with 28 and North Horr sub-county with 22.
- Not all facilities were open the whole day, making it difficult for users to access services. In Isiolo, less than 25 percent of facilities were open the whole day, while in Marsabit it was much better at 83 percent.

Key Finding 8: Functionality of the community health system is hampered by vast geographical areas, persistent conflict and low deployment of community health volunteers (CHVs)

- In Isiolo, there are about 760 CHVs. The majority are assigned to the more urbanized sub-county of Isiolo (42 percent), Garbatulla (35 percent) and Merti (22 percent). Of the 52 community units, only 60 percent are reportedly functional.
- In Marsabit, there are 1,884 CHVs. The majority are assigned to more urban sub-county of Moyale (33 percent), North Horr (27 percent), Saku (21 percent) and Laisamis (19 percent). Of the 102 community units, 87 percent are reportedly functional.

Recommendations

Health financing and health workforce

- Use financial and service data to advocate for increased allocation of budgets for the health sector at the national and county levels. The aim will be to increase the allocation for health at the national level to at least the Abuja commitment of 15 percent. At the county level, health budget allocations need to be at least sustained while increasing overall budgets.
- Support county-level governments to gradually take on more of the costs of the nutrition services from non-governmental and UN partners to improve sustainability.
- Increase the number of CHVs for both Counties and recruit and assign them equitably across CHUs.
- Budget for, recruit and equally distribute key health staff (including nutritionists) across facilities in both Counties. This may require revising staff motivation systems, especially for those working in more remote, “hardship” areas. Develop and implement strategies that attract and build the capacity of health staff from the local areas or those who speak the local language and appreciate the cultural dynamics of the population they are serving.

Community-level health services

- Increase resources, capacity building and other support to improve the functionality of CHUs, particularly in hard-to-reach areas.
- Improve outreach services covering a wider range of health services closer to the populations in need—particularly those who are far from static health facilities.

- Develop and sustain effective platforms and information products that support CHVs to advise the caregiver of the sick child on nutritional counselling and home treatment of illness (e.g., how to give ORS, zinc, antibiotics, antimalarials).

HMIS

- Support digitization of the paper-based health information systems to reduce cost and improve timeliness of data for managers and decision-makers.
- Explore opportunities to strengthen the data quality assurance process to ensure data collated from different sources are of good quality and can be promptly used for action and decision-making.
- Strengthen tools that support data collection at the community level (e.g., MoH 515) which are currently not well integrated into the HMIS. Use of community tools may need to be aligned well with other measurement approaches.

Nutrition services

- Promote joint planning and resource allocation across sectors for nutrition-sensitive interventions, including agriculture/food systems, social protection/ safety nets and women's/girl's empowerment.
- Support county governments to develop a clear strategy to take on responsibility for nutritional services in the health budget. This could be, for example, through operationalization of county nutrition action plans (CNAPs).
- Strengthen supply chain management for key commodities such as RUTF and supplementary feeding rations to ensure a continuous supply to improve access and adherence to treatment and reduce defaulting.

Conclusions

There is persistent acute malnutrition, as illustrated by GAM and SAM levels in both Isiolo and Marsabit Counties during the 10-year period between 2011 and 2020. It continues to be an ongoing and alarming problem. The levels of malnutrition mirror prominent childhood infections—such as diarrhea, pneumonia and malaria. These are largely driven by the current health system (e.g., ineffective leadership in managing healthcare in ASAL settings), human and financial resources to manage nutritional services (including the capacity of providers at all levels of care) and service arrangements (requiring adaptation to the local context). A deliberate effort should be made to improve the quality of nutritional programs, including adoption of simplified and combined protocol to reduce the need to procure two separate products (e.g., SAM and MAM treatment). This will streamline program logistics and staff training and enable a more holistic continuum of care for children with acute malnutrition. Additionally, focused communication and messaging strategies should target girls, women and males with effective/timely nutritional counseling and appropriate/timely services that are contextually relevant.

Another crucial link is strengthening the functionality of the community health system, which is influenced by vast geographical areas and persistent conflicts that hamper effective deployment of CHVs. Inadequate linkages between communities and facilities precipitate sub-optimal community-level programs and would require strengthening to ensure success of existing approaches—such as CMAM. Since acute malnutrition has complex drivers that go beyond the healthcare system, understanding how the vulnerabilities of ASAL settings perpetuate challenges of the health system requires collaborative and interdisciplinary approaches to systematically address the drivers, interactions and pathways of acute malnutrition. Effective programming in the health system domain will require efforts that link with social programs and form better/practical strategies to ensure multisectoral approaches are optimized. This could be designed around a social and cultural system in order to encourage divergence of services at the community level in line with the livelihoods of ASAL communities.

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