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Nawiri

MATERNAL, INFANT AND YOUNG CHILD NUTRITION (MIYCN): DESK REVIEW

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MATERNAL, INFANT AND YOUNG CHILD NUTRITION (MIYCN): DESK REVIEW

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ABBREVIATIONS & ACRONYMS

APHRC	African Population and Heath Research Center
ARI	Acute Respiratory Infection
ASALs	Arid and Semi-arid Lands
BCC	Behavior Change Communication
BFCI	Baby Friendly Community Initiative
CHV	Community Health Volunteer
CMAM	Community Management of Acute Malnutrition
DFSA	Development Food Security Activity
HCD	Human Centered Design
iCCM	Integrated Community Case Management
IMAM	Integrated Management of Acute Malnutrition
IRC	International Rescue Committee
IYCF	Infant and Young Child Feeding
KABP	Knowledge, Attitudes, Beliefs, and Practices
MAM	Moderate Acute Malnutrition
MCSP	Maternal and Child Survival Program
MIYCN	Maternal, Infant, and Young Child Feeding
MUAC	Mid-Upper Arm Circumference
NGO	Nongovernmental Organization
ORS	Oral Rehydration Salts
PIP	Program Impact Pathway
RUTF	Ready to Use Therapeutic Food
RUSF	Ready to Use Supplementary Food
SAM	Severe Acute Malnutrition
SBC	Social and Behavior Change
SD	Standard Deviation
SOW	Scope of Work
UNICEF	United Nations Children's Fund
USAID	US Agency for International Development
WASH	Water, Sanitation, and Hygiene
WHZ	Weight-For-Height Z-Score

EXECUTIVE SUMMARY

The purpose of this desk review is twofold. The first is to identify the key unanswered questions relevant to the underlying determinants of maternal, infant, and young child nutrition (MIYCN) in Samburu and Turkana counties, focusing primarily on those at the household and that are potential questions to explore through a human centered design process to provide insights and candidate interventions for Phase II activities.[1] The second is to identify relevant programs and interventions currently implemented in Samburu and Turkana that can be adapted to improve their effectiveness or used as platforms for new interventions/ approaches, as well as to gather insights on the effectiveness of past programs and lessons learned to inform MIYCN programming for the US Agency for International Development-funded USAID Nawiri Project.

The review addresses four overarching research questions: (1) What do mothers and caregivers in Samburu and Turkana know about optimal complementary feeding and care practices, and what are the barriers and facilitators to improved knowledge and resulting behavior change? How do these barriers and facilitators differ by adolescent versus adult mothers and by different livelihood zones? (2) What do mothers/caregivers understand about how to prevent common childhood illnesses and/or lessen their severity? (3) Who makes decisions about accessing health and nutrition services and food purchases and what to feed young children? How do these decisions differ by livelihood zone? (4) What programs are being implemented or have been implemented, and what are their impacts and lessons learned?

Overall, there are very few studies specific to Samburu and Turkana counties to address these questions and current findings are limited.

- Information is inadequate to determine the extent to which lack of knowledge of optimal breastfeeding and complementary feeding practices is a contributing cause of acute malnutrition. Given the high levels of food insecurity, improved knowledge, and key doable behaviors promoted among mothers and caregivers may reduce the risk of acute malnutrition but may not be adequate to support optimal growth among children.
- With respect to preventing childhood illness and reducing their severity, although caregivers appear to be aware of the importance of handwashing, its practice during the four critical times (i.e., after defecation, after changing diapers, before preparing food, and before eating) is low. There is also a lack of knowledge about the importance of treating water before consumption even when acquired from an improved source.
- Limited data suggest that mothers have autonomy in making food-purchasing decisions and on what to feed their children. At the same time, knowledge of traditional practices has waned as commercial foods have become more available. Additionally, caregivers appear to lack information on best practices for feeding during and after illness.

[1] HCD is an approach to problem solving. HCD is designed to work with project participants to gain their perspectives and input, to create new solutions that are tailor-made to suit their needs. HCD seeks to establish a shared vision for the activity's intent; obtain insights into structural, social, cultural, and behavioral barriers and facilitators that affect the sustainability of community support for optimal infant and young children feeding and care practices; and strengthen capacity to collectively lead social and behavior change SBC interventions for improved MIYCN outcomes.

- Lastly, despite the numerous recent and ongoing activities to improve MIYCN, there is limited information on program effects and lessons learned that would inform programing for Phase II of USAID Nawiri.

The conclusions of this MIYCN desk review suggest that integrating the results of this desk review with other research and learning and program activities to develop action research will be critical. Particularly important to this effort will be to build on the desk review results to develop questions that will inform a human centered design approach to developing pilot programs and implementing research in order to improve MIYCN practices. Additional tools critical to this approach include a landscape analysis and stakeholder mapping of community health systems. The landscape analysis and stakeholder mapping currently being completed for MIYCN will also provide critical information.

1. INTRODUCTION

1.1 USAID Nawiri Project

The goal of the US Agency for International Development (USAID)-funded, five-year USAID Nawiri Project is to sustainably reduce the prevalence of persistent acute malnutrition in four counties in the arid and semi-arid regions (ASALs) of Kenya. A consortium led by Mercy Corps—in collaboration with RTI International; Save the Children; and other partners, including county government partners—is responsible for implementing USAID Nawiri in two counties: Samburu and Turkana.

Acute malnutrition (weight-for-height z-score [WHZ] <-2 SD) in infants and children less than 5 years of age is persistent in these counties despite years of investment by USAID and other donors. Therefore, USAID Nawiri is structured to conduct research to identify and test effective interventions prior to project implementation. USAID Nawiri consists of two phases: (1) a two-year research phase to inform project activities; and (2) a three-year phase of activity implementation. Phase I includes desk reviews, formative and quantitative data collection, and implementation research to identify household, community, and other underlying drivers of acute malnutrition and to test pilot interventions. Overall, the two-year research and learning agenda aims to inform program activities implemented in Phase II and craft them to best serve the needs of diverse livelihood zones and target populations.

1.2 Purpose of Desk Review

The purpose of this desk review is twofold. The first is to identify the key unanswered questions relevant to the underlying determinants of maternal, infant, and young child nutrition (MIYCN) in Samburu and Turkana, focusing primarily on those at the household level and that are potential questions to explore through a human centered design (HCD) process to provide insights and candidate interventions for Phase II activities. The second objective is to identify relevant programs and interventions currently implemented in Samburu and Turkana that can be adapted to improve their effectiveness or used as platforms for new interventions/approaches, as well as to gather insights on the effectiveness of past programs and lessons learned to inform MIYCN programming in USAID Nawiri.

1.3 Theory of Change

The conceptual framework of acute malnutrition in Africa's drylands [1], adapted from the United Nations Children's Fund (UNICEF) nutrition framework [2], posits that the immediate causes of acute malnutrition are inadequate dietary intake and disease and their interaction. Food intake is inadequate if it does not provide enough energy, protein, fat, vitamins, and minerals to support optimal growth. Disease reduces dietary intake and physiological utilization of foods ingested by suppressing appetite, impairing absorption of nutrients and increasing nutrient losses, and diverting nutrients away from growth [3-5]. Inadequate intake and disease are synergistic; their combined effects are worse than their additive effects on child nutrition [6]. Both diarrhea and acute respiratory infections are the most common types of morbidity in young children. Children in these counties also suffer from malaria and intestinal parasites. Some are also living with HIV. Subclinical infections, including those caused by gastrointestinal parasites, that do not have acute manifestations can also harm a child's nutrition, as they can have important and cumulative negative effects on

metabolic function and growth. Environmental enteropathy, or tropical enteropathy, common in many impoverished settings, does not cause any obvious outward symptoms [7]. However, it causes nutrient malabsorption, as it changes the structure and function of the small intestine where nutrients are absorbed. Interventions that combine improving the quantity and quality of foods consumed with prevention and control of infections are likely to be most effective for enhancing child growth, including interventions that aim to prevent acute malnutrition. Women of reproductive age (15–49 years), particularly pregnant and lactating women, and children less than 5 years of age are most affected by poor nutrition [8, 9]. Among pregnant and lactating women, those who are adolescents are particularly at risk.

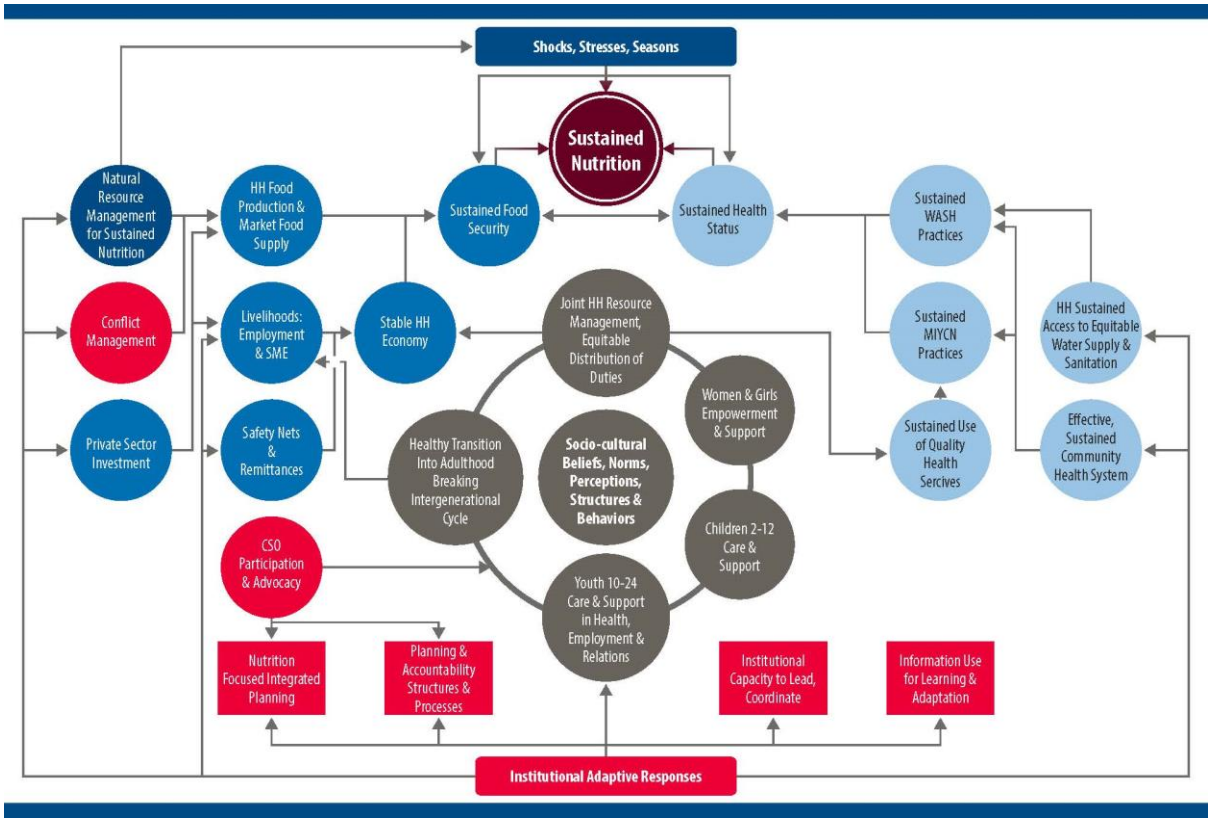
Contributing to the immediate causes of undernutrition are underlying and basic/systematic factors that include deep-rooted poverty; food insecurity; unequal access to basic services, such as health services and water and sanitation; sustained community conflict; migration; seasonal rainfall; and other shocks. Included in the underlying and basic/systematic factors, a woman's ability to adequately feed and care for her children is negatively impacted by discriminatory social norms and gender-based barriers and gaps that may prevent mothers from fully accessing, participating in, and benefiting from interventions [10]. Lack of women's empowerment and limited control over household resources, high workload, domestic violence, and alcohol consumption are also underlying and basic/systematic factors affecting MIYNC [10, 11]. Drought is a particular feature of the ASALs that has led to a number of problems, including conflict and displacement of pastoralist, agro-pastoralist, and farming households to market towns where households struggle to earn a wage that supports basic needs, including food [1]. As a result of the conditions outlined above, nearly 75% of the population in Samburu and Turkana lives in poverty; less than 70% of households register acceptable food security scores; and only 25% or less of children 6-23 months receive minimum acceptable diets as defined by WHO and partners. In Turkana, because of the dry conditions, there is limited potential for household gardens, and only 6% of households report having home gardens [12].

Based on the framework of acute malnutrition in Africa's drylands, Mercy Corps and partners developed a theory of change showing factors USAID Nawiri will influence to reduce persistent acute malnutrition (**Figure 1**). It shows that sustained food security (blue bubble); sustained health status; sustained water, sanitation, and hygiene (WASH) practices; sustained MIYCN practices; and sustained use of quality health services (light blue bubbles) are needed to have sustained nutrition (maroon bubble), thus preventing acute malnutrition in children less than 5 years of age.

Further, nutrition-sensitive interventions in WASH, health, agriculture, social safety nets, early childhood development, and education have enormous potential to enhance the scale and effectiveness of nutrition specific-interventions. Moreover, targeted social protection programs can play a large role in supporting livelihoods, food security, diet quality, household decision-making, gender norms, and women's empowerment [13]. Such programs also foster resilience so that households can manage shocks and stresses that would otherwise put household members, especially including children, at risk of adverse nutrition and health outcomes. USAID Nawiri will use an integrated social and behavior change (SBC) approach that includes a range of interventions that aim to change community norms, household

behaviors, and individual behaviors, as well as strengthen individuals, families, and communities' capabilities to contribute to improved MIYCN.

Figure 1. Theory of Change for Samburu and Turkana

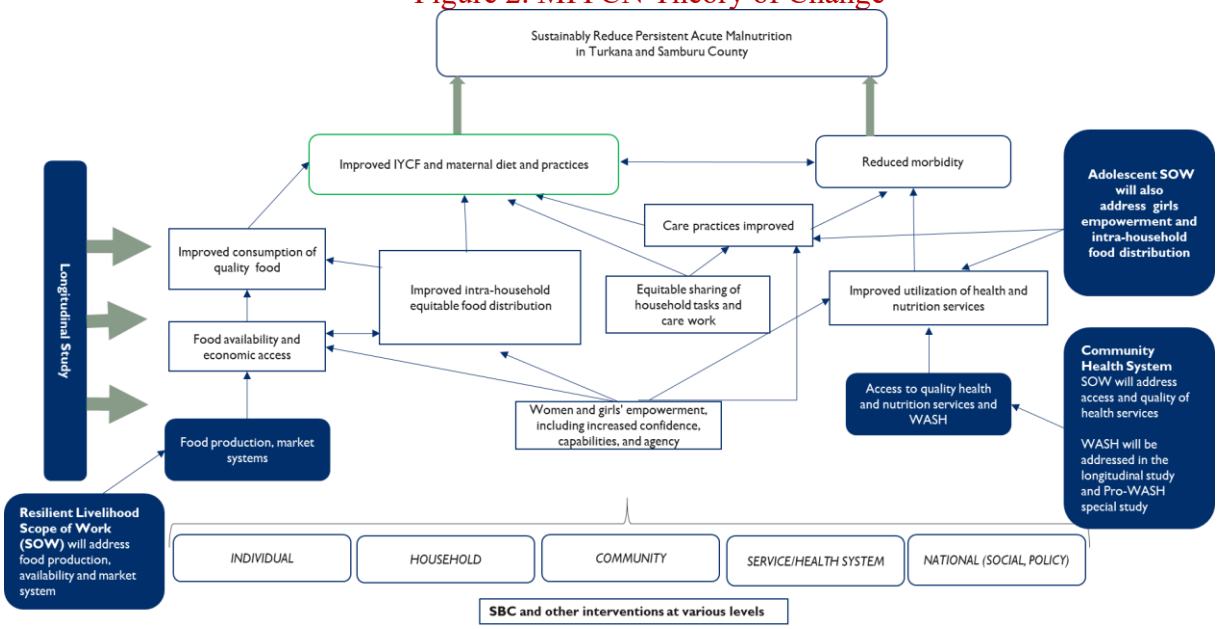


Unpacking this overall USAID Nawiri theory of change specifically for MIYCN reveals that to reduce acute malnutrition, USAID Nawiri, in partnership with country governments and other development partners, must improve infant and young child feeding (IYCF), focusing on improving breastfeeding practices and the quality (and possibly the quantity) of foods provided and reducing the burden of disease, primarily acute respiratory infections, malaria, and diarrhea (**Figure 2**). To do this, USAID Nawiri must facilitate improvements in care practices, including utilization of health and nutrition services and improvements in household hygiene practices, including those related to preparation of food and appropriate treatment to make water safe for drinking [14-15].

In **Figure 2**, the light blue boxes represent how research and learning from other parts of USAID Nawiri will feed into the MIYCN research and learning and vice versa. As can be noted, access to quality services will be addressed in the research and learning on community health systems and gender equality. Information about WASH will be collected in the longitudinal study and Pro-WASH special study. Food production and market systems will be addressed in the research and learning on food production and availability and market systems. The work focusing on adolescents will address girls' empowerment and intra-household food distribution. Lastly, the longitudinal study will address changes in IYCF

practices, child morbidity, food availability and economic access, utilization of health services, and other aspects of the theory of change.

Figure 2. MIYCN Theory of Change



2. DESK REVIEW METHODOLOGY

This desk review will focus the knowledge and information gaps identified through background information gathered in writing the proposal for USAID Nawiri and the SOW for MIYCN.[2] As a result of these knowledge and information gaps, we have identified the following questions:

1. What do mothers, caregivers in Samburu and Turkana know about optimal complementary feeding, and care practices and what are the barriers and facilitators to improved knowledge and resulting behavior change? How do these differ by adolescent versus adult mothers and by different livelihood zones?
2. What do mothers/caregivers understand about how to prevent common childhood illnesses and/or lessen their severity?
3. Who makes decisions about accessing health and nutrition services and food purchases and what to feed young children? How does this differ by livelihood zone?
4. What programs are being implemented or have been implemented and what are their impacts and lessons learned?

To conduct this review, we have sought to identify all relevant published and unpublished papers and reports from Kenya, Samburu, and Turkana, and where relevant, studies and reports from other relevant contexts, especially in Africa. We have done this by reviewing all relevant papers and reports identified through (1) preparation of the USAID Nawiri proposal;

[2] It should be noted that the broader set of questions in the MIYCN SOW will be addressed in the longitudinal study and HCD process.

(2) the protocol for the longitudinal study to be carried out as part of USAID Nawiri[3]; (3) the MIYCN SOW; (4) desk review by the African Population and Health Center (APHRC); and (5) and searches through PubMed. In addition, we have reviewed grey literature drawing on the knowledge of such reports by USAID Nawiri Kenyan staff and reports gathered as part of the research conducted for Community Health Systems.

We have reviewed and summarized the papers and reports identified with respect to the research questions identified above. We have triangulated the information from different reports to look for commonalities and/or contradictory information.

3. MIYCN IN TURKANA AND SAMBURU COUNTIES

3.1 General Background

Samburu and Turkana, located in ASALs of Kenya, have among the worst levels of poverty and poverty-associated health and nutrition outcomes in the country. Among the nearly 1.3 million inhabitants, 75% of households live in poverty and less than 70% of households register acceptable food security scores [16]. Hardcore poverty,[4] which accounts for both food and nonfood poverty, is 42% in Samburu and 58% in Turkana [16]. In both counties, about 60% of the adult population is illiterate. In Samburu, 35% of households are headed by females and in Turkana slightly more than half (52%) are headed by females [17]. We could not find information on whether the nutritional status and risk of acute malnutrition differed by marital status. Because of poverty, there is widespread dependence on food aid and social protection programs to meet basic needs.

These counties are also characterized by several livelihood groups. In Turkana, these groups include those who earn their living as pastoralists (60%), agro-pastoralists (20%), fisheries (12%), and formal employment (8%) [17]. In Samburu, the proportion of the population engaged in the different livelihoods is as follows: pastoral (56.5%), agro-pastoral (36.9%), and formal employment/business/petty trade (6.4%) [18]. The counties are also characterized by demographic transformation, particularly among pastoralists who have been unable to adapt to the speed and magnitude of pressures beyond their control, including drought, population growth, reduced access to sufficient land to support their herds, and conflict. As a result, for many, pastoralism in no longer a reliable livelihood; household food security derived from livestock—such as access to meat and milk as well as the sale of livestock to purchase other basic needs—has suffered. Milk availability and consumption, an integral part of the nutrition of pastoralists and especially critical for infants and young children, has been declining as the pastoralists move to settled livelihoods [19]. Drought is a particular feature of the ASALs that has led to a number of problems, including conflict and displacement of pastoralist, agro-pastoralist, and farming households to market towns where households struggle to earn a wage that supports basic needs such as food [1].

[3] APHRC. (2020). Examining the Complex Dynamics Influencing Persistent Acute Malnutrition in Turkana and Samburu Counties – A Longitudinal Mixed Methods Study to Support Community Driven Activity Design.

[4] In Kenya, extreme poverty is defined as a person living on US$1.99 per day. Hardcore poverty measures the proportion of households where all food and nonfood expenditures combined fails to meet the minimum daily caloric requirement (adult equivalent of 2,250 Kcal) (Wasafiri for the Working Group on Ultra Poverty in Kenya. [2019]. Defining & Better Targeting of the Ultra Poor in Kenya.)

Food prices in these counties are higher than in the rest of Kenya because of isolation, transportation costs, and other barriers. A study by Save the Children calculated that a nutritious diet for a household costs about US$11 per day, a sum well beyond the income of most households [20]. As part of USAID Nawiri, Save the Children is updating the cost of diet in Samburu and Turkana to understand the gap between household resources and the cost of a healthy diet.

3.2 Relevant County Nutrition and Health Plans

The Samburu County Nutrition Action Plan 2019–2023 has the goal of "achieving optimal nutrition for a healthier and better quality of life, and improved productivity for the county's accelerated social and economic growth" [21]. It addresses gaps from the previous Nutrition Action Plan 2013–2018, including poor linkages with other sectors, limited funds allocation from county government (because nutrition activities were not prioritized), and inadequate monitoring and evaluation of the plan. The first strategic objective of the current plan is to improve the nutritional status of women of reproductive age (14–49 years) and children (0–59 months). The report identifies implementing partners as UNICEF, World Vision Kenya, KRCS, Feed the Children, World Concern, Afya Timiza, Nutrition and Health Plus, Child Fund Acted, Caritas, WFP, and KEMSA.

The Turkana Government Nutrition Action Plan 2015-2018 had the goal of bringing together government, United Nations agencies, nongovernmental organizations (NGOs), and other stakeholders to improve the nutritional status of children less than 5 years of age and women of reproductive age. In Turkana, in 2017, there were several international organizations implementing health and nutrition programs. These include Save the Children, World Vision Kenya, International Rescue Committee, and USAID. UNICEF provided nutrition, health, WASH for development, and child protection programs. The World Food Programme provided food for assets and general food distribution relying on Child Fund, OXFAM, and Turkana Relied to implement the programs. The Kenyan Red Cross also included nutrition and WASH in their emergency response and livelihood projects.

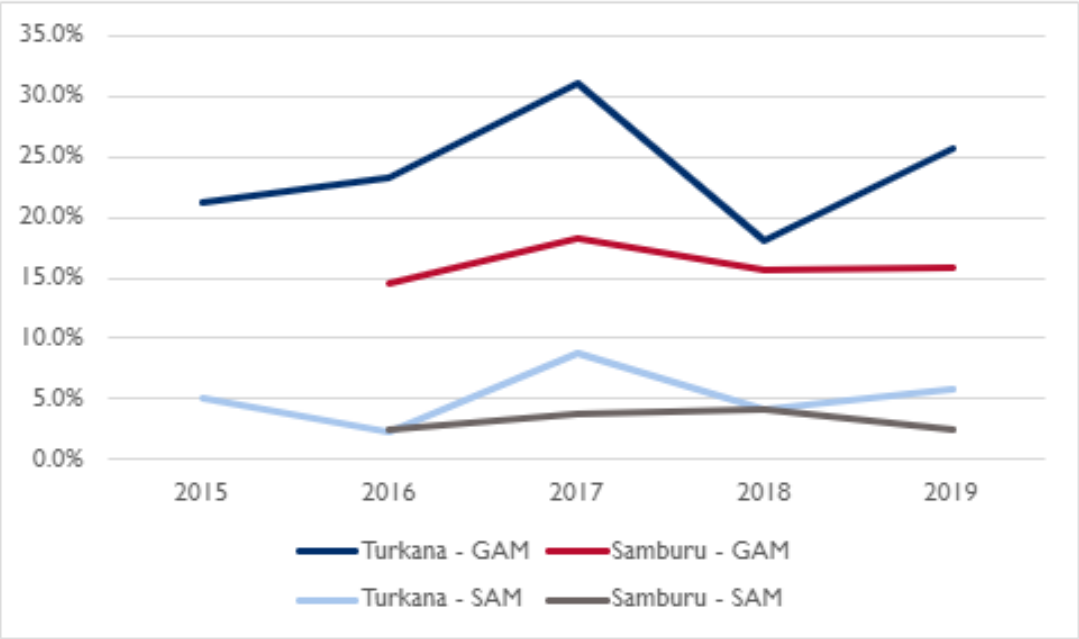
3.3 Maternal, Infant, and Young Child Nutritional Status

Compared to a well-nourished child, children with acute malnutrition are 3.4 times more likely to die. For this reason, the high prevalence of acute malnutrition is a major concern in Samburu and Turkana. As a result of poverty and the socioeconomic situation described earlier, acute malnutrition (weight-for-age <2 SD of the World Health Organization [WHO] Child Growth Standards) among children less than 5 years of age is not only a serious problem, but also persistent [22-31]. Furthermore, malnutrition is often at or above the WHO emergency threshold level of 15%. Analysis of trends of acute malnutrition for children less than 5 years of age indicate that it peaks during the hungry season (June and July) and worsens during drought seasons that are increasingly more frequent and of longer duration. Turkana frequently experiences prevalence of acute malnutrition of up to 30% and Samburu up to 18%. The most recent trend data show that the magnitude of protracted undernutrition in Samburu, as measured by stunting, has increased since 2014 to 29%. However, this is lower than the 36% registered in 2018 [22]. As measured by acute malnutrition, protracted undernutrition has not improved in Turkana since 2010 [27]. Although far less prevalent, severe acute malnutrition (SAM), defined as WHZ < -3 SD among children less than 5 years

of age, shows a similar pattern in Turkana, and it is less prevalent and more stable in Samburu (**Figure 3**).

The most recent SMART surveys in both counties, conducted in June 2019, show that 15.8% of children in Samburu and 25.6% of children in Turkana suffer from acute malnutrition [22, 27], corresponding to 8,008 and 41,789 children, respectively.[5] The same surveys show that 2.4% of children in Samburu suffer from SAM, and 5.9% of children suffer the same in Turkana. Analysis of trends between 2015 and 2019 in Turkana show prevalence rates of acute malnutrition at or above 20%, spiking to 30% in 2017 (**Figure 3**). In Samburu, the prevalence of acute malnutrition hovers at around 15% between 2016 and 2019.

Figure 3. Global acute malnutrition and severe acute malnutrition prevalence among children <5 years in Samburu[6]



These prevalence figures are most certainly an underestimate, as SMART surveys by design are cross-sectional and hence only measure children once. Because acute malnutrition is a transient condition, children in vulnerable contexts, as in Samburu and Turkana, lose weight and risk becoming acutely or severely malnourished. When treated, they recover some or all their weight, but often relapse later. Thus, a prevalence calculated from a single point in time will not capture the total burden or number of cases over the course of a year. To address the limitation of cross-sectional data, an incidence correction (K) factor has been created to permit the conversion of prevalence data gathered from cross-sectional surveys into the cumulative incidence or total number of children affected by an acute condition over a set timeframe. Barba and colleagues recently used data from longitudinal cohort data from Mali

[5] Based on population estimates from the Kenyan 2019 census, the under 5 years of age population of Samburu is 8,008 and Turkana is 41,789. https://www.knbs.or.ke/?wpdmpro=2019-kenya-population-and-housing-census-volume-iii-distribution-of-population-by-age-sex-and-administrative-units

[6] Figure developed by the RLWG on Community Health Systems.

and Burkina Faso to calculate K-factors for acute malnutrition of 4.7 in Burkina Faso and 5.7 in Mali [32]. Using mid-upper arm circumference (MUAC) or presence of nutritional edema rather than weight-for-height did not result in significantly different K factors. If these factors hold for Samburu and Turkana, the implication is that the number of children with episodes of acute malnutrition over the course of a year may be about five times higher than estimated from cross-sectional SMART surveys.

Information on vitamin and mineral deficiencies among children and women are not available for Samburu and Turkana. The most recent micronutrient survey for Kenya, conducted in 2011, reported a national average for any anemia, iron deficiency, and iron deficiency anemia among children less than 5 years of age as 26.3%, 21.8%, and 13.3%, respectively [33]. The survey also indicated that about half of all anemia is due to non-nutritional factors such as malaria or parasitic worms. Although data are only available at the national level, prevalence of all three indicators were higher among children in households where the household head had low or no education and households in the lowest wealth quintile, both of which largely characterize households in Samburu and Turkana. As previously observed, prevalence was highest among children 6–23 months of age. Among children less than 5 years of age, vitamin A deficiency and zinc deficiency were 9.2% and 83.3%, respectively.

Pregnant and lactating women are particularly vulnerable nutritionally because of the high nutritional demands during these physiological states. Among women of reproductive age, 12% in Samburu and 9% in Turkana were moderately acutely undernourished (MUAC < 21 cm) [22, 27]. Data on undernutrition among adolescent girls is not available at the county level; however, at the national level, 16.6% of adolescent girls (15–19 years) are thin (body mass index < 18.5) compared to around 5% for non-adolescents [34]. Among nonpregnant women, the Kenya National Micronutrient Survey, 2011 reported a prevalence of anemia, iron deficiency, and iron deficiency anemia of 21.9%, 21.3%, and 14.0%, respectively [33]. The prevalence of these conditions is comparable to that of children less than 5 years of age.

A cross-sectional study in Marsabit County on factors associated with nutritional status of children aged 6-59 months includes relevant information that is likely salient for Samburu and Turkana countries [35]. In the communities studied, the prevalence of acute malnutrition among children 6–59 months of age was 30%, and caregivers reported in the past two weeks that 38% of children were ill primarily with upper respiratory infections (61%) and diarrhea (24.5%). Only 85% of mothers reported early initiation of breastfeeding. The mean dietary diversity score of children was 3.07 food groups and more than two-thirds (67%) had low dietary diversity. Over one-third of caregivers had low nutritional knowledge. Formative research showed that the three main constraints to the accessibility and utilization of complementary foods were as follows: (1) inadequate household income; (2) lack of food; and (3) cultural barriers. The factors associated with acute malnutrition included low dietary diversity ($p=0.046$), poor nutrition knowledge ($p=0.045$), lack of continued breastfeeding ($p=0.023$), and inadequate consumption of vitamin A-rich fruits and vegetables ($p=0.001$). Sociodemographic factors, morbidity in the previous 2 weeks, and WASH were not associated with acute malnutrition.

Representative data are not available for the past year, as the pandemic has caused severe food shortages and poverty. Therefore, the current situation with respect to maternal and child undernutrition may be far worse than the data presented in this desk review.

3.4 Interventions to Improve Micronutrient Status and Prevent Anemia

The 2019 SMART survey in Samburu showed that although more than 67% of children 6–11 months of age received vitamin supplementation, coverage was significantly lower for children 12–59 months of age [22]. The proportion of children 12–59 months of age who received the recommended two doses per year was only 30%. The 2019 SMART survey in Turkana showed a similar pattern [27]. Although more than 90% of children 6–11 months of age received vitamin supplementation, the proportion of older children who received the recommended two doses per year ranged from 21% to 63%, depending on the survey zone.

Deworming is recommended for controlling helminths to prevent anemia. The 2019 SMART survey in Samburu showed that although 74% of children had been dewormed at least once during the past year, this rate dropped to only 30% for the recommended two doses [22]. In Turkana, 60% of children 12-59 months of age were dewormed at least once during the previous year; only 40% of children 12-59 months of age were dewormed twice during the previous year, as recommended [27].

3.5 Maternal, Infant, and Young Child Diet

In both counties, breastfeeding practices could be improved as measured by the WHO Indicators for Assessing Infant and Young Child Feeding Practices [22, 27, 36]. In Samburu, a survey of knowledge, attitudes, beliefs, and practices (KABP) conducted in 2018 showed that virtually all children less than 2 years of age were breastfed, with 84% initiating breastfeeding within the first hour of life, 95% receiving colostrum, and 93% breastfeeding on demand [37]. Eleven percent received prelacteal feeds. The prevalence of exclusive breastfeeding among infants less than 6 months of age was 78%, declining from 90% at 0–1 months of age to 62% at 4–5 months. Continued breastfeeding at 1 year of age was 85% and only 41% at 2 years of age, showing a steep drop off. Therefore, over the course of their second year of life, nearly 60% of children were no longer receiving nutrient-rich breastmilk and protection from infections that breastfeeding provides. Bottles, a source of contamination, were used by 27% of children less than 24 months of age. Data are not available on what is put into the bottles. A recent study from Nepal showed that bottle-feeding more than doubled the risk of SAM (adjusted odds ratio = 2.19) [38]. Because they are difficult to clean, bottles likely contribute to acute malnutrition because of clinical or subclinical malabsorption that contributes to acute malnutrition [39].

In Turkana, a 2017 KABP survey showed that virtually all children less than 2 years of age were breastfed. Eighty percent initiated breastfeeding within the first hour of life, 98% received colostrum, and 96% breastfed on demand [40]. Thirteen percent of newborns received prelacteal feeds. The prevalence of exclusive breastfeeding among infants less than 6 months was 77%, declining from 89% at 0–1 months of age to 56% at 4–5 months of age. Continued breastfeeding at 1 year of age was 89%. Continued breastfeeding at 2 years of age was not reported in the survey. Bottles were used by 13% of children less than 24 months of age.

Longer breastfeeding duration also provides some protection against the return of fertility, contributing to longer birth intervals [41]. A recent study in Nepal showed that a birth interval shorter than 24 months compared to 24 or more months increased the risk of SAM by

fourfold (crude odds ratio = 4.14) [38]. Longer birth intervals are protective of child health and nutrition, particularly that of the most recently born child.

Complementary feeding practices are far from optimal [37, 40]. In Samburu, the KABP survey showed that only 48% of infants 6–8 months of age received complementary foods. Among children 6–23 months of age, only 36% received a minimum meal frequency and 60% attained a minimum dietary diversity. Cereals were most consumed (84% of children), followed by cheese or other foods made from milk (88% of children). Around 50% of children consumed a root food; a legume; or nuts, beans, or lentils. A dark green vegetable or a vitamin-A rich fruit was consumed by about 40% of children and eggs by 36%. Fish was consumed by less than 2% of children. Slightly over 40% of children consumed a meat and 37% an organ meat. The reported high consumption of meat and organ meats is difficult to reconcile with other information in the report stating that only 21% of children received an iron-rich food, as the numbers should be similar [37].

Compared to Samburu, complementary feeding practices in Turkana are worse [40]. The KABP survey showed that only 36% of infants 6–8 months of age received complementary foods. Among children 6–23 months of age, only 36% attained a minimum meal frequently and 46% attained a minimum dietary diversity. Iron-rich foods were consumed by nearly half (48%) of children. As in Samburu, cereals were most consumed (84% of children) followed by cheese or other foods made from milk (70% of children) and beans, lentils, or nuts (57% of children). Around one-third of children consumed a root food, dark green vegetables, a legume, or a nut. A total of 37% of children consumed meats, 33% consumed organ meats, and 15% consumed eggs.

Maternal dietary diversity remains a challenge. In 2019, in Samburu, although nearly all women of reproductive age consumed a starchy staple food, only 57% and 48% consumed pulses/legumes and dairy, respectively [22]. Flesh foods were consumed by only 35% and eggs by 20%. Only 69% of women met the minimum dietary diversity. In 2019, in Turkana, between 68% and 94% of women of reproductive age met the minimum dietary diversity [27]. Starches and protein foods were commonly consumed; however, there was markedly low consumption of fruits, vegetables, and other nutrient-rich foods such as organ meats and eggs.

In Turkana, findings from focus group discussions showed that the dietary intake of both pregnant and lactating women was inadequate with limited variation among the communities studied [42]. The factors influencing maternal nutrition and dietary intake among women reported in the communities surveyed included availability of food, lack of access to markets because of distance and cost, lack of variety of foods in the markets, and general poverty. High maternal workload—including herding livestock—left them with limited time to prepare meals. Conflict and insecurity were other factors reported that influence dietary intake among women. In some communities, cultural factors influenced the foods eaten by pregnant and lactating women. As in other areas of Kenya [43], it was found that in Turkana South concern about having a large baby and difficult delivery may contribute to lower intake of food during pregnancy. Low birth weight, estimated at 13% among some pastoral groups [44], may be due to reduced food intake during pregnancy.

Linear programming[7] was used to develop context-specific complementary feeding recommendations for breastfed children 6–8 months of age, 9–11 months of age, and 12–23 months of age in northern Kenya, specifically in settled communities in Isiolo, pastoralist communities in Marsabit, and agro-pastoralist communities in Turkana [42]. Among the settled communities and pastoralists, 47% and 57% households, respectively, purchased their food. Among agro-pastoralists, only a small proportion of households purchased their food. Assessment of the Household Hunger Score indicated that Turkana agro-pastoralists suffered the most with respect to severity and prevalence of reported household hunger and dietary diversity. In all three-livelihood communities studied, about one-third of the households participated in a food program during the previous year.

Among children 12–23 months of age, stunting prevalence was highest in the settled communities (25%) and was similar in the pastoralist and agro-pastoralists communities (about 18%) [42]. Although stunting prevalence was highest in settled communities, the prevalence of acute malnutrition was lowest (10%) and about double that in the other two communities. The reasons for these variances are not known.

Women's dietary diversity score was similar in the settled and pastoralist communities (3.4 out of 5 groups) and lower in agro-pastoral communities (2.7 out of 5 groups).

The results for young children showed that in all three livelihood communities, diets were based almost exclusively on four food groups (out of the seven recommended by WHO), namely dairy, grain products, added fats, and added sugars [42]. Virtually absent were fruit and nondairy animal source foods (e.g., meat, fish, poultry, and eggs). Recommendations for complementary feeding diets could be made to ensure that adequate levels of nutrients are included among settled and pastoralists only. Meeting the recommendations for complementary feeding diets was not possible for the agro-pastoralists communities because of the limited consumption of certain nutrient-dense foods. Adequacy of intake for iron, zinc, and niacin were low for most of the three communities and thiamin, vitamin B6, and folate for some of the communities. The very poor quality of complementary diets in the agro-pastoralist group results from the smaller number of unique foods reported as being consumed as well as the smaller number of foods available considered being good sources of nutrients, compared with the other two communities.

The results of the study suggested that daily consumption of animal milk, starchy foods (e.g., potatoes and green bananas), and beans should be recommended in all communities [42]. Other recommended food groups were grain products and vitamin A-fortified fats/oils in settled and pastoralist communities, and vegetables in pastoralist and agro-pastoralist communities. Fruit was included only in settled communities, as it was only available in these settings, and red meat was included only among pastoralist communities because it was only available in these settings. The implications of this study for USAID Nawiri are that although there are some similarities in potential SBC messages across the three livelihood zones, assuming the results for pastoralists and settled communities in Isiolo and Marsabit are like those in Samburu and Turkana.

[7] Linear programming is a technique to minimize cost while maximizing nutrient adequacy for a set of nutrients based on locally available and commonly consumed foods.

Although not adequate to support a healthy diet, in Turkana, 66% of households received cash transfers through the Hunger Safety Net Programme (HSNP) [27]. Again, because of the COVID-19 pandemic, this number may have increased substantially.

3.6 Child Morbidity and Health-Seeking Behaviors by Caregivers

Preventable and treatable illnesses—such as acute respiratory infection (ARI), diarrhea, and malaria/fever—are common in these counties and interact with poor diet to contribute to undernutrition [22, 27]. Young children with severe or chronic diarrhea can quickly become acutely malnourished. The 2019 SMART survey in Samburu shows that 27% of mothers reported their child under 5-years of age had been ill in the previous two weeks [22]. Of these, ARIs were most common (64%), followed by fever with chills (24%), and watery diarrhea (12%). The overall rate of reported illness is much lower than the rate reported during the same month in 2018 (43%). Among mothers who reported that their children became ill, 82% reported seeking assistance. Of these, 77% reported seeking assistance from a public health facility, 11% seeking assistance from a private clinic or pharmacy, and 8% using local herbs. Only 3% reported seeking assistance from a community health worker. The 2019 SMART survey in Turkana showed a higher rate of morbidity compared to Samburu with 41% of mothers reporting their child had been ill in the previous two weeks [27]. Of these, 41% were reported to suffer an acute respiratory infection, 37% fever with chills, and 18% watery diarrhea. Like Samburu, a very high percentage of mothers (86%) reported seeking assistance for their child's illness with most (79%) from public-health facilities. Only 6% reported seeking assistance from a community health worker.

Oral rehydration solutions are extremely effective in reducing risk of undernutrition, severe morbidity, and mortality from diarrhea [45]. Effective strategies to improve their use at the household level also exist [46]. The 2019 SMART surveys from Samburu and Turkana do not report on household use of oral rehydration salts (ORS) for diarrhea, which is a serious omission.

For children with bloody diarrhea, supplementation with zinc is recommended by WHO as an adjunct treatment to ORS treatment [47] and Kenya has adopted these recommendations. In Samburu and Turkana, treatment of children with zinc following diarrhea was reported by 56% and 89% of mothers, respectively [22, 27].

Measles is a well-established contributor to acute malnutrition, and vaccination rates are relatively low. In Samburu, only 78% of children were confirmed to be vaccinated at 9 months of age, with vaccination rates falling to just under 50% (49%) at 18 months of age [22]. In Turkana, only 68% of children were confirmed to be vaccinated at 9 months of age, with rates falling to just over 50% (51%) at 18 months of age [27].

Rotavirus vaccine is also extremely important to prevent diarrhea and was introduced in the Kenya vaccination schedule in 2014 [48]. Unfortunately, the SMART surveys do not report on the prevalence of this vaccine. Like the case for ORS, this is a serious omission.

3.7 Influence of Family Members

Fathers, grandmothers, and other family members' influence IYCF and care practices. A recent mixed-methods systematic review sought to evaluate the impact of behavioral interventions that engaged family members in low- and middle-income countries [49]. The authors found that most of the interventions focused on early breastfeeding, primarily

engaging fathers or, less often, grandmothers. Most found positive impacts with family members' knowledge and support and on exclusive breastfeeding rates. The few interventions that looked at complementary feeding, maternal nutrition, and multiple outcomes also suggested benefits. Overall, they noted that interventions engaging family members could increase awareness and build support for MIYCN.

Engagement of fathers and grandmothers, in addition to mothers, to support optimal infant feeding practices was explored in three rural communities in western Kenya using a quasi-experimental design [50]. The intervention involved the formation of separate dialogue groups for grandmothers and fathers for 6 months, during which time they received information on health and nutrition and were encouraged to provide social support to mothers. Over the course of the study, the percentage of mothers reporting five or more social support actions significantly increased. Concurrently, as the number of social support actions increased, the likelihood of a mother reporting that she fed her infant the minimum number of meals increased significantly. There was also a significant association with the grandmothers' group on infant dietary diversity. The authors concluded that engaging fathers and grandmothers of infants to improve their knowledge of optimal infant feeding practices with the aim of providing social support to mothers could help improve some feeding practices. Ethnographic techniques to identify interventions to help rural Kenyan mothers cope with food insecurity in Vihiga (western Kenya) and Kitui (southern Kenya) also identified the importance of engaging other family members in feeding infants and young children [50]. Fostering the engagement of family members could include interventions to increase the participation of male members of the household in food acquisition responsibilities and activities.

4. INTERVENTIONS TO PREVENT ACUTE MALNUTRITION

While treatment strategies for SAM are well established, evidence is needed for prevention of acute malnutrition and management strategies for moderate acute malnutrition (MAM) in settings such as those in Samburu and Turkana [51].[8] For example, while there is a large body of literature on interventions to prevent stunting, there are fewer published studies of interventions to prevent acute malnutrition that did not involve the provision of food aid, such as ready to use supplementary foods (RUSFs) or cereal-based fortified foods. The few studies that were identified are summarized below.

A Positive Deviance Hearth (Hearth) program was used to test if the program prevents malnutrition among younger siblings of children in in Migori County, Kenya [52].[9] Although stunting was prevalent among the younger siblings of children being treated for acute malnutrition, weight-for-age and length-for-age Z-scores were normal, suggesting that the Hearth program was more likely to address problems of acute, rather than chronic, malnutrition. The results indicated that the program had a positive influence on health care

[8] The primary author of this desk review reached out to the technical officer in charge of preventing acute malnutrition at WHO to request information on prevention strategies and learned that WHO has recently commissioned a systematic review on the subject. However, the WHO technical officer was unable to provide any references published or unpublished.

[9] The "positive deviance" approach is used to find uncommon, beneficial practices by mothers or caretakers of well-nourished children and to spread these practices and behaviors to other mothers and caretakers with malnourished children in the community. The "hearth" is the setting where nutrition education, rehabilitation, and other parts of the program are carried out.

practices of both the mother and health workers. Involvement of local leaders also contributed to program success.

The cost of a counseling-based intervention for MAM compared to treatment with ready to use therapeutic food (RUTFs) was evaluated in six health facilities in Nairobi [53]. The study assessed the amount of staff time used in treatment of MAM and managing RUTF supplies. The cost of purchasing the commodity was also calculated and estimated as between 96% and 98% of total treatment costs. The authors concluded that very little time was spent speaking to mothers of malnourished children; therefore, counseling-based interventions, involving up to eight counseling sessions per month per child, might be more economical than supplementary RUTFs. The authors concluded that well-staffed trials centered on the efficacy of problem-oriented counseling interventions needed to be undertaken.

An integrated and simplified approach to community management of acute malnutrition is being studied using a cluster-randomized design in Turkana and Isiolo counties though the results are not yet available [54]. The primary question the authors seek of answer is the following: does integrating management of acute malnutrition (including MAM and SAM) into integrated community case management (iCCM) improve coverage, quality of care, and treatment outcomes of children 6–59 months of age with acute malnutrition?

Secondary questions include the following:

- Can community health volunteers (CHVs) effectively manage acute malnutrition at the community level?
- What is the effect of integrating acute malnutrition on the CHV's performance, regarding workload and quality of care in the management of primary iCCM illnesses (e.g., diarrhea, malaria, and pneumonia)?
- What are the enabling factors and challenges in integrating management of acute malnutrition into iCCM?
- Is the integration of management of acute malnutrition into iCCM cost effective compared to the baseline system (traditional facility-based approach)?

The Integrated Management of Acute Malnutrition (IMAM) Surge rollout in several countries with high rates of acute malnutrition, including Samburu and Turkana, is also relevant to efforts to address acute malnutrition by identifying active cases of acute malnutrition for referral to health facilities. IMAM is reviewed in detail in the Desk Review on Community Health Systems. Additional information on the IMAM model is available at: https://www.ennonline.net/fex/64/imamsurgekenya.

In India, a study examined the effect of adding a community-based prevention and treatment for acute malnutrition intervention to the Government of India Integrated Child Development Services standard care for children in Mumbai slums [55]. The one-year intervention was delivered by community health workers and included home-based counselling for pregnant women, monthly home-based counselling for caretakers of infants below 6 months of age to promote appropriate feeding practices, monthly growth monitoring for all infants aged 0–3 years, and community awareness and capacity building of community health workers. During the monthly screening, infants' growth was monitored using individual growth cards. Community activities, often in conjunction with government and international campaigns (e.g., breastfeeding week), were organized to raise awareness. Community health workers

monitored the immunizations of infants under 6 months of age and referred the infants to municipal health posts for required immunizations. The control group consisted of children less than 3 years of age who received the standard of care. Over the course of the study, 8,980 and 3,382 children were enrolled in the prevention and treatment programs, respectively [55]. Of the infants admitted to the treatment program, 56% were cured (60% with SAM and 55% with MAM). A total of 31% failed to recover, 8% defaulted, 0.2% died, and 6% did not receive full services (either receiving home visits but not being weighed, or not receiving home visits and not being weighed). Of the 56% cured, 75 children or 18% of the SAM cured relapsed into the SAM category during the study period of one year. While performance is low in terms of cure and default rates, according to SPHERE minimum standards, the children were still being monitored even after reaching the cure threshold.

In Burundi, an intervention that combined food-rations and SBC was implemented to reduce wasting among children from birth to 23 months [56]. The intervention consisted of household and targeted individual (pregnant mother and young child) with food rations (consisting of corn-soy blend and micronutrient-fortified vegetable oil) and behavior change communication (BCC). Three intervention groups were targeted (1) at the first 1,000 days, pregnancy to 18 months, and birth to 23 months only. A control group did not receive food rations or BCC. The results showed a significant protective effect on child wasting ($P<0.5$) and weight-for-length Z-score. The effects were only found among children of mothers and household heads who lived in the poorest households and had no formal education; conditions are true for a large part of the population in Samburu and Turkana. The biggest effects were found for infants 6–11 months of age, which is the age group with the highest prevalence of wasting.

Box 1. Key Findings and Recommendations: Interventions to Prevent Acute Malnutrition

- Very few programs have focused on prevention of wasting, and those that do involve food rations along with other activities, such as SBC.
- In Nawiri, efforts should be focused on promoting optimal IYCF and care behaviors to promote better nutrition overall with the idea that such behaviors also prevent acute malnutrition.

5. INTERVENTIONS TO IMPROVE INFANT AND YOUNG CHILD FEEDING PRACTICES

Alive & Thrive, a large Gates Foundation-funded program aimed at improving infant and young child nutrition, conducted interventions in Bangladesh and Vietnam between 2009 and 2014, with the goal of improving breastfeeding practices [57]. Strategies used included intensified interpersonal counseling, mass media, and community mobilization. These were delivered at scale in the context of policy advocacy in Bangladesh and Vietnam. In Bangladesh, interpersonal counseling was delivered through a large nongovernmental health program; in Vietnam, interpersonal counseling was integrated into government health facilities. A cluster-randomized evaluation design was used in each country. The results showed that in Bangladesh, improvements were significantly greater in the intensive compared to the non-intensive group for early initiation and exclusive breastfeeding in the previous 24 hours. In the intensive group, early initiation increased from 63.7% to 94.2% and exclusive breastfeeding increasing from 48.5% to 87.6%. In Vietnam, early breastfeeding increases were also greater in the intensive group (18.9% to 57.8%); however, early initiation of breastfeeding declined (60.0% to 53.2%) in the intensive group, but less than in the non-intensive group (57.4% to 40.6%). The authors noted that their results may underestimate the

full potential of such a multipronged intervention because the design did not include a pure control area with no mass media or policy advocacy. The authors concluded that at-scale interventions combining intensive interpersonal counseling with mass media, community mobilization, and policy advocacy had greater positive impacts on breastfeeding practices in Bangladesh and Vietnam than standard counseling with mass media, community mobilization, and policy advocacy.

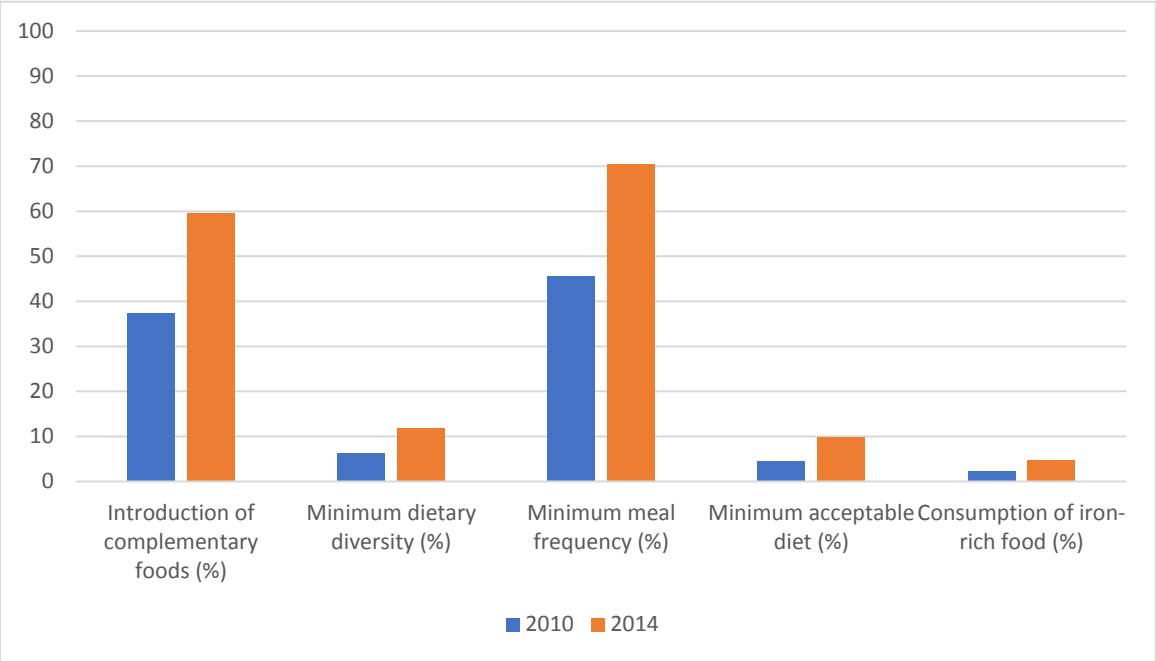
In the Bangladesh intervention, a program impact pathway (PIP) analysis was used to identify the pathways through which the inputs in the program linked to the outputs [58]. The study used mixed methods to review the training materials content for implementation staff, measured their IYCF knowledge, observed their communication with mothers, and examined factors influencing promotion of IYCF practices and their trial and adoption by mothers. The results showed that, to a large extent, program staff demonstrated good knowledge and maintained fidelity to the intervention. Mothers identified program staff as their primary sources of information, and most tried the recommended IYCF practices. Key facilitators included family support and availability of resources. Lack of time, maternal and family perceptions of age-appropriate feeding, and lack of resources were barriers to adopting recommended practices.

Another Alive & Thrive program in Ethiopia sought to improve IYCF practices through large-scale implementation of SBC interventions in four regions between 2010 and 2014 [59]. The program included (1) advocacy and policy dialogues at national and subnational levels, (2) interpersonal communication and community mobilization, (3) mass communication, and (4) strategic use of data. Interpersonal communication focused on the delivery of seven key IYCF messages targeted to mothers and community mobilization and mass media interventions directed at opinion leaders, fathers, and other caregivers.

At the community level, age-appropriate IYCF messages and counseling to mothers and caregivers of children less than 2 years were delivered primarily through the Ministry of Health of Ethiopia, which used a large network of government-salaried female health extension workers and cadres of CHVs. In the communities, the health extension workers and community volunteers engaged in interpersonal counseling at the health post or during routine home visits and community mobilization activities, such as village gatherings to discuss IYCF and food demonstrations (i.e., preparation of enriched complementary foods). In addition, a mass media campaign was launched to promote IYCF messages mainly through the radio.

The evaluation used a pre-post adequacy evaluation design. Analysis of the program showed improvements in most WHO-recommended IYCF indicators. For example, early initiation and exclusive breastfeeding increased by 13.7% and 9.4%, respectively. Significant improvements were also observed in complementary feeding practices, especially for the practices of timely introduction of complementary foods and minimum meal frequency (**Figure 4**).

Figure 4. Changes in complementary feeding resulting from exposure to a large-scale social and behavior change communication intervention



Note: Created from data presented in Kim et al., Exposure to Large-Scale Social Behavior Change Communication Interventions is Associated with Improvements in Infant and Young Child Feeding Practices in Ethiopia

The authors also reported the following:

- A dose-response association between health post visits and early initiation of breastfeeding was observed.
- Higher numbers of home visits by community volunteers and key messages recalled were associated with 1.8 times greater odds of achieving minimum dietary diversity, minimum meal frequency, and minimum adequate diet.
- Higher numbers of radio spots heard were associated with three times greater odds of achieving minimum dietary diversity and minimum meal frequency.

Although the intervention resulted in improvements in IYCF practices, anthropometric indicators did not improve over the course of the program and large gaps in improving children's diets in Ethiopia remain, particularly during complementary feeding.

Key findings and recommendations with respect to interventions to prevent acute malnutrition are summarized in **Box 1**.

6. INTERVENTIONS TO PREVENT CHILD MORBIDITY

Box 2. Key Findings and Recommendations: Interventions to Improve IYCF Practices

- While improving IYCF practices is important, it does not necessarily lead to improvements in child nutrition.
- Very few programs have focused on prevention of wasting and those that involve food rations along with other activities, such as SBC.
- In Nawiri, efforts should be focused on promoting optimal IYCF and care behaviors to promote better nutrition overall with the idea that such behaviors also prevent acute malnutrition.

Diarrhea is a well-known risk factor for acute malnutrition, and exposure to fecal pathogens causes both acute and chronic malnutrition [4]. Caregiver hygiene practices—including those around handwashing and food preparation, storage of food, and clean utensils—can help to mitigate food-born illnesses. Safe places to play so that young children are not exposed to pathogens from animals are also important. In a recent study in Kenya, three novel caregiving hygiene messages were developed from extensive formative research: hygienic food preparation and storage, handwashing at key times, and provision of a safe play environment for children under 2 years of age [60]. The study used the COM-B framework[10] to explore the capabilities, opportunities, and motivations underpinning the behaviors regarding caregiver hygiene practices in rural settings in Homa Bay and Migori counties. Unfortunately, the study did not test the effect of the messages to assess their impact.

The effect of an intensive handwashing promotion intervention in high-risk communities in Pakistan was evaluated through a randomized-controlled trial [61]. The interventions consisted of weekly visits in 25 neighborhoods to promote handwashing with soap after defecation and before preparing food, eating, and feeding a child. Within intervention neighborhoods, 1,523 children in 300 households received a regular supply of antibacterial soap, and 1,640 children living in 300 households received plain soap. Eleven neighborhoods that included 1,528 children in 306 households comprised the control group. The main outcome measure, incidence density of diarrhea among children, was defined as the number of diarrheal episodes per 100 person-weeks of observation.

The authors found that children less than 15 years of age who live in households that received handwashing promotion and plain soap had a 53% lower incidence of diarrhea compared with children living in control neighborhoods. Infants living in households that received handwashing promotion and plain soap had 39% fewer days with diarrhea compared to infants living in control neighborhoods. Children less than 5 years of age who were severely malnourished (weight for age *z* score, <–3.0) and living in households that received handwashing promotion and plain soap had 42% fewer days with diarrhea versus severely malnourished children in the control group. Similar reductions in diarrhea were observed among children living in households receiving antibacterial soap, indicating that antibacterial soap and plain soap had similar effects for reducing diarrhea if coupled with intensive hand promotion.

[10] The COM-B framework three pre-requisites for behavior change are as follows: (1) capability (the person has the skills necessary to perform the behavior), (2) opportunity (there are no existing social or environmental constraints that hinder performance of the behavior), and (3) motivation (the person has strong personal and external reasons to perform the behavior).

Key findings and recommendations regarding interventions to improve IYCF practices are summarized in **Box 2**.

Box 3. Key Findings and Recommendations: Interventions to Prevent Child Morbidity

- Using SBC to promote handwashing at critical points along with the provision of either regular soap or antimicrobial soap was effective at reducing the prevalence of child diarrhea. However, this effect assumes that water is available, which may not be the case in many communities in Samburu and Turkana countries.
- To be successful, there are three key prerequisites for behavior change: (1) capability (the person has the skills necessary to perform the behavior), (2) opportunity (there are not existing social or environmental constraints that hinder performance of the behavior), and (3) motivation (the person has strong personal and external reasons to perform the behavior).

7. EVALUATIONS AND LESSONS LEARNED FROM SBC STRATEGIES

SBC interventions to improve IYCF practices have been used in multiple different settings and are implemented either as a stand-alone intervention or as part of a broader intervention that includes, for example, food distribution or a conditional case transfer. Some stand-alone SBC programs have been successful in improving complementary feeding diets; however, improving nutritional status through SBC alone has proven more challenging [62-65]. It appears that few studies also incorporate prevention of morbidity as part of the messaging. Furthermore, few programs evaluate the pathways though which interventions should occur to have an effect and therefore determine the fidelity to the design and coverage of intended beneficiaries. An analysis of the PIP is essential to understand the pathways through which a program achieves success. The PIP also helps to uncover whether the intervention was unsuccessful because it was ill conceived or implemented so poorly that success was impossible. An analysis of coverage is necessary because a good intervention that has inadequate coverage will not have an impact. Sustainability of an SBC intervention after a program ends, when external resources and technical support is no longer available, is often an issue as well.

Key findings and recommendations with respect to interventions to prevent child morbidity are summarized in **Box 3**.

7.1 SBC Programs in Development Food Security Activities (DFSAs)

A review of 11 DFSAs that used SBC approaches was conducted by the Food and Nutrition Technical Assistance III Project in 2018, the findings from which are highly relevant to USAID Nawiri [66]. The aim of the review was as follows:

- Describe the fundamentals of SBC theory and practice and identify current consensus on evidence-based global best practices.
- Identify the SBC approaches being used by current and recent DFSAs.
- Assess how well those approaches are aligned with best practices.
- Identify the common strengths and weaknesses in the implementation of the SBC activities and the quality of implementation where it was observable.
- Recommend steps that Food for Peace might consider pursuing to improve the impact of DFSAs' SBC activities.

Though the quality varied considerably, the review showed that virtually all the DFSAs used formative research to inform program design, noting that the "strongest programs did a good job analyzing the results from formative research and explicitly linking them to activities through carefully tailored tools and messages, while others remained superficial accounts of barriers (e.g., women lack knowledge of the benefits of breastfeeding, so the program must explain the benefits of breastfeeding)". The review also showed that the strongest SBC approaches and programs demonstrated a conceptual grasp of SBC principles and presented detailed frameworks to guide a variety of tailored interventions at different levels.

Through observation of several IYCF counseling programs, the reviewers noted the following:

- Most facilitators focused on delivering messages rather than engaging people in a process of learning to solve their problems or develop skills.
- There was a notable lack of probing questions and missed opportunities to uncover relevant details and support problem solving.
- The quality of counseling tended to deteriorate at the community level, even when expertise was evident at the trainer level.
- In program discussions, staff and stakeholders talked most about content, emphasizing the "what" rather than the "how" of group facilitation.
- A crucial skill for counseling and group facilitation was almost completely absent: "teach back" to verify learning.

A key take-away message based on these observations highlighted the importance of increasing the focus on implementation quality and capacity. In addition, the review noted that SBC programming should include the following:

- Shift the balance of thinking from the "what" and "how much" to the "how"
- Focus on behaviors more likely to be impactful
- View program participants as active change agents rather than only beneficiaries
- Consider culture an asset rather than an obstacle.

The review further suggested that there should be maximum active involvement in the research process from local implementing partners' staff, community members, and government partners, and that sufficient time and resources during the start-up period for all the staff and government partners to be trained on the strategy and ensure they know how to operationalize it should be allowed. It concluded that best SBC practices should (1) promote the use of more consultative, community dialogue methods for both the research and implementation processes; (2) use SBC approaches focused on individual BCC for changes in KABPs of specific audiences, community mobilization for wider participation, collective action, community ownership, and advocacy to increase resources and political/social commitment for change goals; and (3) promote the use of particularly promising approaches that current DFSAs have used. These include developing and working with grandparents' groups; social analysis and action; couple dialogues; agriculture SBC agents; community drama, segmentation of and profile target subgroups; and tailored activities, particularly for adolescent females. In the case of USAID Nawiri, consideration of the different livelihood zones would also be important.

7.2 SBC Programs in Nutrition-Sensitive Programs

A recent systematic review sought to synthesize and summarize the lessons learned from studies on nutrition sensitive programs in the agriculture, social safety net, and WASH sectors that included an SBC component [67]. The review found that the length of time an intervention is implemented can affect behavioral outcomes and nutritional outcomes. Additionally, it showed the difficulty of determining the impact of SBC activities since they are but one component of an intervention. It can be concluded that the SBC activities contributed to an outcome but because of the evaluation design, a direct causal link cannot be established. Another challenge cited in the review was the lack of detail on the exact mode of SBC delivery, which complicated determining concrete conclusions about the preferred structure of an SBC component within a broader nutrition-sensitive program.

Box 4. Key Findings and Recommendations: Evaluations and Lessons Learned from SBC Strategies

- Carefully follow the recommendations for SBC activities in Nawiri that were articulated in the review of SBC in DFSA's and avoid making the mistakes identified.
- Ensure that Nawiri's SBC strategy is tailored to the local context and focuses on small, achievable actions for key audience segments identified through rigorous testing. Reach a high percentage of the priority groups through repeated contacts.
- Use ongoing engagement and adaptive management to ensure that Nawiri's interventions are relevant to the priority groups and that the project will be able to pivot quickly if an intervention is not working as expected.
- To achieve maintenance of SBC activities, plan for a phased expansion through local nongovernmental implementing partners with a far-reaching community-based platform as well as nationwide mainstreaming through multiple NGOs and government programs.
- Work with county government officials to ensure that once Nawiri program activities have ended that training, monitoring, and evaluation do not decline in frequency, quality, and coverage.
- Consider including HCD in the development process and gain insight on how communities perceive programs to improve IYCF and care practices and how these practices could be improved to have greater impact and sustainability.

7.3 Sustainability of SBC Programs

In the aforementioned Bangladesh and Vietnam projects, an evaluation used mixed-methods to assess its sustainability after the program ended [68]. The project ended in 2014, and the evaluation was conducted in 2017—three years after Alive & Thrive ended its support. The results showed that although stakeholders perceive declines in mass media campaigns, the activities in policy and advocacy, social mobilization, and counseling that had been institutionalized continued.

Quantitative data collected as part of the evaluation showed a persisting modest intervention effect: health workers in intervention areas had significantly higher child feeding knowledge, and in Bangladesh greater self-efficacy and job satisfaction, compared to their counterparts who did not receive the full package of activities. Also, while elements of the program had been integrated into routine services, stakeholders noted dilution of the program focus because of competing priorities. In addition, some program activities—such as training, monitoring, and evaluation—that were essential to the success of the program, declined in frequency, quality, and coverage, or had been eliminated altogether.

Key findings and recommendations regarding evaluations and lessons learned from SBC strategies are summarized in **Box 4**.

8. GAPS IN KNOWLEDGE

This desk review on MIYCN in Samburu and Turkana has identified gaps in our knowledge with respect to the four questions that were identified for further investigation. The following summaries of our findings, by question are presented. We also present a short summary of key findings and recommendations.

8.1 What Do Mothers and Caregivers in Samburu and Turkana Know About Optimal Complementary Feeding and Care Practices, and What Are the Barriers and Facilitators to Improved Knowledge and Resulting Behavior Change? How Do These Differ by Adolescent Versus Adult Mothers and by Different Livelihood Zones?

Information about optimal complementary and care practices is only available from one small study in Turkana [68]; no literature was found on this topic for Samburu. The study in Turkana did not differentiate between adolescent and adult mothers or by livelihood zone because of the very small sample size (46 mothers). Caregivers were poorly educated: 81% had no formal education, and only 4% of the sample had completed secondary school. Nonetheless, they appear to understand the importance of a balanced diet for a healthy child that includes milk, meat, eggs, Plumpy'Nut®, and fruits. Caregivers identified fatty meat of a donkey and sheep, milk, and milk cream as foods to make children grow fat, which was equated with health. They also reported that paying attention to food hygiene—such as making sure utensils and food were clean before cooking and washing hands before cooking food and feeding a child—as a way to prevent illness was important. For the most part, young children did not receive the recommended number of feeds recommended by WHO, though it is unknown if this was because of food insecurity or lack of knowledge of recommended practices.

Box 5. Key Findings and Recommendations: Complementary Feeding Practices

- Information is inadequate to determine the extent to which lack of knowledge of optimal breastfeeding and complementary feeding behaviors is a contributing cause of acute malnutrition.
- Given the high levels of food insecurity, improved knowledge of key behaviors may reduce the risk of acute malnutrition but may not be sufficient to ensure optimal growth. This is likely to be particularly true for recommendations to increase the intake of highly nutritious but expensive animal source foods.
- Action research should focus on small incremental approaches to improving feeding frequency and diet quality, such as adding a small amount of an animal source food at least twice per day to a young child's meal.

Surveys have shown that women in Turkana and Samburu are busy with livelihoods as well as caregiving, and they prioritize ease of food preparation when determining what to feed young children. Ease of food preparation has been cited as the most important determinant of what to feed children, followed by healthiness of food, child acceptance, ease of feeding, ease of acquiring the food, cost, and the influence of others [68]. The prioritization of ease of preparation is likely because mothers identified themselves as "doing business." Of the 46 caregivers, 40 reported "business" alone, while the remaining six combine business and other activities. No mother identified herself as solely a housewife, which speaks to women's time poverty as a likely limiting factor to improved IYCF. An important feature that affected food preparation for infants and young children included time requirements to obtain firewood, challenges in reheating food, or cooking hot food more than once a day, which creates the

potential for foodborne illness since refrigeration is not available and food is often stored beyond a safe period.

Interestingly, although most of the households in the study were rural, much of their food is acquired from the marketplace rather than home production [68]. Food insecurity was present in nearly all the households, and negative changes in the diets of infant and young child were a function of the severity of the insecurity.

In both counties, breastfeeding practices have continued to improve with notable challenges around provision of prelacteal feeds, bottle-feeding with teat or nipple and limited support given to mothers to initiate breastfeeding within one hour of delivery [22, 27]. Infants are introduced to animal milk when a few days old, which is a risk factor for malnutrition and morbidity [37, 40]. In addition, timely initiation of breastfeeding within one hour of delivery and exclusive breastfeeding for 6 months are still a challenge. Research indicates that the breastfeeding practices in both counties are hindered by cultural beliefs and taboos around breast milk. For example, mothers believe that breastfeeding should cease when a child has diarrhea because breast milk causes diarrhea. Cessation of breastfeeding, even if temporary, is dangerous both because it puts the child at risk for dehydration and undernutrition and because less frequent breastfeeding causes a decrease in the mother's production of breast milk. Further, mothers believe that colostrum or the "first milk" is not good for the newborn child. Breastfeeding in the second year may be low because mothers are not aware of its benefits. No documentation was found about knowledge of recommended practices during this period. Therefore, it remains to be known if poor practices are due to lack of knowledge or other obstacles that prevent mothers from acting on knowledge, such as women's time poverty. Bottle-feeding is commonly practiced for children under 2 years of age in both Samburu and Turkana, though it is unknown if mothers are aware of the risks of bottle-feeding.

Because so few studies were identified, the search was broadened to identify other relevant studies in the ASALs. A cross-sectional study of complementary feeding practices among children 6–23 months of age among pastoralists in Laisamis sub county, Marsabit County, showed poor practices [69]. Only half of the children received complementary foods at the age of 6 months. Among breastfed and nonbreastfed children, the recommended minimum meal frequency was 28.7% and 2.6%, respectively. Only about 25% of children achieved the recommended minimum dietary diversity, and only total of 5.9% achieved the minimum acceptable diet. With respect to knowledge of optimal practices, most of the mothers/caregivers (95.1%) knew that children should be encouraged to feed while 61.6% knew that children should be fed more frequently during and after illness. The timing of introduction of complementary feeding were predictors of wasting among children while timing of introduction of complementary feeding and maternal knowledge on the duration of breastfeeding were predictors of child underweight. The authors of the study concluded that complementary feeding practices predicted child nutritional status whereas maternal/caregivers' knowledge on complementary feeding practices had limited impact.

In 2017, a review of the health and nutrition surveys, journal articles, case studies, reports from NGOs, and grey literature examined the nutrition and health challenges of pastoralists in Kenya [44]. The review found that the main challenge pastoralists faced was food insecurity leading to high rates of malnutrition among young children. The nutritional status of young

children varied with seasons, with the highest rates of acute malnutrition occurring during droughts, which have been growing more severe because of climate change. Other challenges included the following:

- To avoid a difficult delivery, pregnant women restricted food intake during pregnancy.
- Knowledge of breastfeeding and complementary feeding were reported to be poor, and newborns were introduced to animal milk from a few days old, which is a risk factor for malnutrition and morbidity.
- Malaria, respiratory tract infections, and diarrhea were frequent and coverage of health services poor.
- Because the availability of safe drinking water was a challenge, waterborne diseases were common.
- When pastoralists become sedentary, negative nutritional consequences include inadequate housing and lack of clean drinking water.

The review recommended that to address these challenges, there should be a focus on nutrition education around the importance of appropriate weight gain during pregnancy, benefits of exclusive breastfeeding, and sanitation concerning safe drinking water. In addition, at the community level, an integrated approach is needed by all stakeholders implementing health and nutrition interventions in pastoralist areas and at the national level. Interventions should focus on both relief and resilience building and be tailor-made specifically for the pastoralist communities. The review also stressed the importance of assessing the nutritional impact of the recommended interventions.

Key findings and recommendations regarding what mothers/caregivers understand about optimal complementary feeding and care practices and the barriers and facilitators to improved knowledge and resulting behavior change are summarized in **Box 5**.

8.2 What Do Mothers/Caregivers Understand About How to Prevent Common Childhood Illnesses and/or Lessen Their Severity?

The 2019 SMART survey in Samburu showed that 84% of households were aware of handwashing practices [22]. However, only 12% reported washing hands at all four critical times: (1) after using the toilet, (2) before cooking, (3) before eating, and (4) after taking child to toilet. This was a significant decline from the 26% who reported this practice in 2018. Washing hands after taking children to the toilet was the least practiced behavior (13%) while 83% reported washing hands before eating. Of concern is that 73% of households reported practicing open defecation.

The 2019 SMART survey in Turkana indicated that almost half (46%) of households, used soap and water for handwashing and 38% used water only [27]. With respect to handwashing in households with children 0–23 months of age, between 77% and 91% of households were aware of handwashing, depending on the survey zone. However, only 12% reported practicing handwashing at the four critical moments. As in Samburu, use of latrines is extremely problematic, with 75% of households reporting open defecation.

Box 6. Key Findings and Recommendations: Common Childhood Illnesses

- Caregivers appear to be aware of the importance of handwashing; however, its practice during the four critical times is low.
- There appears to be a lack of knowledge about the importance of treating water even when acquired from an improved source.
- Information was not available about the extent to which mothers understood the importance of continued breastfeeding during child illness, as children often will breastfeed even when rejecting foods.
- Information was also not available on maternal/caregiver knowledge about the importance of feeding more after illness.
- The MIYCN research and learning should seek information about barriers and opportunities to improve the practice of handwashing at critical moments, treating water, continued breastfeeding during child illness, and feeding more after child illness.

An ethnographic study that used both qualitative and quantitative data collection methods on an integrated WASH and agricultural intervention in Lorroki, Samburu showed that only 24% of households surveyed treated their water before consumption [71]. Those that did not assumed that water from constructed water points was safe for consumption, with one participant noting: "Water from the sites is clean and drinking of clean water will enhance the good health and help in reducing water bone diseases." Almost all the participants reported washing their hands at least once a day, and 50% reported washing 3–5 times. The reasons given for not washing hands included forgetting (44%), no need (33%), no time (12%), and inadequate water (6%). Given the difficulty of finding water in this area, it is interesting that so few cited a lack of water as a barrier to washing hands.

The ethnographic study described above also reported that mothers in Turkana understand the importance of hygiene related to food preparation and washing hands before preparing food [69]. No information was found for Samburu about maternal knowledge of hygiene related to food preparation and washing hands before preparing food. No information was found for either Turkana or Samburu, regarding caregiver knowledge about how to lessen the severity of disease—such as continued breastfeeding when a child is ill, even if the child refuses food, to ensure he or she receives nourishment and hydration, as well as the importance of feeding more after illness to regain any weight that was lost. No information was found on maternal knowledge of ORS and their importance during child diarrhea in both Samburu and Turkana.

Lastly, because of disruptions in the socioecological environment, pastoralist communities in Samburu and Turkana face increasing water insecurity. Pastoralists that have become sedentary are most vulnerable. A recent study on the dimensions of water insecurity in pastoralist households in Kenya reported that water insecurity is most extreme in rural areas and identified a close relationship between water security and social capital [72]. Livelihood diversity did not appear to protect against water insecurity, though households with more livestock tended to be more water insecure compared to households with fewer livestock. In Samburu, high levels of water insecurity in both rural and peri-urban households result in household members, mostly females, spending increasing amounts of time obtaining water

while also procuring an inadequate quantity of water for household use. Beyond interventions to improve hygiene and water quality, interventions need to work to reduce women's work burden related to obtaining adequate amounts of water. The authors concluded that efforts to reduce persistent undernutrition in the ASALs were not likely to be successful without addressing water insecurity.

Key findings and recommendations regarding what mothers/caregivers understand about how to prevent common childhood illnesses or lessen their severity are summarized in **Box 6**.

8.3 Who Makes Decisions about Food Purchases and What to Feed Young Children? How Does This Differ by Livelihood Zone?

Some information is available for Turkana from the ethnographic study about the influence of other household members regarding what to feed young children [69]. The study reported that women are not influenced by their husbands or mothers-in-law, indicating that times have changed. Findings also shows that mothers and caregivers perceive that that children also need fruit and vegetables, not only milk and meat, as was customary before. No information is available about how these practices differ by livelihood zone.

Box 7. Key Findings and Recommendations: Food Purchases and Children Feeding Decisions

- Limited information suggests that mothers do have autonomy in making food purchasing decisions and in deciding what to feed their children.
- Data was identified that showed knowledge of traditional practices has waned as commercial foods have become more available.

Key findings and recommendations regarding who makes decisions about food purchases and wat to feed young children and how they differ by livelihood zone are summarized in **Box 7**.

8.4 What Programs Are Being Implemented or Have Been Implemented and What Are Their Impacts and Lessons Learned?

Baby Friendly Community Initiative, 2012

In 2012, the Government of Kenya included Baby Friendly Community Initiative (BFCI) in the National Nutrition Action Plan and prioritized it as a "high impact nutrition intervention" to reduce child malnutrition and mortality [73]. Support for its implementation has been provided by UNICEF and the USAID Maternal and Child Survival Program (MCSP). Kenya has used an integrated, multileveled approach for implementation [73]. The BFCI eight-point plan for Kenya includes the following items:

Box 8. Key Findings and Recommendations: Programs, Impacts, and Lessons Learned

- Although multiple programs were identified in Samburu and Turkana counties, for the most part, key information is lacking on program effects and lessons learned that would inform programming in Nawiri.
- The BFCI appears to have had some successes, but coverage is a major obstacle.
- It is of critical importance that both process and impact evaluations are conducted in Nawiri activities to understand what worked and why it worked and well as what did not work and why.

1. Have a written MIYCN policy summary statement that is routinely communicated to all health providers, CHVs, and the community members.
2. Train all healthcare providers and community health volunteer and equip them with the knowledge and skills necessary to implement the MIYCN policy.

3. Promote optimal maternal nutrition among women and their families.
4. Inform all pregnant women, lactating women, and their families about the benefits of breastfeeding and risks of artificial feeding.
5. Support mothers to initiate breastfeeding within 1 hour of birth, establish, and maintain exclusive breastfeeding for the first 6 months. Address any breastfeeding problems.
6. Encourage sustained breastfeeding beyond 6 months to 2 years of age or more, alongside the timely introduction of appropriate, adequate, and safe complementary foods while providing holistic care (physical, psychological, spiritual, and social) and stimulation of the child.
7. Provide a welcoming and supportive environment for breastfeeding families.
8. Promote collaboration between healthcare staff, Community Mothers Support Groups, Mother-to-Mother Support Groups, and the local community.

Content has been developed for each step to guide the CHVs counselling. The Kenya Ministry of Health and Sanitation has developed MIYCN-Family Planning Counseling Cards, Job Aids, and other SBC communication materials [74].

With the support of the MCSP, BFCI was implemented in and surpassed the Government of Kenya's target of 28% of all "community units" with coverage between 1% and 10% in Samburu and Turkana [74]. An external assessment of the program, only done in Migori and Kisumu counties, showed improvements in several breastfeeding indicators and consumption of iron-rich foods, though the nature of the assessment did not allow the changes to be attributed to the program. A post-implementation survey 3 months later showed that coverage was sustained in Migori but declined in Kisumu.

An impact evaluation of BFCI in Koibatek County showed that a significantly higher proportion of children in the intervention group compared to the control group had significantly improved complementary feeding indicators [75]. The intervention consisted of (1) home visitations to offer personalized counseling and support on infant feeding; (2) establishment of mother support groups; (3) provision of infant feeding education materials; and (4) income generating activities. The control group only received usual services offered in health facilities such as standard counseling on immunization, general nutrition, prenatal, post-delivery, and hygiene. The results showed that compared to the controls, the proportion of children with minimum dietary diversity was 77% versus 58%, minimum meal frequency was 96% and 89%, and minimum acceptable diet was 77% versus 61%. The authors concluded that the BFCI intervention improved complementary feeding practices; strengthening and prioritizing the intervention could have an important impact on child nutrition. Possible explanations for these results, as described by the authors, include the wide acceptance and support for the BCFI program among the community, spouses, and relatives and the central role of mother and peer support groups.

The BFCI model and rollout in Kenya has not been without its challenges. It is expensive to implement, relies heavily on volunteers, and requires time from already busy and stretched health workers. Additionally, partners have primarily supported rollout and sustainability has been a problem.

German Ministry of Economic Cooperation and Development and GIZ—Improved Nutrition Security Project, April 2015–December 2019

In Turkana and Marsabit, the Food and Nutrition Security project funded by the German Ministry of Economic Cooperation and Development is implemented under the responsibility of the GIZ [76]. Activities in Turkana started in 2016 in six out of seven sub counties. The project goal is to improve the food and nutrition situation at the household level of food and nutrition-insecure individuals, especially women of reproductive age and young children 0–23 months of age. The project is structured to focus on the underlying structural causes of undernutrition rather than its immediate causes and seeks to tackle food insecurity at both the institutional and household/community levels. At the household/community levels, the project worked with Save the Children International, Food for the Hungry Kenya, Word Vision Kenya, Welthungerhilfe, and the Northern Rangeland Trust. At the household/community levels, the project worked to promote basic nutrition education and strengthen the counties' capacities to deliver it. The project also supported a variety of livelihood activities selected by women, including establishing home gardens and improving husbandry practices of goats for milk and hens for eggs, among others. The project also worked to establish savings and loan groups to increase women's cash income to buy nutritious foods. As part of the project, several materials were developed including Trainer's Guides on home gardening, improved husbandry practices for milk in the dry season, and chicken rearing, among others.

The project resulted in a large number of lessons learned related to many underlying determinants that USAID Nawiri will address [76]. With respect to knowledge of nutrition, the key findings were related to the profound relatively recent changes in diets. For example, traditional knowledge of food and nutrition has lost relevance in daily eating practices and has affected its intergenerational transmission. Many younger mothers know less of traditional foods and diets than their mothers and grandmothers and have not acquired adequate skills related to the overwhelming commercial foods now available. Commercial vegetables and fruits are not well known, expensive, and therefore not frequently eaten. Also, certain deep-rooted customs and ancient practices that negatively affect nutrition still play a role, primarily in some remote areas. Older women and men often directly or indirectly communicate these customs. Therefore, there is a clear need for evidence-based, new nutrition knowledge and practices that value traditional knowledge and good local practices given the changing availability of foods. Special attention needs to be paid to household access to sufficient safe, nutritious, and diverse foods. There is also a need for qualified, experienced, and timely expertise on the ground that can deliver appropriate nutrition training and advice to households and facilitate the support required on all the sequences—from production, acquisition, and safe and tasty preparation to consumption of healthy, safe, and diverse foods. The specific lessons learned are as follows [76]:

- Strengthen nutrition awareness in the community
  - Sensitize the community influencers on nutrition before starting the MIYCN sessions in the community.
  - Keep in touch with the influencers throughout the MIYCN course.
- Train for MYICN

- Work with active women and/or community groups.
- Monitor the participants knowledge increase in MIYCN.
- Optimize the composition of MIYCN learning groups.
- Contextualize the learning content.
- Visualize the learning content, e.g., photos, poster, comics, flyers, examples of specimens of nutritious crops and edible wild plants.
- Work with interactive methods and value field-proven local knowledge and skills (e.g., encourage participants to ask questions, facilitate group discussions).
- Incorporate cooking demonstrations in the MIYCN sessions.
- Recap the previous session; prepare for the next session
- Facilitate regular attendance.
- Make sure participants can access nutrition advice after the MIYCN course.

Improved Socioeconomic and Nutrition Status for Drought Affected Pastoralist Communities, July 1, 2018–June 30, 2020

The goal of the project—carried out in Turkana Central, Turkana West, and Loima sub counties—was to improve pastoralist communities' nutrition status and stability across chronic drought cycles by encouraging behavior change and improved knowledge and strengthening water, sanitation, and socioeconomic practices [77]. One of the four project objectives was to monitor and improve the nutritional status of children and pregnant and lactating women through treatment of acute malnutrition and support for maternal IYCF. With respect to this objective, the International Rescue Committee (IRC) collaborated with the Kenya Ministry of Health to integrate nutrition sensitive and nutrition specific interventions, to prevent and treat malnutrition in hard-to-reach communities within the target areas. Activities included providing onsite IMAM services based on Kenyan guidelines and preventing chronic malnutrition by promoting MIYCN programing aimed at pregnant and lactating women and caregivers of children under 5 years of age. To facilitate nutrition program updates and share successes and challenges from different stakeholders, the IRC supported county and subcounty coordination. In addition, the project sought to strengthen the community health management team and subcounty health management team's supervision provided mentorship, facilitated on-the-job training, and identified facility gaps during the reporting period.

The project strengthened surveillance of malnutrition cases in health facilities and supported facilities in implementing the Community Based Management of Acute Malnutrition (CMAM) surge approach to strengthen health responses, focusing on training of CHVs; establishing mother-to-mother support groups; providing outreach to treat minor ailments; and providing prenatal and postnatal care, immunization, and referral services [76]. Community engagement sessions—facilitated by the Community Health Extension Worker, CHVs, and the local administration—focused on sensitizing these individuals to health seeking behavior at community outreaches and in health facilities, identifying barriers to optimal MIYCN practices, creating awareness on the communities' roles in supporting MIYCN programs, and directing target populations toward appropriate nutrition services. To create more awareness about MIYCN programs, the project worked with a local radio station, Radio Ekeyekon, to promote key nutrition messages, such as the importance of exclusive breastfeeding, the importance of maternal health clinic visits for antenatal women, and safe

methods to prepare supplementary feeding for infants under 6 months of age, by using air radio hot spots, advertisements, and radio talk shows.

The report listed multiple achievements, such as the number of CHVs trained and mother-to-mother support groups formed. However, it did not provide any analysis of lessons learned that could be used to understand what worked and why nor what did not work and why to inform future USAID Nawiri programming.

World Relief—Turkana Family Nutrition, June 2016–August 2018

The Turkana Family Nutrition project used the Care Group Model to engage mothers of reproductive age (15–49 years) and mothers and caregivers with children less than 5 years of age. The major objectives were to improve the diets of women and children less than 5 years of age and increase the proportion of women of reproductive age and children less than 5 years of age suffering from acute malnutrition to use available treatment services. Although the project was slated to end in April 2019, it was terminated after 28 months of implementation. Some of the project successes included introducing picture referrals to empower the community to identify cases of acute malnutrition and referral to CMAM services and fostering nutrition weeks to increase mothers' awareness to prepare well-balanced meals for their children and to help address malnutrition issues. Some of the project's challenges included scattered populations and difficulty in accessing services, lack of water for home gardens, and commodities provided to treat acute malnutrition being shared with other community members. Although no data were provided, the project summary indicated that home gardens helped improve household food security and that they also improved the nutritional status of household members.

USAID—Afya Timiza, Project, October 2016–October 2021

The Afya Timiza project included the following interventions:

- Support for World Breastfeeding Week
- Promotion of vitamin A supplementation, and deworming
- Support for mother-to-mother support groups, including BFCI and father-to-father support groups
- Facilitation of county nutrition technical forums
- Support for the distribution of guidelines and standard operating procedures
- Provision of mentorships to health care workers and community health workers
- Delivery of continuing medical education to health care workers.

Save the Children—Strengthening Emergency Nutrition Drought Response and Recovery in Mandera, Turkana and Wajir Counties, June 2017–May 2018

This program had the following objectives: (1) increase demand for and utilization of health and nutrition services by women and children; (2) provide technical assistance for the development and roll out of the capacity development framework in each county; (3) improve utilization of nutrition information, including for early warning and early action (scalability) by county health management teams; and (4) strengthen the Community Health Management Teams capacity to plan, cost, and advocate for increased resource allocation for health and nutrition service delivery. Although there appear to be many successes resulting from the

program, information about lessons learned to inform USAID Nawiri programming was not included in the final report.

Additional Partners

Other partners with projects working in Samburu and Turkana were identified; however, information about the content and coverage of the projects was not available. The partners included International Red Cross, KRCS, Africare, Concern, and GIZ. Relevant materials for programs that were identified follow below. It is expected that the landscape analysis and stakeholder mapping will identify additional materials.

- Program Guidance: Engaging Family Members in Improving Maternal and Child Nutrition. https://www.advancingnutrition.org/sites/default/files/2020-11/program_guidance_on_engaging_family_members.pdf.
- The Kenya Ministry of Health and Sanitation has developed MIYCN-Family Planning Counseling Cards, Job Aids, and other Social Behavior Change Communication materials [75].
- The Baby Friendly Community Initiative: Implementation Guidelines. http://www.nutritionhealth.or.ke/wp-content/uploads/Downloads/Baby%20Friendly%20Community%20Initiative%20%20May%202016.pdf.

A summary of the impacts and lessons learned regarding the programs being implemented or have been implemented in Samburu and Turkana are summarized in **Box 8**.

REFERENCES

1. Young, H. Nutrition in Africa's drylands: A Conceptual Framework for Addressing Acute Malnutrition. 2019: https://www.agrilinks.org/sites/default/files/nutrition_in_africas_drylands_v3.1.pdf
2. UNICEF. *Strategy for improved nutrition of children and women in developing countries*. 1990.
3. Dewey, K.G. and D.R. Mayers. *Early child growth: how to nutritoin and infection interact?* 2011, Alive & Thrive, Academy for Educational Development: Washington, DC.
4. Humphrey, J. *Child undernutrition, tropical enteropathy, toilets, and hand washing.* The Lancet, 2009. 374: p. 1032-35.
5. Lutter, C.K., et al. *Nutritional supplementation: effects on child stuntiing because of diarrhea.* Am J Clin Nutr, 1989. 58(7): p. 1-8.
6. Lutter, C.K., et al. *The relationship between energy inake and diarrhoel disease in the effects on child growth: biological model, evidence and implications for public health policy*. Food Nutr Bull, 1992. 140(2): p. 397-401.
7. Humphrey, J.H. *Child undernutrition, tropical enteropathy, toilets, and handwashing.* Lancet, 2009. 374(9694): p. 1032-1035.
8. UNICEF. *Situation analysis of children and women in Kenya*. 2017.
9. UNICEF. *Kenya Humanitarian Situation Report*. January-December 2019.
10. Hyun, M. and W. Okolo. *USAID/Kenya Gender Analysis Report.* March 2020. Banyan Global. https://banyanglobal.com/wp-content/uploads/2020/05/USAID-Kenya-Final-Gender-Analysis-Report.pdf
11. Mercy Corps. *Summary of Findings: Gender Analysis of Persistent Acute Malnutrition in Samburu and Turkana Counties of Kenya (Nawiri Project)*. Undated.
12. Save the Children. *A desk review of key determinants of malnutrition in Turkana County, Kenya*. 2017.
13. Ruel, M.T. et al., *Nutrition-sensitive interventions and programmes: how can they help to accelerate progress improving maternal and child nutrition?* Lancet, 2013. 382: p. 536-551.
14. Lutter, C.K., L. Grummer-Strawn, and L. Rogers. *Complementary feeding of infants and young chlidren 6 to 23 months of age.* Nutr Reviews, 2021. p. 1-22.
15. Mbuya, M.N. and J. Humphrey. *Preventing environmental enteric dysfunction throuh improved water, sanitation and hygiene: an opportuity for stunting reduction in developing countries.* Matern Child Nutr, 2016. 12 (Suppl 2): p 106-120.
16. Kenya Integrated Household Budget Survey (KIHBS). *Basic Report and Basic Report on Well-Being: Based on 2015/16 KIHBS*. 2018.

17. Joint Report by the Kenya Food Security Steering Group (KFSSG) and Turkana County Steering Group. *Turkana County 2020 Short Rains Food and Nutrition Security Assessment Report*. February 2021.
18. Kenya Ministry of Health, Ministry of Education, Science and Technology and Samburu County. *Samburu County. Long Rains Food Security Assessment Report*. 2013.
19. Iannotti, L. and C. Lesorogol. *Animal milk sustains micronutrient nutrition and child anthropometry among pastoralists in Samburu, Kenya.* Am J Phys Anthropol, 2014. 155 (1): p. 66-76.
20. Save the Children. *Cost of diet study*. 2017.
21. Samburu County Department of Health. *County Nutrition Action Plan 2019-2023*. Undated.
22. Samburu County Department of Health. *Samburu County SMART Survey Report.* June 2019. *http://www.nutritionhealth.or.ke/wp-content/uploads/SMART%20Survey%20Reports/Samburu%20County%20SMART%20Survey%20Report%20-%20June%202019.pdf*.
23. Samburu County Department of Health. *Samburu County SMART Survey Report*. June 2017. *http://www.nutritionhealth.or.ke/wp-content/uploads/SMART%20Survey%20Reports/Samburu%20County%20SMART%20Survey%20Report%20%E2%80%93%20June%202017.pdf*
24. Samburu County Department of Health., et al. *Samburu County SMART Survey Report.* June 2018. *http://www.nutritionhealth.or.ke/wp-content/uploads/SMART%20Survey%20Reports/Samburu%20County%20SMART%20Survey%20Report%20%E2%80%93%20June%202018.pdf*.
25. Samburu County Department of Health.. *Samburu County SMART Survey Report*. June 2016. *http://www.nutritionhealth.or.ke/wp-content/uploads/SMART%20Survey%20Reports/Samburu%20County%20SMART%20Survey%20Report%20Jun2016.pdf*
26. Turkana County Department of Health. *Turkana SMART Nutrition Surveys Final Report.* 2017. http://www.nutritionhealth.or.ke/wp-content/uploads/SMART%20Survey%20Reports/Turkana%20County%20SMART%20Survey%20Report%20-%20June%202017.pdf
27. Turkana County Department of Health. *Turkana County SMART Nutrition Surveys.* 2019. *http://www.nutritionhealth.or.ke/wp-content/uploads/SMART%20Survey%20Reports/Turkana%20County%20SMART%20Survey%20Report%20-%20June%202019.pdf*.
28. Turkana County Department of Health., et al. *Turkana SMART Nutrition Survey Report.* June 2018. *http://www.nutritionhealth.or.ke/wp-content/uploads/SMART%20Survey%20Reports/Turkana%20County%20SMART%20Survey%20Report%20-%20June%202018.pdf*.

29. Turkana County Department of Health. *Turkana SMART Nutrition Surveys*. June 2016. *http://www.nutritionhealth.or.ke/wp-content/uploads/SMART%20Survey%20Reports/Turkana%20%20SMART%20Survey%20Report%20Jun2016.pdf*

30. Turkana County Department of Health. *Turkana SMART Nutrition Surveys*. June 2018. *http://www.nutritionhealth.or.ke/wp-content/uploads/SMART%20Survey%20Reports/Turkana%20County%20SMART%20Survey%20Report%20-%20June%202018.pdf*

31. World Vision Kenya., Ministry of Public Health and Sanitation., and UNICEF. *Samburu Central District SMART Nutrition Survey Report*. 2013.

32. Barba, F., L. Huybregts, and F. Leroy. *Estimating the burden of child acute malnutriton accurately*. 2020. https://www.ifpri.org/blog/estimating-burden-child-acute-malnutrition-accurately

33. Kenya Ministry of Health. *The Kenya National Micronutrient Survey, 2011*. Date not reported.

34. Kenya National Bureau of Statistics., et al. *Kenya Demographic and Health Survey 2014*. 2015.

35. Galgallo, S.O. *Factors associated with nutritional status of children aged 6-59 months in Maikona Ward of Marsabit County, Kenya*. 2017.

36. WHO and partners. *Indicators for Assessing Infant and Young Child Feeding Practices.* 2008.

37. Ochola, S. *Maternal, Infant, and Young Child Nutrition (MIYCN) Knowledge, Attitudes, Beliefs, and Practies (KABP) Survey Report. Samburu County* 2018. http://www.nutritionhealth.or.ke/wp-content/uploads/MIYCN%20Assessments%20Reports/Samburu%20County%20MIYCN%20KAP%20Report%20-%20February%202018.pdf

38. Nilesh Kumar Pravana, N.K., et al. *Determinants of severe acute malnutrition among children under 5 years of age in Nepal: a community-based case-control study* BMJ Open, 2017. 7(8): p. e017084.

39. Brown, K.H., et al. *Infant feeding practices and their relationship with diarrheal and other diseases in Huascar (Lima), Peru.* Pediatrics, 1989. 83: p. 31-49.

40. Ochola, S. *Maternal Infant and Young Child Nutrition (MIYCN) Knowledge, Attitudes, Beliefs and Practices (KABP) Survey Report: Turkana County.* 2017. *http://www.nutritionhealth.or.ke/wp-content/uploads/MIYCN%20Assessments%20Reports/Turkana%20County%20MIYCN%20KAP%20Report%20-%20November%202017.pdf*.

41. Rutstein, S.O. *Effects of preceding birth intervals on neonatal, infant and under-five years mortality and nutritional status in developing countries: evidence from the demographic and health surveys* Int J Gynaecol Obstet, 2005. 89(Suppl 1): p. S7-S24.

42. Vossenaar, M., et al. *Context-specific complementary feeding recommendations developed using Optifood could improve the diets of breast-fed infants and young children from diverse livelihood groups in northern Kenya.* Pub Health Nutr, 2017. 20(6): p. 971-983.

43. Schnefke, C.H., et al. *Is It Possible to Promote Egg Consumption During Pregnancy? Findings From a Study on Knowledge, Perceptions, and Practices in Kenya*. Food and Nutrition Bulletin 2019. 40: 151-170.

44. Wayua, F. *Nutritional and health challenges of pastoralist populations in Kenya.* Afr J Food Agricultural Development, 2017. 17(1): p. 11592-11602.

45. Das, J.K. and Z.A. Bhutta. *Global challenges in acute diarrhea.* Curr Opin Gastroenterol, 2016. 32(1): p. 18-23.

46. Lenters, L.M., J.K. Das, and Z.A. Bhutta. *Systematic review of strategies to increase use of oral rehydration solution at the household level.* BMC Public Health, 2013. 13 (Suppl 3:S28).

47. World Health Organization. *Zinc supplementation in the management of diarrhea*. 2019.

48. Otieno, P., et al., *Impact of Introduction of Rotavirus Vaccine on Hospital Admissions for Diarrhea Among Children in Kenya: A Controlled Interrupted Time-Series Analysis*. Clinical Infectious Diseases, 2020. 70(11): p 2306-2313.

49. Martin, S.L., et al. *Mixed-methods systematic review of behavioral interventions in low- and middle-income countries to increase family support for maternal, infant, and young child nutrition during the first 1000 days.* Current Dev Nutr, 2020. 4(6).

50. Mukuria, A.G., et al. *Role of Social Support in Improving Infant Feeding Practices in Western Kenya: A Quasi-Experimental Study.* Glob Health Sci Pract, 2016. 4(1): p. 55-72.

51. WHO. Guideline: updates on the management of severe acute malnutrition in infants and children. Geneva: World Health Organization, 2013. http://apps.who.int/iris/bitstream/handle/10665/95584/9789241506328_eng.pdf?sequence=1

52. Anino, C.O., G.M. Were, and J.W. Khamasi. *Positived deviant intervention prevents acute malnutrition in younger siblings of undernourished children in Migori County, Kenya.* J Nutr Dietetics, 2018. 2(1): p. 21-27.

53. Wright, C., et al. *The cost of a counseling-based intervention for moderate acute malnutrition (MAM) in Kenya compared to treatment with Rready-to-Use Foods (RUF).* Curr Dev Nutr, 2020. 4(Suppl 2): p. 926.

54. Kimani-Murage, E.W., et al. *Integrated and simplified approaches to community management of acute malnutrition in rural Kenya: a cluster randomized trial protocol.* BMC Public Health, 2019. 19(1253).

55. Goudet, S., et al. *Cost effectiveness of a community based prevention and treatment of acute malnutrition programme in Mumbai slums, India.* PLoS One, 2018. 13(11): p. 1-17.

56. Leroy, J.L., et al. *Tubaramure, a food-assisted integrated health and nutrition program, reduces child wasting in Burundi: A cluster-randomized controlled intervention trial.* J Nutr, 2021. 151: p. 197-205.

57. Menon, P., et al. *Impacts on breastfeeding practices of at-scale strategies that combine intensive interpersonal counseling, mass media, and community mobilization: Results of cluster-randomized program evaluations in Bangladesh and Viet Nam.* PLOS Medicine, 2016. 13(10).

58. Avula, R., et al. *A program impact pathway analysis identifies critical steps in the implementation and utilization of a behavior change communication intervention promoting infant and child feeding practices in Bangladesh.* J Nutr, 2013. 143 p. 2029–2037.

59. Kim, S.S., et al. *Exposure to large-scale social and behavior change communication interventions is associated with improvements in infant and young child feeding practices in Ethiopia.* PLoS ONE, 2016. 11 (10): p. e0164800.

60. Wodnik, B.K., et al. *Development and application of novel caregiver hygiene behavior measures relating to food preparation, handwashing, and play environments in rural Kenya.* Int J Envir Research and Public Health, 2018. 15(9): p. 1994.

61. Luby, S.P., et al. *Effect of Intensive Handwashing Promotion on Childhood Diarrhea in High-Risk Communities in Pakistan: A Randomized Controlled Trial.* JAMA, 2004. 291(21): p. 2547-2554.

62. Bhandari, N., et al. *An educational intervention to promote appropriate complementary feeding practices and physical growth in infants and young children in rural Haryana, India.* J Nutr, 2004. 134: p. 2342–2348.

63. Guldan, G.S., et al. *Culturally appropriate nutrition education improves infant feeding and growth in rural Sichuan, China.* J Nutr, 2000. 130: p. 1204–1211.

64. Santos, I., et al. *Nutrition counseling increases weight gain among Brazilian children.* J Nutr, 2001. 131: p. 2866–2873.

65. Zaman, S., R.N. Ashraf, and J. Martines. *Training in complementary feeding counselling of healthcare workers and its influence on maternal behaviours and child growth: a cluster-randomized controlled trial in Lahore, Pakistan.* J Health Popul Nutr, 2008. 26: p. 210–222.

66. Packard, M. *Report on a Review of Social and Behavior Change Methods and Approaches within Food for Peace Development Food Security.* 2018.

67. Kennedy, E., et al. *Impact of social and behavior change communication in nutrition sensitive interventions on selected indicators of nutritional status.* J Hum Nutr, 2018. 2(1): p. 24-33.

68. Moucheraud, C., et al. *Can complex programs be sustained? A mixed methods sustainability evaluation of a national infant and young child feeding program in Bangladesh and Vietnam.* BMC Public Health, 2020. 20: p. 1361.

69. Pelto, G.H. and F.M. Thuita. *Focused Ethnographic Studies of Infant and Young Child Feeding Behaviors, Beliefs, Contexts, and Environments in Vihiga, Kitui, Isiolo, Marsabit, and Turkana Counties in Kenya*. 2016. https://www.gainhealth.org/resources/reports-and-publications/kenya-ethnographic-study-focused-ethnographic-studies-infant-and

70. Mutuku, J.N., S. Ochola, and J. Osero. *Maternal knowledge and complementary feeding practices and their relationship with nutritional status among children 6-23 months old in pastoral community of Marsabit County, Kenya: A cross-sectional study.* Current Research in Nutr and Food Sci, 2020. 8(3): p. 826-876.

71. Dikir, C.F., et al. *Study Report of Food Security and Nutrition: a case of integrated WASH and agricultural intervention in Lorroki, Samburu County*. 2017, Amref Health Africa in Kenya.

72. Balfour, N., J. Obando, and D. Gohil. *Dimensions of water insecurity in pastoralist households in Kenya.* Waterlines, 2020. 39(1): p. 4-43.

73. Kavale, J.A., et al. *Baby-Friendly Community Initiative—From national guidelines to implementation: A multisectoral platform for improving infant and young child feeding practices and integrated health services.* Matern Child Nutr, 2018. 15(S1): p. e12747.

74. Kenya Ministry of Public Health and Sanitation. *Maternal Infant and Young Child Nutrition and Family Planning (MIYCN-FP) Integration Toolkit*. 2012.

75. Maingi, M., J. Kimiywe, and S. Iron-Segev. *Effectiveness of Baby Friendly Community Initiative (BFCI) on complementary feeding in Koibatek, Kenya: a randomized control study.* BMC Public Health, 2018. 18(600).

76. German Cooperation., et al. *Food and Nutrition Security in Marsabit and Turkana Counties. A Collection of Lessons Learnt*. 2020, Deutsche Gesellschaft fur, Internationale Zusammenarbeit (GIZ), Kenya: Nairobi.

77. International Rescue Committee Inc. and Kenya Country Program. *Improved socioeconomic and nutrition status for drought affected pastorialist communities* 2020: Kenya.

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