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Agriculture in Complex Emergencies: Exploring the Association between Agricultural Programs and Dietary Diversity among Women and Children

A Synthesis of Study Findings from Cameroon and South Sudan



About USAID Advancing Nutrition

USAID Advancing Nutrition is the Agency's flagship multi-sectoral nutrition project, led by JSI Research & Training Institute, Inc. (JSI), and a diverse group of experienced partners. Launched in September 2018, USAID Advancing Nutrition implements nutrition interventions across sectors and disciplines for USAID and its partners. The project's multi-sectoral approach draws together global nutrition experience to design, implement, and evaluate programs that address the root causes of malnutrition. Committed to using a systems approach, USAID Advancing Nutrition strives to sustain positive outcomes by building local capacity, supporting behavior change, and strengthening the enabling environment to save lives, improve health, build resilience, increase economic productivity, and advance development.

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Recommended Citation

USAID Advancing Nutrition. 2022. *Agriculture in Complex Emergencies: Exploring the Association between Agricultural Programs and Dietary Diversity among Women and Children. A Synthesis of Study Findings in Cameroon and South Sudan*. Arlington, VA: USAID Advancing Nutrition.

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Acknowledgments

We acknowledge and thank Première Urgence Internationale for its active collaboration and support for the Cameroon portion of this study. The qualitative research in Cameroon was skillfully completed by Dr. Bernard Aristide Bitouga at the Université de Douala. We also want to acknowledge and thank the Food and Agriculture Organization of the United Nations for South Sudan operations for its active collaboration and support during the South Sudan portion of this study. The data analysis for South Sudan was expertly supported by a team of colleagues at the Institute for Global Nutrition with the University of California, Davis, including Dr. Christine Stewart, Ms. Elise Reynolds, and Mr. Charles Arnold. We could not have completed this study without the time and perspectives that the project participants graciously gave.

Acronyms

BHA	Bureau for Humanitarian Assistance
CFA	<i>Communauté Financière Africaine</i> (African Financial Community)
CI	confidence interval
ELRP	Emergency Livelihood Response Program
FAO	Food and Agriculture Organization of the United Nations
FCS	Food Consumption Score
FEWS NET	Famine Early Warning Systems Network
FFS	Farmer Field School
FSNMS	Food Security and Nutrition Monitoring Survey
HDDS	Household Dietary Diversity Score
IDP	internally displaced person
IPC	Integrated Food Security Phase Classification
IRB	Institutional Review Board
JSI	JSI Research & Training Institute, Inc.
MDD	minimum dietary diversity
MDD-W	minimum dietary diversity for women
MYE	multi-year emergency
NGO	nongovernmental organization
PUI	Première Urgence Internationale
rCSI	Reduced Coping Strategies Index
SBC	social and behavior change
SD	standard deviation
UN	United Nations
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development
WFP	World Food Programme

Executive Summary

Populations in complex emergencies are exposed to food insecurity, malnutrition, and adverse health outcomes. Humanitarian assistance programs that implement agricultural interventions attempt to address food insecurity among vulnerable populations in these complex emergency settings. However, little is known about the effectiveness of these interventions and their impact on nutrition outcomes. Dietary diversity is an indicator reflective of nutritional adequacy of a diet (FAO 2021a). While evidence supports the idea that nutrition-sensitive agriculture can improve dietary diversity in development contexts (Ruel, Alderman, and the Maternal and Child Nutrition Study Group 2013; Ruel, Quisumbing, and Balagamwala 2018), there is little evidence that these investments improve nutrition outcomes in complex emergency contexts (FAO 2010; Hall, Blankson, and Shoham 2011; Levine and Chastre 2011).

To fill this evidence gap, U.S. Agency for International Development's (USAID's) Bureau for Humanitarian Assistance (BHA) requested that USAID Advancing Nutrition explore when agriculture interventions are appropriate in emergency contexts and how they can be designed to improve nutrition outcomes in these contexts. To inform these recommendations, USAID Advancing Nutrition conducted research with two BHA-funded activities. One activity is the Emergency Response to Food Insecurity for Lake Chad Basin Crisis-Affected Populations in the Far North Region of Cameroon, which is implemented by Première Urgence Internationale (PUI). The other activity is the Emergency Livelihood Response Program (ELRP) in South Sudan, led by the Food and Agriculture Organization (FAO) of the United Nations (UN). This report presents the synthesis of findings and recommendations from these two studies and provides greater insight into whether typical BHA-funded agriculture interventions can be appropriate for improving nutrition outcomes. This is one of three reports; [a second report](#) presents findings from the study in South Sudan, and [the third report](#) presents findings from the study in Cameroon.



Key Messages

- Agricultural interventions can increase women's dietary diversity through both production for consumption pathways and income generation pathways, particularly when designed with a nutrition-sensitive focus. Support for complementary feeding should be considered as an intervention to increase the percent of children meeting minimum dietary diversity.
- Several household and external factors were associated with dietary diversity and should thus be considered in project design.
- Intentionally designing nutrition-sensitive agriculture interventions in protracted emergencies may help to improve women's diet diversity for those who are able to make use of these resources.
- The influence of social support on dietary diversity requires more research, but findings suggest that maternal social support and social cohesion may be important considerations in project design.

Research Methodology

In Cameroon, we conducted a mixed-methods study using quantitative data from the PUI project endline survey (n=84 women, n=40 children) and qualitative data from interviews with a subset of survey respondents (n=24 women, n=17 men). In South Sudan, we conducted a secondary data analysis of the cross-sectional survey results from the 27th round of the Food Security and Nutrition Monitoring Survey (FSNMS). The survey was representative at the county level (78 counties in all 10 states). A total of 14,215 households were sampled and completed the survey. The FSNMS survey was administered

and conducted by FAO in collaboration with the World Food Programme, United Nations Children’s Fund, and other UN agencies.

Both studies have some limitations. These data may reflect response and recall bias. Respondents may have answered questions in a way that they thought reflected well on the project, and they may have provided answers that they thought would help them receive project support in the future. They may also have provided responses that they considered socially acceptable, rather than reporting what they actually thought or did. In Cameroon, the sample size was small, and the baseline did not measure dietary diversity, so we cannot isolate the impact of the project on dietary diversity from the impact of other individual and household factors, nor determine which component of the agricultural project contributed most to dietary diversity outcomes. In South Sudan, enumerators were required to translate questions into the local languages when administering the survey, which may have led to differences in meaning conveyed to the respondents, which could have led to reporting errors. In addition, the FAO activities were implemented by implementing partners, so survey respondents may not have been able to distinguish between FAO agricultural program activities and agricultural activities of other organizations.

Research Questions and Findings

An overview of the research questions and main findings are shown in table I.

Table I. Key Findings by Research Question

1. Which factors influenced implementation of the nutrition-sensitive agriculture interventions within emergency activities?
<ul style="list-style-type: none"> • In Cameroon, participant households and PUI staff had positive perceptions about the quality of implementation, particularly for the training provided. The primary issue noted was late seed distribution. Other challenges included a short project duration, logistical challenges, and limited community interest or involvement. • In South Sudan, implementing partners largely had positive perceptions about the quality of implementation. The challenges affecting implementation were largely external and included insecurity and safety issues, poor infrastructure, and the short program implementation cycle. • While both projects faced implementation challenges related to the short implementation period and infrastructure or logistics, the projects were implemented with high quality according to implementers, and participants, in the case of Cameroon.
2. What is the prevalence of minimum dietary diversity among women of reproductive age (18–49 years) and children (aged 6–23 months)?
<ul style="list-style-type: none"> • In Cameroon, the majority of women, 74 percent, and just over half of children in the sample consumed a diet of minimum diversity. • In South Sudan, dietary diversity was low, with only 30 percent of women meeting the minimum dietary diversity for women (MDD-W) and 22 percent of children meeting minimum dietary diversity (MDD). • Dietary diversity among women and children was higher in Cameroon than South Sudan. In both countries, women had higher dietary diversity than children.
3. What is the association between participation in the project and the dietary diversity of women of reproductive age (18–49 years) and children (aged 6–23 months)?
<ul style="list-style-type: none"> • In Cameroon, the quantitative and qualitative data suggest that the project had a positive influence on MDD-W. Planting at least half the seeds the project provided was positively associated with the prevalence of MDD-W, although this association was not statistically significant when controlling

for household and other factors. Planting more than half the seeds received was negatively associated with the prevalence of MDD for children aged 6-23 months. In qualitative interviews, most informants reported adopting some of the agricultural practices taught by PUI and said that planting the seeds received and adopting new practices improved their yields. The improvement in yields influenced diets through improved access to food from their own production and through increased agricultural income.

- In South Sudan, participation in agricultural activities was positively associated with a higher prevalence of MDD-W. The prevalence of MDD-W was about 9 percent higher among women who had participated in agricultural activities than among women who had not participated in any agricultural activity in adjusted statistical models. The prevalence of MDD was higher among children in households that had participated in agricultural activities than among children in households that had not participated in any agricultural activity, but this difference was not statistically significant. We were not able to disaggregate the contributions of specific agricultural activity components.
- In both studies, participation in agricultural activities was positively associated with MDD-W, but it was not associated with MDD.

4. Which household-level factors are associated with the dietary diversity of women of reproductive age (18–49 years) and children (aged 6–23 months) in complex emergency contexts?

- In Cameroon, bivariate analyses showed that household size, quantity of seeds planted, and mother's social support were positively associated with MDD-W. Total area of crops grown, child's age, mother in a monogamous marriage, and number of shocks experienced were positively associated with MDD. The qualitative data show that food access at the household level influences diets, while household coping strategies, food preferences, and perceptions of "good" foods differentially influence women's and children's diets.
- In South Sudan, a few household factors were shown to be associated with dietary diversity of both women and children, including total number of assets owned, having a household member who was part of a social group, the proportion of food that comes from own production, and Household Dietary Diversity Score.
- The factors that were associated with women's and children's dietary diversity varied between contexts. This may be due to differences between the study designs and methods or may reflect the importance of addressing context-relevant factors to help improve dietary diversity.

5. What is the association between the dietary diversity of women of reproductive age (18–49 years) and children (aged 6–23 months) and maternal social support?

- In Cameroon, women's social support was positively associated with MDD-W but not with MDD. The magnitude of the association was minimal but indicates an area that will benefit from further study. In qualitative interviews, female informants primarily reported receiving support from their husbands, and some also received support in the form of food or money from other family members or food from neighbors. They primarily reported a need for more material support, such as cash or food, to help provide for basic needs, which would also help relieve their worry and anxiety.
- In South Sudan, among a study sample with a high portion of female-headed households in an emergency context, women's perceived social support was low. Social support was not associated with MDD-W or MDD. However, this is likely affected by the low levels of social support overall, although we did not have qualitative data in South Sudan to explore the nuance of this topic.
- In both studies, women experienced low levels of social support. In Cameroon, women's social support was positively associated with MDD-W. This is an area that warrants further study.

Discussion and Conclusions

Discussion

Although the methods and sampling frames were different across the two studies, we found that **women's dietary diversity is positively associated with participation in agricultural activities in both Cameroon's and South Sudan's complex emergency contexts**. Women and children were more likely to consume certain foods when their households received seeds from the projects than when their households did not receive those seeds.

The finding that women's dietary diversity is positively associated with participation in agriculture activities is also important because the vast majority of emergency food assistance programming prioritizes protecting food access and meeting basic food needs. Our findings show that women's dietary diversity can improve in complex emergency contexts with targeted interventions that go beyond providing food assistance and meeting basic needs.

However, we did not see statistically significant associations between agriculture interventions and children's dietary diversity in either program area. In Cameroon, this may have been due to the small sample size. It could also relate to a range of mediating factors, including the degree of program exposure, seasonality, agroecological zone, women's empowerment, and market access (Ruel, Quisumbing, and Balagamwala 2018). And it also may reflect the possibility that agriculture interventions can have the unintended consequence of increasing women's time and labor burden with farming needs, thereby reducing the time they have available to provide optimal care for young children (Ruel, Quisumbing, and Balagamwala 2018; Johnston et al. 2018). This may be particularly true in South Sudan, where female-headed households are common and there may be fewer other caregivers. The lack of association between agriculture interventions and children's dietary diversity indicates the need for increased and targeted efforts to improve infant and young child feeding practices in addition to improving food access through agriculture.

Seeing improvements in women's dietary diversity in a complex emergency suggests that improvement is possible, particularly in cases where households plant diverse crops. We found a positive association between the use of seeds received from the projects for the production of crops for MDD-W. There is literature to suggest that promotion of farm production diversity may improve household or women's dietary diversity, particularly when market access is limited (Habtemariam et al. 2021; Khandoker, Singh, and Srivastava 2022; Khonje et al. 2022).

Nutrition-sensitive agriculture interventions have been found to be positively associated with improvements in dietary diversity, likely through a combination of behavior change communication and intentionality in the design of the program to focus on nutrition objectives (Margolies et al. 2022; Ruel, Alderman, and the Maternal and Child Nutrition Study Group 2013). It is difficult to provide any specific recommendations from these studies as to which agricultural interventions would be best suited to different regions because the sample size of those participating in agricultural interventions by region was too small to draw any conclusions. Despite these promising findings, overall dietary diversity remained low, especially among women and children in South Sudan. The findings from South Sudan also suggest that there will be a continued need to reach households that do not rely on agriculture for income through other types of programs.

Another aspect these studies examined was social support. Social support can be both a facilitator and a product of women's empowerment. Research on women's empowerment and dietary diversity shows that women's dietary diversity is positively associated with women's empowerment (Bonis-Profumo, Stacey, and Brimblecombe 2021; Sinharoy et al. 2017; Yimer and Tadesse 2015). Although the overall findings on the association between maternal social support and dietary diversity may not be very conclusive across both these studies, other indicators of social support were associated with dietary diversity. In both projects, respondents indicated that members of their households participated in

groups such as community organizations, farmers' associations, savings groups, youth groups, mothers support groups, and health committees. Social support from external groups may be an important factor in the relationship with dietary diversity, especially in complex emergency contexts, when usual community or familial social support may be eroded.

Across the two projects, other factors were positively associated with women's and children's dietary diversity. These factors varied by context. In South Sudan, a few household factors were shown to be associated with dietary diversity of both women and children, including having a household member who was part of a social group and the proportion of food that comes from their own production. In Cameroon, women's dietary diversity was associated with maternal social support and household size, and children's dietary diversity was associated with the child's age, mother's marital status, and the number of shocks experienced.

Conclusions

The overall study findings suggest that agricultural interventions can improve women's dietary diversity in a complex emergency context and a short program implementation time frame. These studies also suggest that intentionally designing nutrition-sensitive agriculture programs in complex emergencies could have important benefits for nutrition outcomes by increasing access to food from households' own agricultural production. Dietary diversity indicators are not consistently included in surveys undertaken by emergency implementing partners. These should be consistently included and integrated in emergency surveys and surveillance for agricultural programs that have nutrition goals and objectives, as they allow implementers to better track diet quality in emergency contexts. The role of social and material support for women in these contexts and the effects on nutrition deserve further study. The role of idiosyncratic shocks deserves further study as well.

Finally, our findings indicate the potential existence of a relationship between inadequate social and care environments with the outcome of inadequate dietary intake. Although household food insecurity was not related to MDD-W or MDD, the qualitative findings from Cameroon suggest that food insecurity does affect dietary intake, as described in the drylands acute malnutrition framework (Young 2020), whether that be the quantity, quality, or diversity of foods. These findings suggest that those portions of the framework may also be applicable in complex emergency contexts that are not in drylands.

Recommendations

Based on the study findings, we propose a number of recommendations for consideration by both BHA and other international donors, as well as emergency implementing partners (including cluster coordination and UN organizations). In addition to the study findings, we drew knowledge and best practices from USAID Advancing Nutrition's work researching and developing guidance for nutrition-sensitive agriculture and social and behavior change (SBC) to develop the recommendations. These recommendations largely focus on the guidance for and design of nutrition-sensitive agricultural programming.

BHA and Other Donors

Our findings have implications for BHA and international donors that develop guidance for funding nutrition and agriculture programs in complex emergencies:

- **Emphasize and prioritize the need to fund nutrition-sensitive agriculture and recommend diverse crop production in complex emergencies to improve women's and children's diets.** The findings from the study show that agricultural interventions can be appropriate to improve dietary diversity among women. Nutrition outcomes resulting from such interventions are likely even stronger if nutrition goals are an explicit focus in the project design and implementation. In addition, emphasis should be placed on the integration and application of

nutrition-sensitive approaches, including for instance the production of nutrient-rich foods coupled with SBC approaches that promote the consumption of such foods.

- **Evaluate the appropriateness of agricultural activities to improve diets.** When evaluating emergency applications with nutrition objectives, consider whether the agricultural activities proposed are indeed nutrition sensitive and likely to improve diets in the specific context (including considerations relating to different socio-economic and cultural factors, local agro-ecologies and production systems, as well as market environments that can influence nutrition outcomes but that often differ greatly depending on the emergency setting).
- **Integrate and encourage the need to evaluate and prioritize multiple agriculture-nutrition pathways when designing nutrition-sensitive agriculture programs in complex emergencies.** The application of cause-and-effect relationships for achieving nutrition outcomes along the agriculture-to-nutrition pathways—food production, agricultural income, and women’s empowerment (Herforth and Harris 2014)—has shown relevance in complex emergencies with limited time frames as well. For more guidance on nutrition-sensitive agriculture programming design, please see USAID Advancing Nutrition’s Designing Effective Nutrition-Sensitive Agriculture Activities Workshop: Facilitator’s Guide and Slides. This design guide was developed for programs in development settings, but many elements will be useful and applicable for emergency settings, as well.
- **Incorporate nutrition-sensitive agriculture-related indicators.** For agricultural programs with nutrition objectives, ensuring that agricultural programs are intentionally designed with a nutrition-sensitive focus is essential to achieve positive outcomes along the agriculture-to-nutrition pathways. Incorporating appropriate indicators to monitor and measure the related nutrition outcomes is needed to capture results such as enhanced dietary diversity among women and children.
- **Require the integration of women’s dietary diversity measures into food security and nutrition survey modules.** This study shows MDD-W is a meaningful indicator that is sensitive enough to detect effects of agricultural interventions. This now well-established indicator should thus be integrated in survey modules conducted by implementing partners as an important metric for monitoring food security and nutrition in complex emergency contexts.
- **Consider longer-term emergency program cycles.** Agricultural interventions implemented in complex protracted crisis settings will likely benefit from a longer implementation period given the general length of a full pre- and postproduction cycle. Multi-year activities may also mitigate the impact of shocks, prevent the erosion of household assets and livelihoods, and accelerate recovery—contributing to the future resilience of affected farming households and communities.

Emergency Implementing Partners, Cluster Coordination, and UN Organizations

Through thoughtful program design, implementing organizations can increase the likelihood that their programs will have an impact on improving dietary quality:

- **Engage through the global and local Food Security Clusters as multidisciplinary teams with a multi-sectoral approach to ensure the inclusion of nutrition in food security implementation.** By engaging expertise from multiple sectors (including health/nutrition, agriculture, WASH), implementing partners can leverage knowledge, reach, and resources, benefiting from their combined and complementary strengths as they work toward the shared goal of improving specific nutrition outcomes. The global as well as country-based Food Security Clusters provide an important platform that can drive the implementation of this recommendation.

- **Bring nutrition goals to the forefront of the design of agricultural programs.** Nutrition-sensitive agriculture interventions are most likely to have impacts on dietary diversity when there is explicitly stated intent to achieve nutrition-related objectives. However, such nutrition-sensitive agricultural activities should be reviewed against what is appropriate and desirable given a specific context (e.g., socio-economic and cultural circumstances, agro-ecological zones, and market environment) when proposing them as part of an agricultural program design.
- **Implement agriculture interventions in line with seasonal calendars and climatic conditions.** Given the short implementation timeline of most emergency agriculture programs, it is critical that the timing of input distribution, demonstrations, or training aligns with the seasonal calendar and crop production cycles that support year-round access to diverse foods. In addition, access to suitable land and water for production is essential to ensure that households are able to optimally benefit from these interventions. This also requires extension workers to be trained in the full range agricultural competencies, including approaches such as nutrition-sensitive agriculture, Farmer Field Schools (FFSs), integrated pest management, and integrated soil fertility management, to transfer those practices to producers.
- **Standardize and integrate the women’s dietary diversity measures into survey modules.** MDD-W is now a well-established and meaningful indicator. This study also shows that it is an indicator that is sensitive enough to detect effects of agricultural interventions in complex emergency contexts. Therefore, it is a useful metric for monitoring food security and nutrition in these contexts.
- **Integrate nutrition SBC best practices to improve the diets of women and children.** SBC interventions targeting improved nutrition behaviors should be included in the design from the outset because the nutrition-sensitive agriculture activities should be linked with specific nutrition behaviors. Nutrition SBC can oftentimes be integrated in program-supported training efforts, such as FFSs or agriculture and community health worker extension training modules. For more SBC approaches and resources, see USAID Advancing Nutrition’s guidance on designing effective nutrition-sensitive agriculture activities, prioritizing multi-sectoral nutrition behaviors, designing complementary feeding activities, and engaging family members in nutrition.
- **Explore other nutrition activities to improve children’s diets in complex emergencies.** Children’s diets are affected by care and feeding practices that are not necessarily related to household food access. Agricultural interventions should be designed in a

Implications

- These studies make an important contribution to filling a key gap in the multi-sectoral nutrition evidence base in complex emergencies.
- The findings show that investing in nutrition-sensitive agriculture in complex emergencies has the potential to improve dietary diversity for women. However, agriculture activities should not be used in isolation to improve children’s dietary intake.
- Most agriculture programs in complex emergencies are currently not designed to be nutrition-sensitive, but if they were intentionally designed with a nutrition-sensitive focus, they have the potential to further bolster dietary diversity.
- These findings also lend support for the revision of BHA emergency application guidelines to place a greater emphasis and focus on nutrition-sensitive agriculture as a means to improve nutrition outcomes.

manner that avoids unintended consequences for young child nutrition. **Explore the utility of social support interventions.** The role of social support in influencing women's and children's nutrition warrants further study and consideration in complex emergency contexts. Social support can strengthen women's empowerment, contribute to shared workloads that reduce energy expenditure, facilitate access to knowledge and resources, and enhance caring capacity to improve nutrition outcomes.

- **Place greater emphasis on non-staple foods for greater crop diversity.** In complex emergency contexts, where access to markets is limited, an increased focus on legumes and vegetables to diversify homestead food production may enable households to access a wider variety of foods than would otherwise be available to them. Assessing the local seed variety preference, as well as their availability in the market and at the household level, is a prerequisite for designing a seed intervention. All implementing partners are encouraged to apply the following assessment tools when designing and implementing activities that include a seed intervention: the [Seed System Security Assessment](#) to determine seed quality, availability, and accessibility; the [Seed Emergency Response Tool](#) for guidance on how to make informed decisions about the choice of a seed security intervention; and the [Context Analysis Tool](#) to quickly grasp the environment and circumstances in which seed systems function and identify practical entry points for selecting and designing seed interventions.

Suggested Further Research

The study findings revealed that further study of certain specific areas is needed to better understand how nutrition can be improved through the implementation of agricultural interventions in complex emergency contexts:

- **Conduct more research on the factors influencing dietary diversity as part of agricultural programs in complex emergency contexts** to allow for the evaluation of other factors related to agriculture-nutrition pathways (e.g., as outlined in Herforth and Harris 2014) for which we did not have quantitative data, including seasonality, crop diversity, animal-source food production, yields, how harvests were used, women's empowerment, and mental health.
- **Conduct more studies with a large(r) sample size or quasi-experimental design** to compare and supplement our study findings.
- **Develop survey modules that specifically assess program activities to strengthen monitoring.** Particularly in contexts where surveys are repeated, standardized data collection tools can be used to evaluate the reach of large-scale programs over time and in response to situational changes.
- **Consider conducting a study specifically designed to evaluate the effectiveness of emergency agricultural programs.** The studies done on the projects in Cameroon and South Sudan used secondary data from surveys that were not explicitly designed to evaluate the programs. Such an evaluation could also assess the effectiveness of different agricultural components (e.g., training vs. input distribution) on dietary outcomes.

Chapter I. Introduction

Globally, there is broad recognition that humanitarian emergencies have become increasingly complex. This change has reinforced the need to maintain and protect agriculture, food production, and livelihoods to minimize the risk of further deterioration for households and communities living for prolonged periods in complex crises. Humanitarian assistance has therefore prioritized funding agriculture in complex emergencies. Agriculture interventions in complex emergency contexts have been implemented to protect and rebuild livelihoods and food security. These interventions typically include seed and tool distribution, livestock support, and training (Maxwell and Caldwell 2008). Evidence supports the effectiveness of nutrition-sensitive¹ agriculture activities in improving dietary outcomes in development contexts (Ruel, Alderman, and the Maternal and Child Nutrition Study Group 2013; Ruel, Quisumbing, and Balagamwala 2018). Little research has been done, however, to determine the effectiveness of these investments to improve nutrition outcomes in complex emergency contexts (FAO 2010; Hall, Blankson, and Shoham 2011; Levine and Chastre 2011).

In development contexts, the evidence base on the effects of nutrition-sensitive agriculture on diet quality and nutrition is growing. Two systematic reviews concluded that nutrition-sensitive agriculture programs increased household and child dietary diversity through a range of interventions, including homestead production, biofortified crop production, and livestock and dairy value chain interventions. In these programs, improvements were seen in both agricultural production and consumption of nutrient-rich foods (Ruel, Alderman, and the Maternal and Child Nutrition Study Group 2013; Ruel, Quisumbing, and Balagamwala 2018). Importantly, in emergency contexts, the vast majority of programming has centered on addressing and meeting immediate basic needs of food and shelter. However, as emergencies become more protracted, there has not been a similar shift in focus on improving dietary diversity or diet quality, which are essential to protecting and improving nutrition outcomes. Specifically, emergency food assistance programs are designed to save lives and meet basic needs. However, they may be insufficient for providing adequate dietary quality that would enable people to thrive over many years. This is particularly concerning for women and children who are ultimately most at risk in terms of increased risk of morbidity, mortality, and adverse long-term consequences.

Agricultural interventions have the potential to improve dietary intake, but such programs in emergency contexts may not have the same effect on nutrition as they do in development contexts, for several reasons. Even in the context of complex emergencies, emergency programs are often funded for short periods and implemented for only 6 to 12 months. Implementing partners likely respond to this time frame, designing short-term programs in a different way than they would for those projects that have an extended implementation timeline. In addition, emergency programs themselves face more challenging implementation circumstances, and the enabling environment is often weak (Hall, Blankson, and Shoham 2011; Hendrix and Anderson 2021; Quak 2018). Indeed, a systematic review of factors influencing implementation of nutrition-sensitive agriculture interventions found that project implementation can be

Box I. Types of Emergencies

Slow onset emergencies are gradual, can be multi-year events, and take place in specific geographic areas known to be at risk. Early response is often inadequate to prevent this type of emergency.

Rapid onset emergencies occur with little or no warning or notice, impacts occur within hours or days.

Complex emergencies are associated with protracted political instability and/or internal or external conflict and occur over years or decades.

Source: LEGS 2014

¹ Nutrition-sensitive agriculture interventions are commonly defined as “those that address the underlying determinants of fetal and child nutrition and development ... and incorporate specific nutrition goals and actions” (Ruel, Quisumbing, and Balagamwala 2018, 129).

constrained by implementer and farmer capacity, a weak enabling environment, poor infrastructure, and shocks (Di Prima et al. 2022). Further, farmers receiving agricultural interventions in such contexts face different complex challenges than those in stable, non-conflict contexts. Household membership or dynamics may shift as a result of conflict or displacement, which could influence the household's ability to carry out farming activities. Finally, household access to land may be particularly challenging for internally displaced populations, refugees, and refugee returnees. The challenging contexts in which emergency programs are implemented warrant exploring whether agricultural interventions positively influence dietary intake in these contexts.

Nutrition stakeholders in emergency programming are gradually seeking opportunities to shift from the basic paradigm of meeting caloric needs to recognizing the need to improve diet quality. In protracted crises, achieving these goals is likely partly contingent on transforming agriculture interventions to become more nutrition sensitive. The question is whether improving dietary diversity in protracted crises through agriculture is possible, given the current nature of short-term funded emergency programming.

With this in mind, **Bureau for Humanitarian Assistance (BHA) engaged USAID Advancing Nutrition to explore whether agriculture activities can improve dietary outcomes in complex emergency contexts** and how these activities could be better designed to improve nutrition outcomes. BHA's goal is for the findings of this research to inform its emergency application guidelines where relevant and advise implementing partners who identify improved nutrition outcomes as a goal for agricultural interventions in an application for BHA emergency funding.

Study Partners and Locations

We assessed associations between agricultural activities and women's and children's dietary diversity as an indicator of diet quality that could change within a short period of time, such as that in which emergency programs take place. Indicators of nutrition status, such as stunting, are long-term indicators that are not appropriate for assessment in activities implemented for five years or less or for single-intervention activities (USAID Advancing Nutrition 2020).

USAID Advancing Nutrition conducted research with two BHA-funded activities. USAID Advancing Nutrition reviewed a range of projects with agriculture components that operate in complex emergency contexts.² We selected individual projects to examine under this activity based on the following criteria:

- implemented in fiscal year 2021 and partnership was feasible given the project work plan and timeline
- had a nutrition-sensitive agricultural component
- operated in complex emergency context illustrative of other similar complex emergency contexts
- implementing partner and USAID Mission were interested in the research activity and
- had emergency funding.

We identified two BHA-funded agriculture activities that met the above criteria, were interested in collaborating, and had existing data collection plans on which we could build. The following two activities met the criteria:

- Emergency Response to Food Insecurity for Lake Chad Basin Crisis-Affected Populations in the Far North Region of Cameroon, implemented by Première Urgence Internationale (PUI)

² FAO defines complex crises as situations in which there are recurrent natural disasters or conflict (or both) that lead to long food crises that threaten livelihoods (FAO 2010).

- Emergency Livelihood Response Program (ELRP), South Sudan, implemented by the Food and Agriculture Organization (FAO) of the United Nations (UN).

The projects that we identified had food security and livelihood objectives, which are underlying determinants of nutrition. However, the projects did not have specific nutrition goals or actions, so they were not nutrition-sensitive projects. As such, we will refer to the activities as agricultural rather than nutrition-sensitive agriculture going forward.

Research Questions

USAID Advancing Nutrition implemented these studies to answer the following research questions:

1. Which factors influenced implementation of the nutrition-sensitive³ agriculture interventions within emergency activities?
2. What is the prevalence of minimum dietary diversity (MDD) among women of reproductive age (18–49 years) and children (aged 6–23 months)?
3. What is the association between participation in the project⁴ and the dietary diversity of women of reproductive age (18–49 years) and children (aged 6–23 months)?
4. Which household-level factors are associated with the dietary diversity of women of reproductive age (18–49 years) and children (aged 6–23 months) in complex emergency contexts?
5. What is the association between the dietary diversity of women of reproductive age (18–49 years) and children (aged 6–23 months) and maternal social support?

Methodology

We used a common conceptual framework to inform both studies and answered a common set of research questions. However, the study designs were different for the two studies, as summarized in table 2 and described in more detail below.

Table 2. Study Designs

	Cameroon	South Sudan
Household survey	Baseline (October 2020) and endline (March 2021) surveys (N=101 households)	Analysis of data from the Food Security and Nutrition Monitoring Survey (FSNMS) conducted between October 2021 through January 2022 (N=14,215 households)
Online implementer survey	Online survey of project staff (N=18)	Online survey of implementers (N=24)
Qualitative interviews	Qualitative semi-structured interviews with survey respondents (N=24)	N/A

³ During the course of this investigation, it was determined that PUI did not explicitly implement nutrition-sensitive interventions, although they monitored nutrition indicators.

⁴ In Cameroon, while there was variation in which agricultural activities participants engaged in across the project, nearly the entire endline sample participated in all three agricultural interventions. Therefore, we used the portion of PUI-provided seeds planted as an indication of project participation.

Conceptual Framework

These research questions were informed by Young’s conceptual framework for acute malnutrition in Africa’s drylands to develop the research questions (annex 1). Young’s framework builds on the United Nations Children’s Fund’s (UNICEF’s) malnutrition framework with evidence that has emerged over the past 30 years; it also incorporates seasonality, resilience, and other underlying issues and drivers that are relevant beyond drylands contexts (Young 2020).

We used this framework to determine the underlying and basic/systemic factors that are connected to our outcome of interest—inadequate dietary intake (as measured by dietary diversity). We identified the components of the framework the projects targeted directly and related factors that the projects did not target directly but may affect dietary outcomes. We used these categories to inform the research questions and data collection instruments to develop a more comprehensive understanding of what influences dietary diversity in complex emergency contexts. We explored agricultural livelihoods and household food security as the projects aimed to directly improve those. We also explored the two other mediating factors along the pathway between livelihoods and dietary intake: idiosyncratic shocks⁵ and inadequate social and care environment.⁶ Although the projects did not aim to improve shocks or the social and care environment, we still explored them to better understand the factors that influence dietary intake. Because this is not a project evaluation, we were not limited to exploring the factors that the projects aimed to address.

To inform the analytic models for this study, we developed two conceptual frameworks—one for minimum dietary diversity for women (MDD-W) (figure 1) and one for children’s MDD (figure 2). These frameworks use the Strengthening Partnerships, Results, and Innovations in Nutrition Globally pathways between agriculture and nutrition (Herforth and Harris 2014) (annex 2), which show how agriculture can support nutrition through three pathways—food production, agricultural income, and women’s empowerment. The two food security-related pathways were relevant for the two projects we studied:

- **Increased food production.** Agricultural production can help increase households’ access to nutritious foods through their own production. As a result of increased yields or diversified production, households can (a) have greater access to foods they commonly consume, (b) have greater access to foods they were not able to eat often previously, (c) reduce overall market purchases, or (d) diversify food purchases. Improved postharvest management can ensure that household production is safely stored for consumption (Herforth and Harris 2014; Quak 2018).
- **Increased agricultural income.** Households can sell products from increased agricultural production to earn income. Such sales can enable households to (a) increase the quantity of foods they typically purchase or (b) diversify food purchases, including purchase of more expensive, nutritious foods, such as animal-source foods. Households can also use this income to invest in other non-food necessities that can support nutrition, including health care and improved water and sanitation (Herforth and Harris 2014).

We adjusted the Strengthening Partnerships, Results, and Innovations in Nutrition Globally agriculture-nutrition pathways to end at our outcome of interest—dietary diversity. We also updated the framework to include shocks from Young’s framework (2020) and additional factors that evidence shows influence dietary intake, namely food market access (Ruel, Quisumbing, and Balagamwala 2018; Innovation Lab for Nutrition 2020), food-related capabilities and choices (Herforth and Ahmed 2015), mental health status (Surkan and Behbehani 2020; Madeghe et al. 2021; Rahman et al. 2008; Rabbani at

⁵ Idiosyncratic shocks are those that affect individual households as opposed to communities. In protracted crises, households are typically more exposed and vulnerable to shocks that can negatively affect their livelihoods and health (Quak 2018).

⁶ In complex emergencies, the social and care environment often undergoes stress or breakdown. This breakdown can adversely affect child nutrition because social support is a critical factor in caregiving and can be protective for maternal mental health. Mothers with higher social support have been found to have children with a more diverse diet in some contexts (Matare et al 2020; Ickes et al. 2018; Baye, Laillou, and Chitekwe 2021).

el. 2020), and social support (Matare et al. 2020; Ickes et al. 2018; Baye, Laillou, and Chitekwe 2021). The light blue boxes represent factors for which we had data available for South Sudan.

Figure 1. Conceptual Framework for Women’s Dietary Diversity

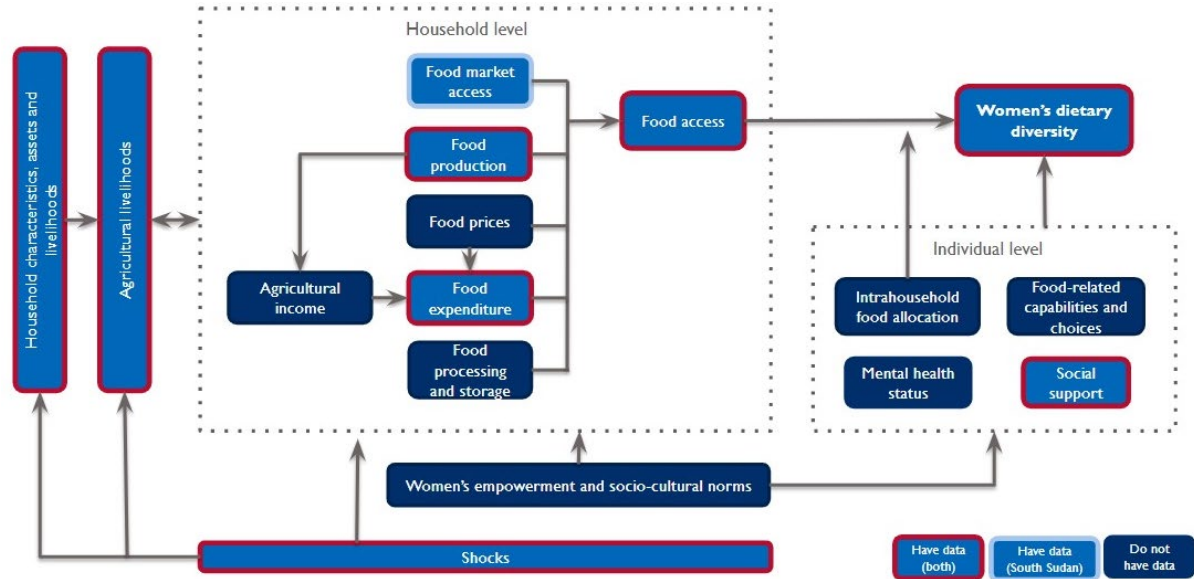
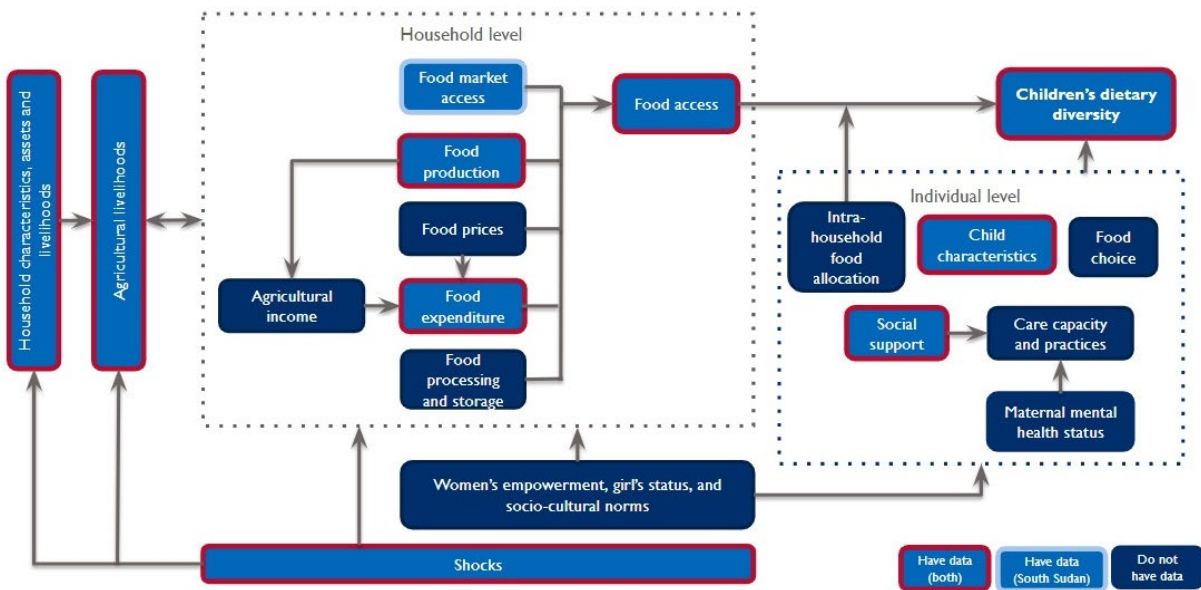


Figure 2. Conceptual Framework for Children’s Dietary Diversity



Methods: Cameroon

We conducted a mixed-methods study using quantitative data from the PUI project endline survey and qualitative data from an investigation that we developed with PUI and for which we hired a qualitative researcher. In brief, PUI conducted a household endline survey in March 2021 using the mobile data collection platform KoboCollect and provided a clean dataset to USAID Advancing Nutrition for this analysis. The endline survey was conducted in 13 villages across three councils. USAID Advancing Nutrition worked with PUI to include modules on dietary diversity, social support, and household shocks in the survey for this study. We are only able to use the endline survey data because these topics, including dietary diversity, were not measured at the baseline. We used this cross-sectional household survey data to estimate prevalence ratios for the two primary outcomes of interest: MDD-W of reproductive age (18–49 years), defined as consumption of 5 of 10 food groups in the previous day, and MDD for children (aged 6–23 months), defined as consuming 5 of 8 food groups in the previous day.

We used a 24-hour dietary recall to assess MDD-W and MDD. For MDD-W, one female household member of reproductive age (18–49 years) was randomly selected to complete the dietary recall. A child 6–23 months old of the selected woman was selected for MDD. If the selected woman had more than one eligible child, one was randomly selected. We used a list-based, 24-hour dietary recall approach in which the interviewer read the respondent a list of predefined sentinel foods and beverages categorized into food groups and asked if they consumed any of the listed foods the previous day (FAO 2021a). We used Diet Quality Questionnaire modules tailored for adults and children in Cameroon for this dietary recall (Herforth et al. 2019). The primary exposure was the planting of more than half of the seeds provided by PUI.

We also collected data on household demographic characteristics, food security, agricultural production, social support, and experience of shocks. Women’s social support was measured by an eight-item questionnaire adapted from the Duke-University of North Carolina Functional Social Support Questionnaire (Broadhead et al. 1988). The questionnaire measured different dimensions of social support, including confidante (someone to share and discuss important matters in life), affective (being shown love), and instrumental (such as having support to complete household chores) support measured on a five-point Likert scale (Epino et al. 2012). USAID Advancing Nutrition analyzed a subset of the data from 101 households that had complete data, as household demographic information was only available for those households (taken from the “targeting validation survey” conducted in June/July 2020). Of those 101 households, 84 had eligible women for MDD-W and 40 of those 84 had eligible children for MDD. To assess the factors associated with MDD of women and children, bivariate analyses were conducted for all categorical household variables using Chi-square tests; Fisher’s exact test was conducted when the conditions for a Chi-square test were not met. We estimated prevalence ratios with bivariate and multivariable Poisson regression analyses for MDD-W and MDD.

We used semi-structured interviews to collect qualitative data from project participants. We interviewed a purposive sample of 24 households that were respondents in the PUI endline household survey (table 2). Fifteen of these households had a child aged 6–23 months (six had inadequate dietary diversity and nine met MDD).⁷ Within these households, we interviewed 24 women of reproductive age (18–49 years) and 17 male household heads. Of the women interviewed, 10 had inadequate dietary diversity and 14 met MDD-W. If a man was interviewed in the household, the man and woman participated in the initial sections of the interview on agricultural production and PUI participation. Then, the man was asked to excuse himself, and the researcher completed the interview with the woman. The interviews covered these primary topics:

⁷ Six informants per category is likely to be sufficient to capture variation across groups (councils and those consuming and not consuming a diet of minimum diversity) based on available research that has found that conducting interviews with 6 to 12 informants per respondent group is sufficient to reach data saturation (Guest, Bunce, and Johnson 2006).

- household agricultural production in the most recent off-season (October 2020 to April 2021)
- household food access
- household mealtimes and intrahousehold food allocation
- women's diets and decision-making about food
- children's (aged 6–23 months) diets
- women's experience of stress/worry and social support
- participation in the PUI project and perceived effects.

We coded the data with thematic and structural codes in ATLAS.ti and then applied thematic analysis to identify patterns (Guest, MacQueen, and Namey 2012).

We also administered an online survey to collect information from 18 project staff on the interventions implemented, perceived quality of training, perceived outcomes achieved, and implementation challenges faced. We used the online survey because PUI thought it would be more feasible than conducting phone interviews with a broad set of staff. The survey included closed and open-ended questions and is considered a qualitative method in this case due to the small sample size. We cleaned those data in Microsoft Excel. When synthesizing the data on implementation, we triangulated the data from the online survey with project monitoring and evaluation data and related documents.

Methods: South Sudan

We conducted a secondary data analysis of the cross-sectional survey results from the 27th round of the FSNMS. Representative data for this analysis were collected across South Sudan in October 2021 through January 2022. The FSNMS survey was administered and conducted by FAO in collaboration with the World Food Programme (WFP), UNICEF, and other UN agencies.

A random sample of households that is representative at the county level (78 counties in all 10 states) was selected. A total of 14,215 households were sampled and completed the survey (an additional 16 were selected but did not provide consent). Two-stage stratified sampling was used first to randomly select 12 to 20 enumeration areas per county. Then, a minimum of 12 households were selected per enumeration area. We included only data from rural households, given the nature of the agricultural activities. Research questions 2 through 4 were assessed using the full sample of women and children who had complete data in the FSNMS survey ($N = 14,215$). Research question 5 restricted analysis to a smaller subsample of households that reported just one woman in the household ($n = 9,503$).

The primary exposure variable of interest was participation in agricultural activities, which was used as an indicator of participation in the ELRP. Participation in agricultural activities was assessed through four survey questions, which asked about training and humanitarian services received in the past three months, the source of seeds for crops planted in the past year, and the source for fishing equipment. Because the FAO activities were carried out through implementing partners, survey respondents may have been unable to distinguish between FAO agricultural program activities and agricultural activities of other organizations; even if they were able to tell the difference, the FSNMS survey questions were not designed to allow them to make this distinction. As such, these questions may have captured agricultural interventions that were not part of ELRP. We estimated the prevalence of MDD-W and MDD, accounting for the complex survey sampling weights. We calculated crude prevalence ratios through bivariate analyses between the exposure (participation in agricultural activities as a dichotomous variable) and outcome of interest (MDD or MDD-W). Adjusted prevalence ratios were calculated using multivariable models that included covariates associated with the outcome variable. Prevalence ratios were estimated using binomial regression with log-link function and robust variance. We also assessed the association between maternal social support and MDD-W and MDD.

We also collected data through an online survey with 24 implementers who had received funding for implementation for April 2020 through April 2021 to collect information about how the interventions were implemented, the perceived quality of training and outcomes achieved, and implementation challenges faced. We used an online survey because it was a feasible way to get information from the large number of implementing partners that operated under the FAO program. The survey included closed and open-ended questions and is considered a qualitative method because of the small sample size. We used convenience sampling for the survey. We also reviewed program documents provided by FAO to inform our understanding of the program implementation.

Ethics

USAID Advancing Nutrition submitted both studies for review by the JSI Research & Training Institute, Inc. (JSI) Institutional Review Board (IRB). The Cameroon study underwent expedited review and was approved. PUI obtained government clearance for the project and associated research. We also provided a letter informing the Cameroon Ministry of Health about the study. For the South Sudan study, the JSI IRB determined that JSI's involvement did not constitute being engaged in human subjects research because our involvement was limited to analyzing de-identified data that others collected. Similarly, the University of California, Davis, IRB reviewed the protocol and determined that the analysis of de-identified data constituted nonhuman subjects research. While the Government of South Sudan did not approve of the FSNMS survey at the time of data collection, FAO and other implementing UN agencies resolved the issues with the government. The issues were not directly related to the data collection; they were larger issues between the government and the UN. In consultation with the JSI IRB and USAID, we determined that we could proceed with secondary analysis of the survey data because of the nonsensitive nature of the data and the IRB determinations that USAID Advancing Nutrition's involvement did not constitute engagement in human subjects research.

This report presents a synthesis of findings and recommendations from the cross-sectional, mixed-methods study that USAID Advancing Nutrition conducted with PUI in 2021 and from the quantitative study (secondary analysis) of the FAO ELRP, implemented in South Sudan. This is one of three reports. A second report presents findings from the study in South Sudan. The third report presents findings from the study in Cameroon. This report provides background information on the two projects in chapter 2. Chapter 3 presents the research findings by question for each study. Chapter 4 provides a discussion and synthesis of the findings from both studies. Finally, chapter 5 presents recommendations.

Chapter 2. Project Background

BHA supported both projects, the PUI-implemented Emergency Response to Food Insecurity for Lake Chad Basin Crisis-Affected Populations in the Far North Region of Cameroon and the FAO-implemented ELRP in South Sudan. The projects both aimed to improve livelihoods and food security of participant households. However, they did not have specific nutrition or dietary diversity objectives. They provided cereal and vegetable seeds and similar agricultural interventions, including training on production, and started demonstration plots. The South Sudan project also provided fishing equipment to some households. In table 3, we provide background about the implementation context and detail about each project.

Table 3. Project Background

	Cameroon	South Sudan
Project name	Emergency Response to Food Insecurity for Lake Chad Basin Crisis-Affected Populations in the Far North Region of Cameroon	ELRP, South Sudan
Donor	USAID BHA	USAID BHA8
Implementer	PUI	FAO
Time period	April 2020–March 2021	April 2020–April 2021
Funding amount	\$1.5 million	\$25 million
Location	Councils of Kousséri, Makary, and Fotokol in Logone-et-Chari Department in the Far North Region	Rural areas of eight states in South Sudan: Central Equatoria, Eastern Equatoria, Jonglei, Lakes, Northern bahr el Ghazal, Warrap, Western bahr el Ghazal, and Western Equatoria
Scale	6,563 farmers	Targeted 402,000 farming households
Targeting	Vulnerable households	Households with acute food insecurity (Integrated Food Security Phase Classification [IPC] 3 or worse)
Agriculture interventions	<ul style="list-style-type: none"> • Distribution of seeds • Distribution of tools • Agricultural production training • Farmer Field School (FFS; training and demonstration plots on model farmer land) 	<ul style="list-style-type: none"> • Distribution of seeds and agricultural tools • Agricultural production training • Demonstration plots • Distribution of fishing equipment • Nutrition training and cooking demonstrations provided to some

Source: PUI 2020, 2021; FAO 2021b.

⁸ ELRP is a multi-donor initiative. FAO received \$25 million in funding from BHA for ELRP. Additional funding was received from the governments of the United Kingdom, Norway, and the Netherlands and the UN Central Emergency Response Fund. However, we do not have details about those funding amounts.

Cameroon

Context

The project was implemented in the Far North region of Cameroon. The Far North is part of the Lake Chad Basin, which is in the midst of a complex emergency characterized by armed conflict, climatic shocks, and extreme poverty (ECHO 2021; USAID 2020). The conflict has led to a humanitarian crisis that has displaced 2.7 million people in the region and constrained and disrupted agricultural production, livelihoods, trade, and access to basic services and humanitarian assistance (Kah 2017; ODI 2017; USAID 2020).

Rainfed agricultural production is a main livelihood activity in the region. Plots are relatively small (1.7 hectares on average), and crop diversity is low (1.6 crop varieties grown on average) (WFP 2017). Crop yields are very low in the Far North due to crop disease, erratic rainfall, and constrained access to fields caused by instability (WFP 2017). Fifty-seven percent of households engage in livestock production (WFP 2017). The main production and rainy season is approximately March to October, and the lean season typically lasts from March to May (FEWS NET 2019).

The Far North has the highest rates of food insecurity in the country, with 33.7 percent of the population experiencing moderate or severe food insecurity; 52.8 percent are marginally food insecure, and only 13.6 percent of households are food secure (WFP 2017). Six percent of women 15-49 years of age are underweight, and 10 percent are overweight or obese. Forty-three percent of women in this age range are anemic (INS and ICF 2020). Malnutrition rates are higher among children than among women in the Far North. Thirty-seven percent of children younger than two years are stunted (have low height for age), 10 percent are wasted (have low weight for height), and 26 percent are underweight (INS and ICF 2020). Among children aged 6–23 months who were breastfed and non-breastfed, only 10 percent had a minimum acceptable diet, 18 percent had MDD and consumed at least four food groups, and 46 percent consumed minimum meal frequency. The WFP found that several factors are associated with low mid-upper arm circumference scores in the country: the education level of parents (particularly the mother), access to improved drinking water sources and sanitation facilities, household wealth, and household use of food-related coping strategies (WFP 2017).

Project Description

The project was implemented by PUI in the Councils of Kousséri, Makary, and Fotokol in the Logone-et-Chari Department in the Far North region. The project was implemented in two phases. This study covers phase 2 of the agriculture component of this project, which was implemented from April 2020 to March 2021.

The overall objective of the project was to improve the target population's capability to withstand shocks through the provision of food assistance and access to improved agricultural activities for the crisis-affected Cameroonian host population, internally displaced persons (IDPs), and out-of-camp Nigerian refugees. The project had three results and corresponding components. The agricultural-related result was to reduce vulnerability to food insecurity through access to improved agricultural activities.

The project had several eligibility criteria for households. The interventions were aimed at households that had low incomes and a vulnerable household member (pregnant or lactating woman, person with a disability, or IDP). Respondents also had to be willing to participate in the community-based FFS approach, have basic agricultural knowledge, have an adult who is physically able to work, and have access to agricultural land (PUI 2021).

Farmers in all participant households received two agricultural production training sessions, which were delivered in collaboration with the Cameroonian Ministry of Agriculture and Rural Development. The training covered sowing techniques, soil preparation, transplanting, types of amendments and

fertilization, insect control, and making organic pesticides. Participant households were also provided the opportunity to participate in FFSs, which were facilitated by lead farmers.

The project distributed agricultural inputs to participant households for off-season production (September 2020 to March 2021). A total of 6,563 individuals received farm inputs in phase 2. Each participating household was provided with one of each of the following types of agricultural tools in August 2020: shovels, machetes, hoes, rakes, watering cans, and buckets. Participant households were also provided with seeds in September and October 2020. Households were provided with grain and legume seeds (8.25 kilograms (kg) of sorghum and 11 kg of cowpeas) and vegetable seeds (9 grams of tomatoes, 88 grams of onions, 176 grams of green peppers, 440 grams of okra, and 220 grams of Guinea sorrel). PUI solicited participant farmers' input on the choice of crop seeds to provide.

PUI measured two outcome indicators for result 3, the agricultural component of the project, through baseline (in 2020) and endline (in 2021) household surveys:

- percentage of beneficiaries with a light Reduced Coping Strategies Index (rCSI)⁹
- percentage of beneficiaries who had an acceptable Food Consumption Score (FCS).¹⁰

Both indicators exceeded the project targets at the endline. As anticipated, however, both indicators declined from the baseline to the endline. The percentage of beneficiaries with light rCSI fell from 65 percent at baseline to 47 percent at endline (the target was 40 percent). The percentage of beneficiaries with acceptable FCS decreased from 88 percent at baseline to 79 percent at endline. The declines in food security may be the result of the timing of the baseline and endline surveys and seasonal variation in food access at those times. The baseline survey was conducted in October 2020, which coincided with the end of the rainy season and the beginning of the harvest. The endline survey was conducted in March 2021, which was the lean season.

South Sudan

Context

South Sudan became an independent state from Sudan in 2011 and has been in a complex emergency for much of its independence. In addition to organized, armed conflict, low-level resource and ethnic conflict has persisted since independence (FEWS NET 2018). The conflict has contributed to the internal displacement of an estimated 1.7 million people, and in 2021, an estimated 8.3 million people needed humanitarian assistance out of a total estimated population of 12.1 million (USAID BHA 2021). The ongoing conflict has exacerbated vulnerabilities in the country. Poverty rates are high, with four out of five people living under the poverty line in 2016, a problem that is concentrated in the eastern portion of the country (OCHA 2022).

Much of the population lives in rural areas and relies on small-scale, rainfed crop and livestock production (FEWS NET 2018; UNICEF 2021). About 80 percent of the population relied on subsistence agriculture in 2020, and 49 percent of households owned livestock in 2018 (UNICEF 2021). South Sudan has seven general agroecological zones. The main rainy season is June to September in many regions. The main harvest takes place between June and February, depending on the region, and the lean season

⁹ According to the *Indicator Handbook for Emergency Activities*, "The rCSI is a proxy indicator of household food insecurity that is based on a list of behaviors (coping strategies) that people do to manage their food insecurity situation. The index reflects both the frequency of each behavior (i.e., how many days over the last 7 days the coping strategy was used by any member of the household) and severity (i.e., how serious the strategy is relative to other strategies). The rCSI is based on a list of five food-related coping strategies" (USAID BHA 2021).

¹⁰ According to the *Indicator Handbook for Emergency Activities*, "The Food Consumption Score (FCS) is a composite score based on dietary diversity, food frequency, and the relative nutritional importance of different food groups. It is a proxy indicator for food intake. A questionnaire is used to ask respondents about the frequency of their households' consumption of nine food groups over the previous seven days. To calculate the FCS, the consumption frequencies are summed and multiplied by the standardized food group weight. ... Households are then classified into three groups based on their weighted scores—poor, borderline, or acceptable—using the World Food Program recommended cutoff points" (USAID BHA 2021).

generally occurs from May to August. Most livelihood zones are agropastoral, with reliance on rainfed crop production and livestock production. Only one livelihood zone—the southeastern semiarid pastoral zone—is primarily pastoral. Fishing, use of forest products, and wild food gathering is common in some zones. Market access and the primary hazards vary across livelihood zones, depending on location (e.g., if near a border), agroecology, infrastructure quality, and conflict severity (FEWS NET 2018).

Food insecurity has increased since 2015 because of the compounding negative effects of conflict on the economy and food production systems (WFP 2018). Acute food insecurity was projected to rise to 60 percent of the population, or 7.24 million people, during the lean season of April to July 2021 (IPC 2020). Acute malnutrition is a serious problem in South Sudan. Nearly 500,000 pregnant and lactating women were estimated to be acutely malnourished in 2021 and in need of treatment (UNICEF 2021). In 2020, 31.3 percent of children under five years of age were stunted (have low height for age) (UNICEF 2021). Diets are poor for children aged 6–23 months, with only 7 percent having a minimum acceptable diet and 15 percent having MDD (IPC 2020). Malnutrition rates for children under five in South Sudan are related to a complex set of factors, including inadequate care practices, insufficient access to health and nutrition services, high prevalence of disease, inadequate hygiene and sanitation behaviors, food insecurity, sociocultural norms, conflict, natural shocks, and, more recently, COVID-19 disruptions (IPC 2022; WFP 2018).

Project Description

ELRP is a multi-donor initiative that has been implemented in annual cycles since 2014. FAO contracts with nongovernmental organizations (NGOs) to implement the program. In 2020, there were 38 implementing partners (FAO 2020), many of which were local NGOs. The ELRP was primarily implemented in rural areas across the country, with the 2021 activities focused on eight states: Central Equatoria, Eastern Equatoria, Jonglei, Lakes, Northern bahr el Ghazal, Warrap, Western bahr el Ghazal, and Western Equatoria (FAO 2021b).

The intended impact of the program was to protect the livelihoods of the most vulnerable communities, enhance food production, and strengthen resilience (FAO 2021d). Two outcomes were expected to contribute to achieving that impact:

- “The livelihoods of vulnerable households are protected and their food production is increased” (FAO 2021d, 21).
- “Absorptive capacity is strengthened and resilience is built at household and community level” (FAO 2021d, 21).

The ELRP targeted households that were food insecure (IPC phase 3 or worse) and had members in a vulnerable group using a community-based participatory planning approach. Overall, the project target was to reach 100 percent of households facing IPC phase 3 or worse, regardless of residency status. In 2020, the ELRP reached 850,134 households, or 5.1 million people, in 78 counties. This was 96 percent of people facing IPC phase 3 food insecurity or worse (IPC 2022). In 2021, the program target was 6 million people, and it reached approximately 4.1 million.

The ELRP provided agricultural training and supported demonstration plots. The implementing partners used consistent curriculum, guidance, and tools for the training and demonstration plots. About 75 percent of households receiving inputs received basic training on cultivation (FAO 2021c). The project also trained the community members who established the demonstration plots in crop production, vegetable production, or fishing. These community members provided training to others in the community, including farmers and community leaders, at the demonstration plots to show best agronomic practices. Nutrition education was integrated into at least one vegetable training session per community. Households with malnourished children were the primary targets for these trainings. Each

demonstration plot also had between 10 and 20 members who received training and participated in tasks for experiential learning at the plot.

The ELRP distributed seeds and agricultural tools, provided agricultural training and demonstration plots, and provided fishing equipment. A post-distribution monitoring survey was conducted in April to August 2021, corresponding to the main season immediately after the distribution of the agricultural kits, to monitor whether distribution had been conducted according to project plans and to assess how participants used the inputs. The survey was conducted with an average purposive sample size of about 50 households per intervention (crop kits, fishing kits, vegetable kits, and tools), selected from participant lists for each implementing partner in each county. The total sample size was 8,868. Of those, 3,893 received crop seed kits, 2,701 received vegetable seed kits, and 2,274 received fishing kits (FAO 2021c). In 2021, the crop seed kit included 5 kg of maize, 5 kg of sorghum, and 3 kg of cowpeas. Eligible households could also receive vegetable seed kits, which included five types of vegetable seeds: amaranth, tomato, onion, cabbage, carrot, collard, watermelon, eggplant, and okra. Households in fishing communities also received fishing kits that typically included hooks, monofilament, and twine. All eligible households also received agricultural tools—typically, one *maloda* (shovel), one rake, and one hoe, although there was some variation by state (FAO 2021c).

Based on the post-distribution monitoring survey, on average, households planted 60 percent of the 0.89 hectares of their planted land with the seeds received in 2021—a 34.6 percent increase from the amount of land households planted in 2020. Many households (72.5 percent) also planted seeds that they sourced from their seed stocks, purchased, or received from friends or relatives, although this percentage was low in Jonglei (17.5 percent) and Central Equatoria (31.8 percent). Of those who received fishing kits, 75 percent used the inputs for fishing, while the rest stored, exchanged, shared, or sold the inputs. Fishers caught the largest quantity of fish using nets (2.1 kg per day on average), followed by hook and line (1.7 kg per day on average) and hook single (1.5 kg per day on average) (FAO 2021c).

Chapter 3. Findings

First, we present the basic characteristics for the households in the survey samples. Then, we present findings by research question for each study.

Household Characteristics

Cameroon

For Cameroon, key characteristics of households with women (n=84) or children (n=40) in the survey are presented in table 4 (see full table of characteristics in annex 3). The mean age of women was about 30 years, and the mean age of children was about 13 months. The mean size of households was nearly 9. For the majority of households, the status of the household head was part of the host community, as opposed to IDP (approximately 95 percent). Most households (approximately 87 percent) had a vulnerable member (pregnant and lactating women, person with disability, or IDP), and the main source of livelihood was agriculture (approximately 99 percent). Approximately two-thirds of households practiced market gardening, which is off-season vegetable production on land that is in low-lying riverbeds or irrigated and primarily managed by men and seen as an income-generating activity. Seventy percent of households practiced rainfed food production, and less than a quarter practiced off-season crop production. Approximately half of the households had a monthly household income of 15,000 or greater *Communauté Financière Africaine* (African Financial Community) CFA franc (U.S. \$27.05/month), and 60 percent of the households spent less than 15,000 CFA franc on food per month. Eighty-five percent of households had acceptable food security as measured by the FCS.

Table 4. Household Characteristics, Cameroon

Household Characteristics	% or Mean (SD*)	n
Woman's age (in years)	30.23 (8.52)	84
Child's age (in months)	13.05 (5.43)	40
Household size	8.78 (3.83)	84
Head-of-household status		
IDP	4.76%	4
Host	95.24%	80
Household monthly food expenditure (CFA franc)		
≤15,000	60.71%	51
15,000 or greater	39.29%	33
Coping Strategies Index	6.14 (7.99)	84
FCS		
Poor	3.57%	3
Borderline	10.71%	9
Acceptable	85.71%	72

*SD is Standard Deviation

South Sudan

In South Sudan, key characteristics of households (N=14,215) with women or children in the survey are presented in table 5 (see full table of characteristics in annex 3). The mean age of women was approximately 28, and the mean age of children was 14 months. The median household size was seven. Most households were residents (67.7 percent) or IDPs (15.9 percent). Forty-one percent of households spent less than 50 percent of their household expenditure on food, and household food security appeared to be low overall, with 53.8 percent of households having a “Poor” FCS.

Table 5. Household Characteristics, South Sudan

Household Characteristics	% or mean (SD)	n
Woman’s age (in years)	28.3 (8.7)	14,215
Child’s age (in months)	13.8 (5.0)	14,215
Household size (median; Q1, Q3)	7 (5, 10)	14,215
Head-of-household status		
Resident	67.7%	9,619
IDP	15.9%	2,257
IDP returnee	12.1%	1,721
Refugee returnee	4.2%	593
Voluntary migrant	0.2%	25
Resident	67.7%	9,619
Proportion of household expenditure on food		
Less than 50%	40.8%	5,797
50%–65%	30.3%	4,305
65%–75%	18.4%	2,616
>75%	10.5%	1,497
FCS		
Poor	53.8%	7,651
Borderline	24.5%	3,491
Acceptable	21.7%	3,089

Research Question 1: Factors Influencing Implementation

The first research question was, “Which factors influenced implementation of the nutrition-sensitive agriculture interventions within emergency activities?” We used qualitative data from the online implementer survey and project documents to answer this question. In Cameroon, we also had data from interviews with participants to help answer this question.



Key Findings

- In Cameroon, participant households and PUI staff had positive perceptions about the quality of implementation, particularly for the training provided. The primary issue noted was late seed distribution. Other challenges included a short project duration, logistical challenges, and limited community interest or involvement.
- In South Sudan, implementing partners largely had positive perceptions about the quality of implementation. The challenges affecting implementation were predominantly external and included insecurity and safety issues, poor infrastructure, and the short program implementation cycle.
- While both projects faced implementation challenges related to the short implementation period and infrastructure or logistics, the projects were implemented with high quality according to implementers in both countries and participants in the case of Cameroon.

Cameroon

PUI project staff most commonly reported that having highly competent staff and a strong relationship with the community facilitated successful project implementation. Staff reported facing a range of challenges during implementation, but most challenges were reported by just a few staff members. The most common challenges reported were the short project duration, logistical issues, and limited community interest or involvement.

Most project participants had positive perceptions of the quality of the training and FFS and found the content useful. In addition, a few informants emphasized that the training materials were accessible. The seeds were provided in October, after the dry season had started, which posed challenges for farmers with limited access to water. A few informants said that the quantity of seeds PUI provided was insufficient.

The implementing partner staff indicated that project impacts could be improved by improving seed distribution (including the timing of distribution) and raising nutritional awareness in the project, among other ideas. The informants primarily reported that future projects could help them by providing food.

South Sudan

Implementing partners reported several program strengths, including strong program management, high staff technical capacity, efficient distribution of resources, and strong relationships with the donor and communities. Most respondents reported that they perceived the nutrition training, whether provided solely by their organization or in collaboration with the Ministry of Health, were of high or very high quality. This may reflect response bias as respondents were reporting on training that their organizations implemented. The challenges faced during implementation were primarily insecurity and safety challenges, poor infrastructure, and the short program implementation cycle. Program monitoring reports indicated that there were more implementation challenges in Western Equatoria, Jonglei, and Warrap than in the other states, including lower rates of farmers being trained and late input distribution.

Implementing partners provided several recommendations to improve the ELRP's implementation and impact in the future. Primary among them was to lengthen the implementation period. Several respondents also recommended increasing the funding for the ELRP and ensuring that agricultural inputs are delivered early. A few respondents thought that the ELRP should focus more on nutrition for women and children rather than just food security and that nutrition could be included more strongly in training. Additional suggestions included providing support to address access to water for agriculture, including by providing small irrigation pumps; taking a more participatory approach with community

stakeholders; tailoring program support to the local context and needs; and developing or working with groups (e.g., women’s groups, village savings and loan groups) to increase effectiveness and sustainability.

Research Question 2: Prevalence of Dietary Diversity

The second research question was, “What is the prevalence of MDD among women of reproductive age (15–49 years) and children (aged 6–23 months)?” Dietary diversity is our main outcome of interest as an indicator of the quality of diets.



Key Findings

- In Cameroon, the majority of women, 74 percent, and just over half of children in the sample had MDD.
- In South Sudan, dietary diversity was low, with only 30 percent of women meeting MDD-W and 22 percent of children meeting MDD.
- Dietary diversity among women and children was higher in Cameroon than South Sudan. In both countries, women had higher dietary diversity than children.

Cameroon

In Cameroon, among participant households (n=84), about 74 percent of women (18–49 years) met MDD-W, and about 53 percent of children (aged 6–23 months) met MDD (see table 6). For women, the two most consumed food groups were grains, roots, and tubers (100 percent) and meat, poultry, and fish (96 percent), while eggs were the least consumed food group (4 percent). For children, the two most consumed food groups were breast milk (98 percent) and grains, roots, and tubers (73 percent), with eggs being the least consumed food group (3 percent).

Table 6. Prevalence of Dietary Diversity, Cameroon

MDD	%	n
Women’s		
Less than 5 food groups	26.19	22
5 or more	73.81	62
Children’s		
Less than 5 food groups	47.50	19
5 or more	52.50	21

There was no significant difference between MDD-W and MDD for pairs of women and their children. Of the women who had a child aged 6–23 months, 50 percent of those who had MDD also had a child who had MDD. For women who had inadequate dietary diversity and a child aged 6–23 months, about 56 percent had a child who had MDD (see table 7).

Table 7. Women’s Dietary Diversity by Children’s Dietary Diversity, Cameroon

Children’s MDD	MDD-W*			
	Less than 5		More than 5	
	%	n	%	n
Less than 5 food groups	44.44	4	50.00	15
More than 5	55.56	5	50.00	15

*There was one case of a child 6–23 months old who did not have a woman 18–49 years old in the household; therefore, the total count for this table (n=39) is less than the total number of children 6–23 months old surveyed (n=40).

South Sudan

In South Sudan, among rural households, 30.4 percent of women and 22.7 percent of children met the MDD-W and MDD thresholds, respectively (table 8). For women, the two most consumed food groups were grains, roots, and tubers (70.7 percent) and dark leafy green vegetables (56.1 percent). For children, the two most consumed food groups were breastmilk (74.1 percent) and grains, roots, and tubers (55.1 percent). Eggs were the least consumed food group for both women and children (< 8 percent).

Table 8. Prevalence of Dietary Diversity, South Sudan

MDD	%	n
Women’s		
Less than 5 food groups	69.6	9,894
5 or more	30.4	4,321
Children’s		
Less than 5 food groups	77.3	10,989
5 or more	22.7	3,226

In South Sudan, there was a strong correlation between women’s and children’s dietary diversity scores (table 9) in women and children pairs. Sixty-two percent of households had both a woman and child(ren) who did not meet the MDD score. Conversely, in 15.2 percent of households, both the woman and the children met the MDD score. The remaining households showed discordance, wherein about 14.7 percent of households had a child who did not meet the MDD while the mother did meet the MDD-W, and 8.4 percent of households had a child who met the MDD with a mother who did not meet the MDD-W.

Table 9. Women’s Dietary Diversity by Children’s Dietary Diversity, South Sudan

Children’s MDD	MDD-W			
	Less than 5		More than 5	
	%	n	%	n
Less than 5 food groups	61.8	2,475	14.7	588
More than 5	8.4	335	15.2	609

Research Question 3: Association between Project Participation and Dietary Diversity

The third research question was, “What is the association between participation in the project and the dietary diversity of women of reproductive age (18–49 years) and children (aged 6–23 months)?” Although we cannot directly attribute changes in dietary diversity to the projects, we explored the associations between project participation and dietary diversity. For Cameroon, we used quantitative data from the household endline survey and qualitative data from interviews with participants to answer this question. For South Sudan, we used cross-sectional quantitative data from the FSNMS.



Key Findings

- In Cameroon, the quantitative and qualitative data suggest that the project had a positive influence on MDD-W. Planting at least half the seeds the project provided was positively associated with the prevalence of MDD-W, although this association was not statistically significant when controlling for household and other factors. Planting more than half the seeds received was negatively associated with the prevalence of MDD for children aged 6–23 months. In qualitative interviews, most informants reported adopting some of the agricultural practices taught by PUI and said that planting the seeds received and adopting new practices improved their yields. The improvement in yields influenced diets through improved access to food from their own production and increased agricultural income.
- In South Sudan, participation in agricultural activities was positively associated with a higher prevalence of MDD-W. The prevalence of MDD-W was about 9 percent higher among women who had participated in agricultural activities than among women who had not participated in any agricultural activity in adjusted statistical models. The prevalence of MDD was higher among children in households that had participated in agricultural activities than among children in households that had not participated in any agricultural activity, but this difference was not statistically significant.
- In both studies, participation in agricultural activities was positively associated with MDD-W, but it was not associated with MDD.

Cameroon

In Cameroon, the PUI agriculture intervention had three principal components: distribution of seeds and tools, agriculture production training, and FFS (training and demonstration plots on model farmer land). Almost all (97 percent) households had a member participate in the FFS. As a result, we cannot measure the effect participation in the FFS may have on dietary diversity. Alternatively, two other project activities that household members participated in were agricultural production training and planting seeds that they received from PUI. Almost all households (98 percent) participating in the survey had a household member that participated in agricultural production training.

Additionally, almost all households (98 percent) that had an eligible woman received seeds. Of those households, nearly 88 percent planted their seeds, with 66 percent planting more than half of their seeds. The mean number of seed varieties households with a participating woman received was 3.63, with tomato (60 percent) and pepper (61 percent) being the most common type of seeds received.

In bivariate analyses, planting more than half of the seeds received was positively associated with MDD-W. Planting more than half of the seeds received was associated with a 56 percent increase in MDD-W. There was a negative but not statistically significant association with MDD (table 10). After adjusting for household factors, planting more than half of the seeds received no longer had a statistically significant association with MDD-W (table 11). We did not conduct a multivariable analysis for MDD due to the small sample size.

Table 10. Bivariate Association of Dietary Diversity by Quantity of Seeds Planted, Cameroon

Quantity of Seeds Planted	MDD-W* ¹				MDD ¹			
	Less than 5 food groups (n=17)		More than 5 food groups (n=55)		Less than 5 food groups (n=15)		More than 5 food groups (n=17)	
	%	n	%	n	%	n	%	n
Half or less	59.09	13	25.00	15	16.67	3	42.86	9
More than half	40.91	9	75.00	45	83.33	15	57.14	12

*Significant at p<.05

¹ n=82 for MDD-W; n=39 for MDD

Table 11. Association between Women’s Dietary Diversity and Quantity of Seeds Planted, Adjusted for Household Factors, Cameroon

Planted More Than Half of the Seeds Received by PUI ¹	Crude Prevalence Ratio (95% confidence interval [CI])	Adjusted Prevalence Ratio (95% CI) ²
MDD-W	1.56 (1.08–2.25)*	1.29 (0.91–1.83)
MDD	0.59 (0.35–1.02)	N/A

*Significant at p<.05

¹ n=82 for MDD-W; n=38 for MDD

² Adjusted for the following: total social support, total number of crops grown, total area of crops grown, types of agriculture practiced, household size, head-of-household status, household monthly income, household monthly food expenditure, Coping Strategy Index, household experience of shocks, head-of-household marital status, and whether the household has a vulnerable member.

We examined the percentage of women and children consuming food groups that did and did not receive seeds in that food group. The proportion of women consuming those foods was higher for households that received the seeds than for households that did not receive the seeds, implying that receiving seeds increased women’s consumption of those foods. Similar to the women, a greater proportion of children in households receiving certain types of seeds consumed those foods than children living in households that did not receive the seeds.

We do not know the baseline levels of dietary diversity among participants, so we cannot infer an increase in dietary diversity resulting from the intervention. In addition, we do not know the proportion of each seed variety participants planted.

In qualitative interviews, participant farmers reported using the seeds PUI provided in several ways: sown during the off-season, saved to grow during the rainy season, consumed, sold, or gifted. Most informants reported planting the seeds they received. Those who did not plant any or all of the seeds they received from PUI did not primarily because they received the seeds late.

Informants reported learning about a range of agricultural production topics during training and the FFS, including soil fertility management, pest control, land preparation, and planting techniques. Most informants explicitly reported adopting new agricultural practices, most commonly including making and applying organic fertilizer and organic pesticides. Informants largely reported success trying these new agricultural practices and using the seeds PUI provided.

Informants reported several types of benefits that resulted from the PUI support that demonstrate multiple agriculture-nutrition pathways at work that may have influenced informants’ diets and the diversity of foods they consumed. Some informants reported an increase in yields resulting from the

agricultural practices they adopted after the PUI training and the additional seeds they received from PUI. The increase in yields improved access to food through production, according to informants. A few noted that this increased access allowed them to purchase different foods because they no longer had to purchase the ones they grew. A few households also increased crop sales due to increased yields. For example, one male informant explained:

Apart from daily food, with the Première Urgence project, there are also the [food] varieties that we continued to buy as needed. As soon as we produce a certain quantity, we bring it to the market. We buy other foods that we would not eat before, such as meat. We change our food from time to time thanks to the project.

South Sudan

The South Sudan interventions had four principal components: distribution of seeds and tools, agricultural production training, distribution of fishing equipment, and demonstration plots. Overall, just over one-third (33.7 percent) of respondents reported participating in any agricultural activity. The two most common types of activities were receiving seeds from FAO or an NGO (13.8) and receiving fishing equipment from FAO or an NGO (14.9). The most common types of seeds reported to have been received from FAO or an NGO were sorghum and maize.

Participation in any agricultural activity was positively associated with MDD-W among women (table 12). The prevalence of MDD-W was about 9 percent higher among women who had participated in agricultural activities than among women who had not participated in any agricultural activity in adjusted statistical models. Among children, the prevalence of MDD was about 11 percent higher among children in households that had participated in agricultural activities than among children in households that had not participated in any agricultural activity, but this difference was not statistically significant. Household Dietary Diversity Scores (HDDSs) were also significantly higher in households that participated in agricultural activities, with a 0.2 point mean difference in scores between groups.

Table 12. Prevalence of MDD-W and MDD by Participation Status*, South Sudan

	Participant	Nonparticipant	Adjusted Prevalence Ratio/ Mean Difference
% meeting MDD-W	32.6	29.4	1.09 (1.01, 1.16) ¹
% meeting MDD	26.4	21.9	1.11 (0.99, 1.24) ²
Mean HDDS	4.60	4.13	0.22 (0.10, 0.35) ³

* N=14,215

1. Adjusted for covariates that were significant in bivariate models at $p < 0.1$: woman's age, total number of household assets, family size, proportion of income spent on food, most important source of food and income, proportion of food that comes from own production, having a distressed family member, having a family member part of a social group, distance to market, and HDDS.

2. Adjusted for covariates that were significant in bivariate models at $p < 0.1$: household hunger score, child age, total number of household assets, proportion of income spent on food, most important source of food and income, proportion of food that comes from own production, having a family member part of a social group, distance to market, and HDDS.

3. Adjusted for covariates that were significant in bivariate models with MDD-W at $p < 0.1$: woman's age, total number of household assets, family size, proportion of income spent on food, most important source of food and income, proportion of food that comes from own production, having a distressed family member, having a family member part of a social group, and distance to market.

Crop diversity was low overall. However, there were some notable differences in dietary patterns between those who planted certain types of crops and those who did not. Women and children were more likely to consume a food group if they planted a crop variety in that same food group. Among those who planted crops other than staple grains, roots, or tubers, women and children had a higher prevalence of MDD-W and MDD. This difference was found regardless of the seed source. These results suggest that planting crops other than staple grains and tubers is associated with greater dietary

diversity. While the source of seeds did not appear to matter, the provision of seeds from FAO or an NGO¹¹ may have enabled a greater proportion of households to plant the crops for which they received seeds than otherwise would have.

Research Question 4: Household-Level Factors Associated with Dietary Diversity

The fourth research question was, “Which household-level factors are associated with the dietary diversity of women of reproductive age (18–49 years) and children (aged 6–23 months) in complex emergency contexts?” To answer this question, we used quantitative data from the household surveys. For Cameroon, we also used qualitative data from interviews with participants.



Key Messages

- In Cameroon, bivariate analyses showed that household size, quantity of seeds planted, and mother’s social support were positively associated with MDD-W. Child’s age, mother in a monogamous marriage, and number of shocks experienced were positively associated with MDD. The qualitative data show that food access at the household level influences diets, while household coping strategies, food preferences, and perceptions of “good” foods differentially influence women’s and children’s diets.
- In South Sudan, a few household factors were shown to be associated with dietary diversity of both women and children, including having a household member who was part of a social group and the proportion of food that comes from own production.
- The factors that were associated with women’s and children’s dietary diversity varied between contexts. Several factors were associated with women’s and children’s dietary diversity in both studies, suggesting the importance of addressing context-relevant factors to help improve dietary diversity.

Cameroon

We explored bivariate associations between MDD-W and MDD and household characteristics (table 19 in annex 4). In Cameroon, household size was significantly associated with women’s dietary diversity. Women who met MDD were more likely to live in a larger household (mean=9.27 members; SD=3.98), which can be explained by the positive effects larger households (resulting from the presence of grown-up children and/or polygamy) can have on the increased availability of labor for agricultural production. Other household factors, such as food security status, income, and number of household shocks experienced were not significantly associated with MDD-W.

Children with MDD were more likely to be older (mean [SD] age, 16 [4.88] months) and have a mother who was married monogamously (50 percent) and less likely to have a mother in a polygamous union (25 percent) and live in a household that experienced more household shocks (mean [SD], 3.62 [2.80]) compared with children who did not meet MDD (table 20 in annex 4). It seems counterintuitive that a child with MDD was more likely to live in a household with more shocks, but this may be because households experiencing more shocks received more assistance than those that did not experience shocks; it may also reflect a measurement issue with the timing of shocks (the recall period for shocks

¹¹ The FSNMS did not collect data on receipt of seeds from ELRP specifically. Therefore, receipts of seeds from FAO or an NGO could include support from other projects.

was the past six months, while the dietary recall period was the previous 24 hours). Other household factors such as food security status and income were not significantly associated with MDD.

In qualitative interviews, male and female informants described how food access, coping strategies, and food choices influenced women's and children's food consumption. Households sourced food from both agricultural production (e.g., red [finger] millet, sorghum, maize, onion, okra, tomatoes, sorrel, and beans) and market purchases (e.g., meat, fish, rice, pasta, groundnuts, beans, and oil). Seasonality has a strong influence on food access. Food access is greater after the main rainy season harvest and decreases toward the end of the dry season, when households have to purchase more food. Most informants, whether or not they were from households with women who met MDD-W, discussed how limited access to food, whether from their own production or from purchases, constrained their dietary diversity. One way informants said they cope with food insecurity is by purchasing less expensive foods, which constrains the diversity of family diets during times of food insecurity. Most informants said that when they experience food insecurity, they prioritize children, so parents consume less so that they do not have to reduce the amount of food they feed their children. Both mothers and fathers described making this sacrifice for their children because the children need the food more than the adults do. Intrahousehold allocation did not seem to favor men consistently over women, as may be expected, but gender inequality is often internalized, so informants may not have described intrahousehold allocation as being unequal if it aligned with cultural norms.

Food preferences and what was seen as “good” foods also shaped food choices within the constraints that households faced. Some informants saw diversifying food day-to-day, particularly what was eaten as the sauce or side dish (i.e., starchy staples), as part of what it means to eat well. “Good” foods were described as meals containing meat, such as chicken, fresh fish, or rice for adults. When we asked what foods women would like to eat if they could choose, they primarily described meals with rice, including fresh fish with rice, meat with rice, and rice and beans. During pregnancy, women particularly wanted to consume these good foods and also desired specific foods—for example, sour foods, such as sorrel and fruit. When we asked about children's food preferences, female informants primarily said that they like starchy foods, such as porridge, spaghetti, and rice. A few other foods women noted that children like are milk, sorrel, and fish. Good foods for children were seen as milk, porridge or enriched porridge, rice, and fresh fish. Informants primarily discussed feeding children starchy foods, such as porridge, which they saw as foods that are good for children and that children like.

South Sudan

In South Sudan, factors that were associated with MDD-W in both bivariate and multivariable analyses included woman's age, total number of assets owned by the household, household size, proportion of household expenditures spent on food, most important source of food and income, proportion of food that comes from own production, household member who is part of a social group, distance to market, and HDDS (table 21 in annex 4). Having a distressed family member was significant in bivariate but not multivariate analyses. These are only associations, however, so these relationships may be confounded by other factors that could not be controlled for in this study.

The adjusted associations show that total asset ownership and larger household size were both positively associated with MDD-W. With an increasing asset score, there was a 2 percent increase in MDD-W. Similarly, there was a 2 percent increase in MDD-W with each additional person living in the household. Conversely, woman's age was negatively associated with dietary diversity: for each one-year increase in age, there was a 1 percent lower prevalence of MDD-W.

Source of household income was also associated with MDD-W. Considering agricultural income as the reference category, households whose primary source of income was from the sale of alcoholic beverages, unskilled casual labor, skilled labor, sale of firewood, fishing/sale of fish, and gathering wild food/hunting had a significantly lower prevalence of MDD-W. Those without access to land for their own food production may need to spend a greater proportion of their income on food. Indeed, the

proportion of household expenditures spent on food was negatively associated with MDD-W. Those who spent 65 percent to 75 percent of their expenditures on food had a 13 percent lower prevalence of MDD-W compared with those who spent less than 50 percent. In this context, although agricultural income appeared to be associated with relatively greater dietary diversity scores, there was an inverse, U-shaped relationship between the proportion of food from their own production and MDD-W. Using less than 50 percent as the reference category, those with 50 percent to 65 percent or 65 percent to 75 percent of food from their own production had a 7 percent to 9 percent greater prevalence of MDD-W. Conversely, those with more than 75 percent of food from their own production had a 13 percent lower prevalence of MDD-W. This finding may be because those who are wholly reliant on subsistence agriculture are unable to supplement their diets with a greater variety of foods obtainable through markets. It is also worth noting that for households that relied on support from family/friends and food assistance programs as their primary source of household income had a lower prevalence of MDD-W compared with agricultural households. Agricultural households were likely better off because of land ownership and other resources than households that were reliant on food assistance programs, which may be part of the reason why agricultural households may have had greater dietary diversity. It is also likely, however, that food assistance programs are not providing sufficient access to fruits and vegetables or animal-source foods, the types of food groups that would lead to improvements in dietary diversity scores.

Having a household member who was part of a social group was associated with an 18 percent greater prevalence of MDD-W. Social groups included community organizations, farmers' associations, savings groups, youth groups, mothers support groups, and health committees. These organizations may enable households to become better connected to support systems, information, and other resources. In addition, organized groups such as these are likely used to target the FFSs and cascade trainings for agricultural production practices.

There were some unexpected associations in these analyses. Distance to market was positively associated with dietary diversity. Those who lived within a 15-minute walk of the market were considered the reference category and had the lowest dietary diversity scores. This finding might be related to those households having a greater dependence on nonagricultural activities for their livelihoods or possibly, being poorer. One might expect that households living outside the immediate vicinity but still near markets would be relatively better off. This was true to some degree, but with those living 30 to 60 minutes from market having 15 percent greater prevalence of MDD-W, the highest prevalence was among those who lived a one- to two-hour walk from the market (22 percent greater prevalence compared with the reference category). Those living farther away from a market may be more likely to depend on their own production. It was also unexpected to find no association between household food insecurity, as indicated by the household hunger score, and MDD-W; nor was there an association with household residency status.

Child's age, total number of assets the household owns, proportion of food that comes from own production, a household member who is a part of a social group, and HDDS were all associated with MDD in bivariate and multivariate analyses (table 22 in annex 4). Child age was positively associated with MDD. For each month of age increase, there was a 3 percent increase in the prevalence of MDD. This pattern is seen consistently across studies: as infants age, they are gradually introduced to a wider variety of family foods.

Some patterns of relationships with MDD differed from those described above for MDD-W. For example, household size was not associated with MDD, nor was there a consistent pattern with primary source of income. MDD did not differ significantly between many of the nonagricultural forms of household income (e.g., skilled or unskilled labor, sale of firewood or alcohol, traders, or salaried work) compared with households reliant on agricultural income. Also, in contrast to the patterns observed

with MDD-W, there was not a strong association with the proportion of household income spent on food or an association with distance to market.

We observed some important similarities with the patterns observed with MDD-W—specifically, that a high proportion (>75 percent) of food from own production was associated with a 30 percent lower prevalence of MDD compared with households with less than 50 percent of food from their own production. This finding may be the result of burdens on women’s time: if they need to devote significant time to agricultural production, there may be less time for caregiving and infant feeding. This issue may be further compounded by the high proportion of female-headed households with reportedly low levels of social support. Also, the prevalence of MDD was lower in households reliant on livestock (17 percent lower), fishing (51 percent lower), or hunting/gathering (47 percent lower) compared with agricultural households. Household membership in a social group was associated with a 19 percent higher prevalence of MDD. Finally, children in households reliant on food assistance had a 16 percent lower prevalence of MDD compared with agricultural households. Although this finding was not statistically significantly different, the pattern mirrored that seen for MDD-W among women and underscores the likely lack of food group diversity within food assistance programs or may be a symptom of poverty.

Research Question 5: Association between Dietary Diversity and Maternal Social Support

The fifth research question was: “What is the association between maternal social support and meeting MDD among women of reproductive age and children?” As with the other questions, we used household survey data to answer this question. Both studies used social support measures that measure functional social support, including emotional, instrumental, and informational support. However, the scores from the two surveys are not directly comparable because the measure used in Cameroon uses Likert scale questions and the measure used in South Sudan uses binary questions.¹²



Key Findings

- In Cameroon, women’s social support was positively associated with MDD-W but not with MDD. The magnitude of the association was minimal but indicates an area that will benefit from further study. In qualitative interviews, female informants primarily reported receiving support from their husbands, and some also received support in the form of food or money from other family members or food from neighbors. They primarily reported a need for more material support, such as cash or food, to help provide for basic needs, which would also help relieve their worry and anxiety.
- In South Sudan, among a study sample with a high portion of female-headed households in an emergency context, women’s perceived social support was low. Social support was not associated with MDD-W or MDD; however, this is likely affected by the low levels of social support overall.
- In both studies, women experienced low levels of social support. In Cameroon, women’s social support was positively associated with MDD-W. This is an area that warrants further study.

Cameroon

Women in Cameroon reported low social support, with a mean social support score of 26 out of a total possible score of 50 (table 13). This mean score indicates “low” support following most scale interpretations. The mean score of women’s self-report for each factor related to social support did not

¹² This difference reflected the need of the FSNMS to be as simple as possible due to enumerator capability and translation challenges.

go above 3, which meant that a woman reported receiving some support in that area but would like more. Overall, women reported receiving some social support, but they would like to receive more in all aspects of social support

Table 13. Mean Score of Each Factor of Women’s Social Support (Possible Range: 1–5), Cameroon

Social Support Factors	Mean (SD)
Having people care about her	2.64 (0.94)
Having love and affection	2.74 (0.91)
Having someone to talk to about problems at work or with housework	2.56 (0.91)
Having someone trusted to talk with about personal and family problems	2.54 (0.96)
Having the chance to talk about money matters	2.21 (1.08)
Receiving invitations to go out and do things with others	2.61 (0.94)*
Receiving helpful advice on important things in her life	2.69 (0.94)*
Help when she’s sick	2.46 (1.06)
Help with household chores	2.55 (1.22)
Participating in making decisions about the education of children	2.65 (1.03)
Total social support score	25.65 (7.09)

In Cameroon, women’s social support was positively associated with MDD-W both in the bivariate and multivariable analyses. In the multivariable analysis, while adjusting for household factors based on the existing literature, we found that, for each one-point increase in women’s social support, there was a 2 percent increase in the prevalence of MDD-W. While minimal, this positive association indicates the need for further study. There was a positive but not statistically significant association between maternal social support and MDD (table 14). We did not conduct a multivariable analysis for MDD due to the small sample size.

Table 14. Association between MDD-W and MDD and Maternal Social Support Score Adjusted for Household Factors, Cameroon

Total Social Support ¹	Crude Prevalence Ratio (95% CI)	Adjusted Prevalence Ratio (95% CI) ²
MDD-W	1.02 (1.01–1.03)*	1.02 (1.00–1.04)*
MDD	1.01 (0.96–1.05)	N/A

*Significant at p<.05

¹ n=82 for MDD-W; n=38 for MDD

² Adjusted for the following: quantity of seeds planted, total number of crops grown, total area of crops grown, types of agriculture practiced, household size, head-of-household status, household monthly income, household monthly food expenditure, Coping Strategy Index, household experience of shocks, head-of-household marital status, and whether the household has a vulnerable member.

South Sudan

Overall, women felt low social support, with a mean score of 13 out of a total possible score of 20 (table 15). On average, women wanted more support than they received. A total of 70 percent of

women scored in the lowest category (score <16 points), while 21 percent scored in the moderate social support category (16–19 points). Only 9 percent of women scored in the highest category (20 points). The two questions with the lowest scores were having help with money in an emergency and having help with transportation when needed.

Table 15. Mean Score of Each Factor of Women’s Social Support (Possible Range: 0–2), South Sudan

Social Support Factors	Mean (SD)
Visits from friends and neighbors	1.4 (0.68)
Receives useful advice about important things	1.4 (0.68)
Having someone trusted to talk with about personal and family problems	1.4 (0.67)
People who hope you are doing well	1.5 (0.66)
Feeling loved by family	1.7 (0.56)
Husband and family show/tell they are thankful	1.5 (0.62)
Help with household chores	1.3 (0.76)
Help with money in an emergency	0.7 (0.83)
Help when transportation needed	0.8 (0.82)
Cared for when sick at home	1.4 (0.70)
Total social support score	13.0 (4.4)

Overall, social support was not significantly associated with MDD-W or MDD in crude or adjusted models (table 16). The levels of social support in this humanitarian emergency context may have been too low to have seen an association with dietary diversity. Women who participated in agricultural activities had a slightly lower social support score (mean [SD], 12.8 [4.6]) compared with nonparticipants (mean [SD], 13.0 [4.4]). This finding may reflect reverse causality in that participants were selected on the basis of their vulnerability. It is worth noting that while this finding was not significant, membership in a social group was found to be positively associated with MDD-W and MDD under research question 4.

Table 16. Association of Social Support with MDD-W and MDD, South Sudan

	Crude Prevalence Ratio (95% CI)	p-Value	Adjusted Prevalence Ratio (95% CI)	p-Value
MDD-W	1.00 (0.99–1.01)	0.77	1.00 (0.99–1.01) ¹	0.950
MDD	1.00 (0.98–1.02)	0.99	1.00 (0.98–1.01) ²	0.637

1. Adjusted for covariates that were significant at $p < 0.1$ in bivariate analyses with MDD-W. These are woman’s age, total number of household assets, family size, proportion of income spent on food, most important source of food and income, proportion of food that comes from own production, having a distressed family member, having a family member part of a social group, distance to market, HDDS, and participation in the intervention.

2. Adjusted for covariates that were significant at $p < 0.1$ in bivariate analyses with MDD. These are household hunger score, child age, total number of household assets, proportion of income spent on food, most important source of food and income, proportion of food that comes from own production, having a family member part of a social group, distance to market, HDDS, and participation in the intervention.

Chapter 4. Discussion and Conclusions

Discussion

Although the methods and sampling frames were different across the two studies, we found that **women’s dietary diversity is positively associated with participation in agricultural activities in both Cameroon’s and South Sudan’s complex emergency contexts.** The qualitative data from Cameroon also suggest that most informants reported that participating in the project helped improve their agricultural practices and access to food through their own production and increased incomes from crop sales or money saved from reduced purchases resulting from increased production. Women and children were more likely to consume certain foods when their households received those seeds from the project than when their households did not receive those seeds.

A key priority in complex emergencies is to protect, promote, and maintain food production to reduce food insecurity. It is important to maintain agricultural production while also reducing the need for external resources to feed communities and meet their persistent food security needs. These findings suggest that agricultural interventions are good investments in complex emergency contexts not only to maintain food production and reduce food insecurity but also as a means to improve MDD-W. Dietary diversity is important because it is positively associated with nutrient adequacy—the ability of the diet to meet all essential nutrient requirements (Arimond et al. 2010; Steyn et al. 2006). In addition, improved dietary quality among women is associated with lower odds of anemia and low mid-upper arm circumference, an indicator of undernutrition (Bromage et al. 2021).

The finding that women’s dietary diversity is positively associated with participation in agriculture activities is also important because the vast majority of emergency food assistance programming prioritizes protecting food access and meeting basic food needs, and there has been little shift to prioritize dietary diversity in complex emergency contexts. Moreover, there is little evidence to date that interventions in emergency contexts can improve diet diversity. Our findings fill some of this evidence gap and suggest that women’s dietary diversity can improve in complex emergency contexts with targeted interventions that go beyond providing food assistance and meeting basic needs. This evidence can contribute toward shifting the paradigm to prioritizing dietary diversity in complex emergency contexts.

At the same time, **we did not see significant associations between agriculture interventions and children’s dietary diversity across the two studies.** In Cameroon, this may have been due to the small sample size. It could also relate to a range of mediating factors, including the degree of program exposure, seasonality, agroecological zone, women’s empowerment, and market access (Ruel, Quisumbing, and Balagamwala 2018). And it also may reflect the possibility that agriculture interventions can have the unintended consequence of increasing women’s time and labor burden with farming needs, thereby reducing the time they have available to provide for optimal care for young children (Ruel, Quisumbing, and Balagamwala 2018; Johnston et al. 2018). This may be particularly true in South Sudan, where female-headed households are common and there may be few other caregivers. Among households with very young children, this suggests the need for increased and targeted efforts to improve infant and young child feeding practices in addition to improving food access through agriculture.

Improving women’s dietary diversity can be challenging because women are often the last to benefit from efforts to improve household dietary diversity, and often, household diet has to improve for women’s diets to improve in tandem. In this sense, seeing improvements in women’s dietary diversity in a complex emergency suggests that improvement is possible, particularly in cases where households plant diverse crops. We found a positive association between the use of seeds received from the projects for the production of crops for MDD-W. For South Sudan specifically, we observed that there

was a higher prevalence of consumption of pulses (among women) and legumes, nuts, and seeds (among children). There was also a small increase in the prevalence of consumption of vitamin A-rich vegetables and other vegetables (among women). This finding mirrored what was seen with individual types of seeds households received in South Sudan. However, as noted in this report, only a small subset of households planted diverse crops. There is literature to suggest that promotion of farm production diversity may improve household or women's dietary diversity, particularly when market access is limited (Habtemariam et al. 2021; Khandoker, Singh, and Srivastava 2022; Khonje et al. 2022). Nevertheless, there is likely a threshold beyond which further diversification may harm benefits to household income that could be gained through specialization (Sibhatu, Krishna, and Qaim 2015).

Further, nutrition-sensitive agriculture interventions have been found to be positively associated with improvements in dietary diversity, likely through a combination of behavior change communication and intentionality in the design of the program to focus on nutrition objectives (Margolies et al. 2022; Ruel, Alderman, and the Maternal and Child Nutrition Study Group 2013). In both contexts, the intervention approach may need to be flexible and tailored to specific agroecological zones. From these studies, it is difficult to provide any specific recommendations as to which agricultural interventions would be best suited to different regions because the sample size of those participating in agricultural interventions by region was too small to draw any conclusions. Despite these promising findings, overall dietary diversity remained low, especially among women and children in South Sudan, and agricultural programs only reached approximately one-third of households surveyed.

The findings from South Sudan also suggest that there will be a continued need to reach households that do not rely on agriculture for income through other types of programs. Service workers, laborers, and sales/market vendors had significantly worse dietary diversity. These groups are likely more reliant on markets to obtain most of their foods. Thus, programs should additionally consider how to move diverse foods through the food system to reach beyond agricultural households and further how to ensure affordability of these foods. Recognizing the challenges of implementing agricultural and food systems programs in emergency contexts, greater emphasis on this type of programming could potentially mitigate the impact of emergencies on dietary diversity.

Another aspect these studies examined was social support. Social support can be both a facilitator and a product of women's empowerment. Different domains of women's empowerment have been found to be associated with women's versus children's nutrition and diets in different contexts (Ruel, Quisumbing, and Balagamwala 2018). Research on women's empowerment and dietary diversity shows that women's dietary diversity is positively associated with women's empowerment (Bonis-Profumo, Stacey, and Brimblecombe 2021; Sinharoy et al. 2017; Yimer and Tadesse 2015). While study findings for Cameroon showed that maternal social support had a positive association with MDD-W and could have a positive association with MDD, our findings from South Sudan did not show any significant associations between social support and dietary diversity. However, it should be noted that overall average social support scores were very low among women in the case of South Sudan.

Although the overall findings on the association between maternal social support and dietary diversity may not be very conclusive across both these studies, other indicators of social support were associated. For instance, in South Sudan, household membership in a social group was significantly positively associated with dietary diversity among women and children. In Cameroon, statistically significant elements of social support associated with MDD-W included receiving invitations to go out and do things and receiving advice on important things in life. In both projects, respondents indicated they participated in groups such as community organizations, farmers' associations, savings groups, youth groups, mothers' support groups, and health committees. These organizations may enable households to become better connected to support systems, information, and other resources. However, the social support scale used in this survey did not capture these specific dimensions of social support because it was primarily focused on social support within the household. In emergency settings that have a high

proportion of female-headed households, there may be few options for women to feel supported within their families because men may be away from their homestead for the majority of the year. Thus, social support from external groups may be an important factor in the relationship with dietary diversity, especially in complex emergency contexts, when usual household social support may be eroded.

Across the two projects, other factors were positively associated with women's and children's dietary diversity. These factors varied by context. In South Sudan, a few household factors were shown to be associated with dietary diversity of both women and children, including having a household member who was part of a social group and the proportion of food that comes from own production. In Cameroon, women's dietary diversity was associated with maternal social support and household size, and children's dietary diversity was associated with the child's age, mother's marital status, total area of crops grown, and the number of shocks experienced.

Limitations

Both studies have some limitations. These data may reflect response and recall bias. Respondents may have answered questions in a way that they thought reflected well on the project, and they may have provided answers that they thought would help them receive project support in the future. They may also have provided responses that they considered socially acceptable, rather than reporting what they actually thought or did. It should be noted that the survey in South Sudan was administered by trained enumerators who were required to translate questions into the local languages. This challenging task may have led to differences in meaning conveyed to the respondents, which could have led to reporting errors.

Clear informed-consent scripts were used when conducting the surveys to help mitigate these risks. In the qualitative interviews conducted in Cameroon, key questions were asked in multiple ways, as needed. There may have been recall bias because some questions, such as those about agricultural production, asked informants to think back to the previous three to six months. The use of the online survey among implementing partners may have hindered staff participation because it required access to the Internet.

The South Sudan study has some important strengths. The large, nationally representative survey enables us to generalize these results broadly geographically in South Sudan. It also enables us to have sufficient statistical power to detect household factors associated with dietary diversity. However, beyond FAO, other organizations may have been carrying out agricultural activities during the same period. Because the FAO activities were carried out through implementing partners, survey respondents may have been unable to distinguish between FAO agricultural program activities and agricultural activities of other organizations; even if they were able to tell the difference, the FSNMS survey questions were not designed to allow them to make this distinction.

For Cameroon, the quantitative analysis was limited by the small sample size; therefore, the results should be interpreted cautiously. As compared to the South Sudan dataset, there was much more limited statistical power to detect associations. Here, we did not conduct multivariable analysis for MDD because of the small sample size. The qualitative data for Cameroon support the survey findings for MDD-W, and that is a strength of using mixed methods to answer these questions. However, in this instance, we were limited to analyzing data from the endline survey because the baseline did not collect dietary diversity data for women and children, and we cannot isolate the impact of the project on dietary diversity from the impact of other individual and household factors, nor determine which component of the agricultural project contributed most to dietary diversity outcomes. In addition, the endline survey focused on project monitoring and did not collect data on some additional factors that would have been useful for our analysis, such as adoption of agricultural practices, crop yields, how respondents used their harvest, postharvest losses, and women's empowerment.

Conclusions

The overall study findings suggest that agricultural interventions can improve women's dietary diversity in a complex emergency context and a short program implementation time frame. These studies also suggest that intentionally designing nutrition-sensitive agriculture programs in complex emergencies could have important benefits for nutrition outcomes by promoting diverse crop production, particularly on women's dietary diversity. It is however unclear whether increased food access can be sustained without the intervention, but respondents' reports from Cameroon of improved agricultural practices is promising for improved future yields and the reported dietary diversity associated with it after harvest, whether through the income or consumption pathway. These findings should be confirmed in other (larger) surveys and different geographies, and there should be a concerted effort to study MDD. MDD indicators are not consistently included in surveys undertaken by emergency implementing partners—be they large- or small-scale emergency responses. Given there are standard validated international indicators available to measure dietary diversity, these should be consistently included and integrated in emergency surveys and surveillance. The findings from these two studies suggest that these indicators are sensitive to change in short time frames and are therefore worth including to better track diet quality in emergency contexts. The role of social and material support for women in these contexts and the effects on nutrition deserve further study. The role of idiosyncratic shocks deserves further study as well.

Finally, our findings indicate the potential existence of a relationship between inadequate social and care environments with the outcome of inadequate dietary intake, as depicted in figures 1 and 2, described in the Conceptual Framework section of the Methodology, and presented in the drylands acute malnutrition framework (Young 2020) included in annex 1. Although household food insecurity was not related to MDD-W or MDD, the qualitative findings from Cameroon suggest that food insecurity does affect dietary intake, as described in the drylands acute malnutrition framework (Young 2020), whether that be the quantity, quality, or diversity of foods. These findings suggest that those portions of the framework may also be applicable in complex emergency contexts that are not in drylands.

Chapter 5. Recommendations

BHA, the international donor community, emergency implementing partners, food and nutrition cluster coordination, and UN organizations engaged in agricultural programming in emergency settings should consider several details for the design and implementation of these interventions. Although these considerations may not be unique to complex emergency contexts, we have found that they can be applicable in such contexts. These recommendations largely focus on the design of nutrition-sensitive agricultural programming because the design is key to making agriculture programming nutrition sensitive, which was the focus of this study. Importantly, at the outset of these studies, we were unable to find nutrition-sensitive agriculture emergency programs, though that was the original intent. We developed these recommendations based on the study findings and knowledge and best practices from USAID Advancing Nutrition’s work researching and developing guidance for nutrition-sensitive agriculture and social and behavior change (SBC).

Based on our findings, food security measures were not associated with dietary diversity. However, the definition for food security used by many practitioners indicates that “food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (World Food Summit 1996). This indicates that a shift in program design is needed to ensure that agriculture program design addresses issues of food security *and* nutrition security.

High-quality and well-thought-out project design and implementation are critical to achieving the intended outcomes. But, as shown in a recent review, the factors that affect implementation of nutrition-sensitive agriculture projects (such as timely availability of inputs and the application of best practices) are, largely, not unique to nutrition-sensitive agriculture projects (Di Prima et al. 2022).

BHA and other donors can provide and improve the specific guidance, standards, and requirements for the design and implementation of nutrition-sensitive agricultural interventions in complex emergency settings as part of the application guidance for awards they extend to implementing partners. On the other hand, implementing partners are generally well placed to ensure that appropriate tools, approaches, and methodologies for implementation and measurement are designed to be context specific and address food insecurity and nutrition-related barriers and inefficiencies that stand in the way of achieving nutrition outcomes for targeted populations.

BHA and Other Donors

- **Emphasize and prioritize the need to fund nutrition-sensitive agriculture and recommend diverse crop production in complex emergencies to improve women’s and children’s diets.** We found that among households that planted diverse, nutrient-rich crops, women’s dietary diversity improved. Agriculture projects can thus be considered appropriate to improve women’s dietary diversity within highly food insecure, complex emergency contexts. While not preferable, they can also be implemented within short time frames, provided that the project aligns with the seasonal calendar and production and harvesting cycles. The nutrition outcomes from these interventions will likely be stronger if nutrition is an explicit component of the project design and implementation, which can be made a requirement in application guidance for these types of awards. Key to this is determining the nutritional gaps in diets (e.g., gaps in consumption by food group), the main constraints related to household access to the foods that would fill the nutritional gaps, and how agricultural support could help address the nutritional gaps *and* food access constraints.

Where appropriate, complementary nutrition interventions should also be considered by implementing partners during the program design phase. During this phase, a rapid assessment or situation analysis will allow implementing partners to not only determine intervention

priorities¹³ but also ensure the appropriate timing of seasonal agricultural activities proposed. A context-specific nutrition-sensitive agricultural project that takes into account seasonality for production and market availability during different seasons could provide inputs and training to address the constraints farmers face producing specific nutrient-rich foods that are lacking in their diets. However, the provision of inputs, through for instance seed intervention activities, should be accompanied by participatory rapid needs assessments using existing tools, such as the Seed System Security Assessment. Emphasis should be placed on the production of nutrient-rich foods coupled with SBC approaches that promote the consumption of such foods. Formative research approaches, such as trials of improved practices, can be used to design SBC strategies to support consumption of those foods by nutritionally vulnerable household members. In instances where agricultural production cannot adequately address dietary needs or nutritional gaps, market-based approaches like cash and vouchers should be considered if markets are functioning and accessible. Otherwise, other nutrition interventions can be provided alongside nutrition-sensitive agriculture, such as micronutrient powders or lipid-based nutrient supplements (Ruel, Alderman, and the Maternal and Child Nutrition Study Group 2013; Ruel, Quisumbing, and Balagamwala 2018).

- **Evaluate the appropriateness of agricultural activities to improve diets.** When evaluating emergency applications with nutrition-sensitive agriculture objectives, consider whether the agricultural activities proposed are indeed nutrition sensitive and likely to improve diets in the specific context. This can include considerations relating to different socio-economic and cultural factors, local agro-ecologies and production systems, as well as market environments that can influence nutrition outcomes but often differ greatly depending on the emergency setting. The theory of change statement in the application should provide logic for how the agricultural activities are nutrition sensitive and will improve diets; it should also include both crop-based interventions and animal-source food production efforts. This shift requires developing objectives and hypotheses that go beyond improving food security. Context-specific data and information on the nature, extent, magnitude, and severity of different types of nutritional problems, as well as their causes, resources, and how they are changing over time, is essential for the development, implementation, monitoring, and evaluation of effective programs to improve nutrition. The response analysis that implementing partners conduct should also provide justification for the design of the nutrition-sensitive agriculture programming, including timeline considerations based on production cycles and seasonality. In the context of evaluating applications, nutrition-sensitive agriculture programming is an additional tool for BHA to achieve its objectives in terms of providing supplemental nutrition assistance targeted to nutritionally vulnerable segments of the population. Nutrition-sensitive agriculture can support the same objectives as those intended by supplemental nutrition assistance by increasing food production and income as a means to improving diets.
- **Integrate and encourage the need to evaluate and prioritize multiple agriculture-nutrition pathways when designing nutrition-sensitive agriculture programs in complex emergencies.** The three main agriculture-nutrition pathways—food production, agricultural income, and women’s empowerment (Herforth and Harris 2014)—are likely relevant in complex emergencies. We found that agricultural support influenced diets through both food production and agricultural income. However, activities that influence the amount of time or labor women spend on agriculture-related tasks can affect their own health and energy expenditure, and in turn, their capacity to feed and care for infants, young children, and

¹³ In certain instances and types of emergencies, nutrition-sensitive agriculture interventions might not be considered a priority intervention. An example would be a post-hurricane emergency where fields are flooded or destroyed. In that case, and based on a context analysis, other non-agriculture interventions will likely need to be prioritized.

themselves. While our findings on social support as a factor of women's empowerment warrant further research and consideration, agriculture interventions that are implemented by creating and implementing group activities are known to potentially serve a dual purpose: improving agricultural practices and serving as a social network that provides women with social support. More intentional efforts to engage women could be beneficial for increasing and improving dietary diversity, including considerations of increased women's labor, which could have a negative impact on MDD and other aspects of child care. Actions to improve social care among vulnerable populations will be most successful if they are sensitive to the particular needs and traditions of a local community and targeted households. As such, understanding the situational complexities and interplay of cause-and-effect considerations to achieve nutrition outcomes along the agriculture-to-nutrition pathways is crucial for the successful design and implementation of nutrition-sensitive agriculture programming. For more guidance on nutrition-sensitive agriculture programming design, please see USAID Advancing Nutrition's [Designing Effective Nutrition-Sensitive Agriculture Activities Workshop: Facilitator's Guide and Slides](#). This design guide was developed for programs in development settings, but many elements will be useful and applicable for emergency settings, as well.¹⁴

- **Incorporate indicators related to nutrition-sensitive agriculture.** Ensuring that programs are intentionally designed with a nutrition-sensitive focus is essential to achieve positive outcomes along the agriculture-to-nutrition pathways. However, being able to properly monitor and measure the related nutrition outcomes will be necessary to capture achievements and improvements, such as enhanced dietary diversity among women of reproductive age and children. The use of nutrition-related indicators for measuring outcomes from nutrition-sensitive agricultural interventions should be standardized as part of the application guidance. This inherently means that survey tools for baseline and endline studies that measure project outcomes will have to be designed accordingly. At the same time, it is important to follow through on these nutrition goals and targets by establishing indicators to measure the outcomes of nutrition-sensitive agriculture efforts. The *Nutrition-Sensitive Agriculture Design Guide* provides guidance on the steps involved in the design of such nutrition-sensitive agricultural programs, as well as indicators for six key nutrition outcomes (please see USAID Advancing Nutrition's [Designing Effective Nutrition-Sensitive Agriculture Activities Workshop: Facilitator's Guide and Slides](#)). In addition, the comprehensive [Compendium of Indicators](#) (FAO 2016) can be referenced as a resource for indicators that programs should consider to measure nutrition-sensitive agriculture program outcomes.
- **Require the integration of the women's dietary diversity measures into food security and nutrition survey modules.** Women's dietary diversity was integrated into the population-based FSNMS in South Sudan for the purposes of this secondary analysis. The study shows MDD-W is a meaningful indicator that is sensitive enough to detect effects of agricultural interventions. Given that this is now a well-established indicator, it should thus be integrated in survey modules conducted by implementing partners. It would be particularly valuable, like in the case of South Sudan, to incorporate the MDD-W indicator *into* national surveys as a metric for monitoring food security and nutrition in complex emergency contexts. Being able to capture nutrition-specific outcomes will allow programs to take this into consideration when designing interventions while strengthening nutrition monitoring efforts at the same time.
- **Consider longer-term emergency program cycles.** While certain emergency interventions merit short-term interventions only, those implemented in complex protracted

¹⁴ Several implementing partners working in humanitarian contexts or implementing programs with crisis affected vulnerable populations have already shown a keen interest in this design guide, and some of these partners participated in the design guide training of trainers and/or are part of the USAID Advancing Nutrition facilitate design guide community of practice.

crisis settings will likely benefit from a longer implementation period. This is particularly true for the agricultural components of emergency programs, given that agricultural production and market interventions, and their related outcomes, are highly seasonal. Short-term agriculture interventions often only allow for one production cycle (i.e., season) to be supported, yet the range of preproduction planning, seed acquisition, and land preparation, as well as postproduction harvesting, conservation, transformation, and marketing activities stretch well beyond the limited implementation timelines most emergency programs are allotted. In the findings from our study, the implementing partners (as well as program beneficiaries in Cameroon) consistently referenced that the short project cycle is a major implementation challenge. BHA is currently pursuing a pilot multi-year emergency (MYE) program in South Sudan (as well as Nepal and Ethiopia) for which the outcomes should be considered for further study (LASER PULSE 2022). Longer-term emergency interventions in protracted crisis situations can potentially help populations move beyond relief assistance to longer-term recovery. MYE activities may also mitigate the impact of shocks, prevent the erosion of household assets and livelihoods, and accelerate recovery—contributing to the future resilience of affected farming households and communities. Multi-year commitments and relationships will also allow for deepened engagement, capacity building, and longer-term impact while allowing donors to consider new types of (local) partnerships. In addition, multi-year funding will allow (local) implementing partners to ensure job security for their technical and operational staff to retain staff capacity. This will create opportunities for greater operational efficiencies for emergency response implementation and, more importantly, support a paradigm shift in emergency programming from a basic-needs focus on surviving to thriving. Finally, this shift is also in line with donor commitments to longer-term funding in the Grand Bargain commitments.

Emergency Implementing Partners, Cluster Coordination, and UN Organizations

- **Engage through the global and local Food Security Clusters as multidisciplinary teams with a multi-sectoral approach to ensure the inclusion of nutrition in food security implementation.** While implementing partners and coordinating agencies across humanitarian and development assistance programs are encouraged to apply multidisciplinary planning and multi-sectoral program design principles, the reality is often different. Nutrition programs are often still nutrition specific in focus, and agriculture programs may be designed to address food security, but they often lack a nutrition-sensitive focus. The Global Nutrition Cluster strategy (2022–2025) places much emphasis on the need for capacity-building efforts for nutrition personnel at the national and subnational levels, but it does not focus specifically on capacities of non-nutrition personnel. As a result, there is a risk that a multi-sector approach to nutrition in emergency program design is undermined. While the global Food Security Cluster strategic plan (2020–2022) does discuss the need to collaborate and ensure efforts are multi-sectoral, its focus remains on food security, not on nutrition security per se. While the inter-cluster nutrition working group (which consolidates efforts of the global Nutrition and Food Security Clusters) hopes to address the need to collaborate across sectors, these efforts are not always fully operational at the field level. Similarly, within humanitarian assistance projects, implementing partners and UN organizations’ interventions are generally organized by technical components. This risks further compartmentalization of program implementation and forms a barrier to cross-sectoral collaboration and complementarity within a program. The USAID Multi-Sectoral Nutrition Strategy (USAID 2016) and the Scaling Up Nutrition Movement¹⁵

¹⁵ As part of this commitment to supporting good nutrition in humanitarian contexts, the SUN Movement established a new Convergence Hub in 2022 that specifically accommodates the needs of fragile and conflict-affected SUN countries, in addition to those countries not served by SUN’s regional hubs. Thirteen SUN countries currently form the Convergence Hub. Ten of these are on the 2020 Organisation for Economic

Strategy 3.0 (SUN 2020) provide important strategic guidance for the design of such efforts at global, national, and subnational levels that emphasizes the engagement of national governments in addition to humanitarian and development partners. Multi-sectoral collaboration also includes sharing of data and lessons learned to inform decisions and facilitate change that might be needed to adjust results monitoring and adapt program implementation in real time. By actively engaging expertise from multiple sectors (including health/nutrition, agriculture, WASH), implementing partners can leverage knowledge, reach, and resources, benefiting from their combined and complementary strengths as they work toward the shared goal of producing specific nutrition outcomes.

- **Bring nutrition goals to the forefront of the design of agricultural programs.** Nutrition-sensitive agriculture interventions are most likely to have impacts on dietary diversity when there is an explicitly stated intent to achieve nutrition-related objectives (Margolies et al. 2022). The foundation for this can be laid through clearly established nutrition goals and targets, which are reflected in a program’s theory of change. At the same time, it is important to follow through on these nutrition goals and targets by establishing a results framework that incorporates a set of comprehensive indicators to measure the outcomes of nutrition-sensitive agriculture efforts. The *Nutrition-Sensitive Agriculture Design Guide* provides guidance on the steps involved in the design of such nutrition-sensitive agricultural programs and provides suggestions for outcome indicators (please see USAID Advancing Nutrition’s [Designing Effective Nutrition-Sensitive Agriculture Activities Workshop: Facilitator’s Guide and Slides](#)). In addition, the FAO designed the [Compendium of Indicators](#) (FAO 2016) that can be considered for measuring nutrition-sensitive agriculture program outcomes. Although this design guide and compendium were not specifically developed for programs in complex emergency settings, many of their elements will be useful and applicable for emergency settings.
- **Implement agriculture interventions in line with seasonal calendars and climatic conditions.** Given the short implementation timeline of most emergency agriculture programs, the timing of interventions is particularly important. Many short-term emergency interventions only cover one growing season, sometimes two. As a result, agricultural input distribution, demonstrations, or training should align with the seasonal calendar and crop production cycles. In addition, access to suitable land and water for production is essential to ensure that households are able to optimally benefit from these interventions. Certain interventions might not be appropriate for refugees or IDPs if they lack access to arable land. Implementing partners can consider this when conducting BHA-required response analysis.

Many geographies are subjected to the effects of climate change and experience increased climate variability, which influences food production conditions. Changes in temperatures, precipitation, growing season length, soil moisture, and pest pressures are just a few of the variables that influence agricultural productivity and agricultural management decisions that should be considered and planned for to the extent possible. It may be useful to plan to provide interventions in advance of the timing required for the typical seasonal calendar, given the variation in climate conditions resulting from climate change and the risk of disruptions to programming resulting from insecurity or other shocks.

The possibility of multi-year agricultural programming, particularly in a protracted emergency context, would enhance the planning and implementation of seasonal crop production, harvesting, and processing interventions and increase opportunities for resilience building of

Co-operation and Development list of fragile states: Afghanistan, Burundi, Central African Republic, Congo, Democratic Republic of Congo, Haiti, Somalia, South Sudan, Sudan, and Yemen. Additionally, Kyrgyzstan, Papua New Guinea, and Tajikistan are included because they fall outside the areas covered by the four SUN Movement regional hubs.

targeted populations and, as a result, would likely improve their year-round food and nutrition security.

The USAID-funded Famine Early Warning Systems Network (FEWS NET) and Climatelinks initiatives provide a number of tools and methodologies on early warning, weather forecasting, and climate screening as well as informational updates and situational analysis on food and nutrition insecurity that implementing partners are encouraged to consult during both the design and implementation of emergency response programs.

- **Standardize and integrate the women’s dietary diversity measures into survey modules.** Women’s dietary diversity was integrated into the population-based FSNMS in South Sudan for the purposes of this secondary analysis, and the results suggest that it is sensitive enough to detect associations with agricultural program activities. MDD-W is now a well-established and meaningful indicator reflecting overall dietary quality and nutrient adequacy that is important to include in monitoring food security and nutrition in complex emergency contexts. There is thus a need to review the opportunities to develop brief, standardized survey modules that can be incorporated into national surveys to better capture nutrition-specific outcomes and ensure that program design and monitoring on nutrition interventions are strengthened.
- **Integrate nutrition SBC best practices to improve children’s and women’s diets.** SBC interventions targeting improved nutrition behaviors should be included in the design from the outset because the nutrition-sensitive agriculture activities should be linked with specific nutrition behaviors. The inclusion or integration of nutrition SBC activities, even if as simple as including nutrition behavior change communication in agricultural training, can help translate improvements in agricultural production to improvements in consumption, as dietary intake is affected by factors other than just access to food from production. Approaches such as household dialogue (Farnworth and Munachonga 2010; International Rescue Committee 2013), which is a gendered SBC approach, have been used even in emergency contexts where feasible to strengthen women’s agency and joint decision-making around the use of food produced at the household level. Gender analyses that are required for emergency applications can also provide implementing partners with a greater understanding of factors influencing the women’s empowerment pathway to improved nutrition, including elements related to household decision-making about how to use harvests for home consumption or trade, how to integrate a nutrient-rich ingredient into children’s porridge, or the importance of ensuring that pregnant and lactating women consume more of a promoted nutrient-rich food. Importantly, a gender analysis¹⁶ can also help implementing partners tailor their nutrition interventions if female-headed households predominate, as in the case of South Sudan; in these contexts women may have more agency but may be more resource poor than male-headed households. The nutrition behaviors that are promoted should be tailored to the project’s nutrition goals and the agricultural support provided. For example, if a project provides iron-rich bean seeds to households, the nutrition SBC activities could promote the consumption of iron-rich beans by pregnant and lactating women. These activities could engage husbands through agricultural training to encourage keeping the beans for consumption and ensuring that their pregnant or lactating wife eats them regularly; they could engage women through cooking demonstrations so that they are comfortable cooking the new variety of beans and get the opportunity to taste them.

The USAID Advancing Nutrition guide and slides for designing effective nutrition-sensitive agriculture activities, referenced above, uses a behavior-centered approach and provides

¹⁶ A useful tool developed by CARE is the rapid gender analysis toolkit for emergency contexts - http://gender.careinternationalwikis.org/care_rapid_gender_analysis_toolkit

numerous examples for consideration. To improve dietary diversity *for* children, intentionally addressing norms and behaviors around what families feed children and how the food is prepared may be needed. For more guidance, see USAID Advancing Nutrition’s guidance on [prioritizing multi-sectoral nutrition behaviors](#), [designing complementary feeding activities](#), and [engaging family members in nutrition](#).

- **Explore other nutrition activities to improve children’s diets in complex emergencies.** Children’s diets are affected by care and feeding practices that are not necessarily related to household food access alone. Even in development contexts, nutrition-sensitive agriculture tends to benefit children less than other nutritionally vulnerable household members, in part because efforts to increase agricultural production rely heavily on women’s labor, reducing the time they have available for child care and adversely affecting nutrition outcomes (Ruel, Quisumbing, and Balagamwala 2018). This challenge may be particularly acute in female-headed households or those where the mother has few sources of social support within her household. Agricultural interventions should be designed in a manner that avoids unintended consequences for young child nutrition, including focusing on less labor-intensive agricultural practices (e.g., no-till, kitchen gardens) and crops (e.g., drought and pest tolerant crops, perennials). SBC interventions can also encourage task sharing among spouses and other household members. Other evidence-based nutrition-sensitive and nutrition-specific activities for infant and young child feeding should be considered in line with the context and needs of the population. Complementary feeding with continued breastfeeding can be particularly challenging in emergency contexts. Special attention should be given to intervention design to address barriers that prevent caregivers from providing a variety of nutrient-rich foods given in amounts, frequency, and consistency to cover the nutritional needs of the growing child. In general, complementary feeding in emergencies is an overlooked aspect of infant feeding, with greater emphasis on breastfeeding, and greater efforts are needed to improve complementary feeding to achieve young child dietary diversity. SBC interventions may need to be adapted to the emergency context and reflect the unique barriers that caregivers face in such settings. In addition, other strategies, such as the provision of specially formulated nutritious foods for 6–24-month-old children designed to fill basic nutrient gaps, also may be needed. For more guidance, see USAID Advancing Nutrition’s guidance on prioritizing multi-sectoral nutrition behaviors and designing complementary feeding activities.
- **Explore the utility of social support interventions.** The role of social support and women’s diets warrants further study and consideration in complex emergency contexts where social networks and support services have fractured or weakened. Social support can also be considered as an aspect of women’s empowerment because social support can be both a cause and a consequence of women’s empowerment. Implementing partners should consider empowerment when they conduct BHA-required gender analysis and ensure protection mainstreaming. Women’s empowerment as a pathway between agriculture and nutrition determines female energy expenditure as well as care capacities and practices, which influences both the mother and child nutrition outcomes. Understanding the dynamics of women’s empowerment and the factors that influence empowerment is essential to “getting it right” when designing nutrition-sensitive agriculture interventions. For example, providing seed for home gardening may increase crop diversification and positively influence dietary diversity for women of reproductive age. However, such interventions have the potential to negatively impact children’s dietary diversity if the increased labor burden on women’s efforts on gardening activities results in reduced child care and feeding time (Ruel, Quisumbing, and Balagamwala 2018; Johnston et al. 2018). As such, social support as a factor of women’s empowerment to reduce energy expenditure and increase caring capacity could influence nutrition outcomes.

The design of agriculture interventions should thus take into account the importance of social cohesion and social networks in crisis-affected situations, particularly given the fact that target populations of complex emergency programs are often confronted with an influx or displacement of people. Group approaches, village savings and loan groups, or mother care groups should be considered to strengthen social networks and cohesion. Nutrition SBC activities implemented through approaches such as family dialogues or fathers' or mothers' groups can also include aspects to improve social support. Importantly, the platforms to increase social support already exist in most programs through the various group activities implementing partners undertake. For more guidance, see USAID Advancing Nutrition's guidance on [engaging family members in nutrition](#).

- **Place greater emphasis on non-staple foods for greater crop diversity.** Seed interventions are often a particular focus of humanitarian aid as seed is relatively easy for farmers to use and can give quick returns. The study findings for South Sudan showed that the most common types of seeds received from FAO or an NGO were staple crops, more specifically sorghum and maize. Only a small fraction of households reported receiving seeds for legumes, nuts, seeds, fruits, or vegetables. Among the small proportion of households that did receive these types of seeds, there appeared to be higher dietary diversity scores. In Cameroon, our findings showed that planting at least half of the seeds the project provided was positively associated with the prevalence of MDD-W for women of reproductive age (18–49 years). Evidence suggests that crop diversity can translate into increased dietary diversity in some contexts (Khandoker, Singh, and Srivastava 2022). In complex emergency contexts, where there may be limited access to markets, an increased focus on legumes and vegetables to diversify homestead food production may enable households to access a wider variety of foods than would otherwise be available to them.

All implementing partners should consider the BHA-required [Seed System Security Assessment](#) to determine seed quality, availability, and accessibility when reviewing the appropriateness of seed being selected for distribution-related activities. While good seed aid can bolster farming systems, poor seed aid can increase farmers' vulnerability. For instance, seed that arrives too late or is poorly adapted wastes farmers' land and labor resources. Effective seed security responses require strategic thinking and deliberate design actions. The [Seed Emergency Response Tool](#), recently developed by Mercy Corps and SeedSystem through the Integrated Seed Sector Development Africa, provides guidance on how to make informed decisions about the choice of a seed security intervention and how best to implement it. However, seed systems in fragile states differ from seed systems in more stable environments. They need to function amid fluid situations and absorb the effects of market disruptions, displacement, and other conflict features while enabling access to a diversity of crops and varieties to support vulnerable populations. This requires assessing and understanding the context and functioning of the seed system before implementing context-appropriate interventions that, at a minimum, do no harm and, where possible, contribute to peacebuilding initiatives. Through an Integrated Seed Sector Development Africa collaboration, Mercy Corps and SeedSystem have recently developed a [Context Analysis Tool](#) to help implementers working in conflict-affected areas of fragile states quickly grasp the environment and circumstances in which seed systems function and identify practical entry points for selecting and designing seed interventions.

Further Research

Although there is a growing body of evidence on the effectiveness of agricultural interventions on improving nutrition outcomes in development contexts, there is limited research on such programs in emergency contexts. This hinders the development of evidence-based operational guidance for program implementation. Recognizing the challenges of conducting research in these difficult settings, there are,

nevertheless, opportunities to use large-scale surveys or tailor studies to assess the reach and effectiveness of agricultural programs:

- **Conduct more research on the factors influencing dietary diversity as part of agricultural programs in complex emergency contexts.** Further study of the influence of agricultural interventions on dietary diversity in complex emergency contexts would also benefit from inclusion of other factors related to agriculture-nutrition pathways (e.g., as outlined in Herforth and Harris 2014) that we did not have quantitative data for, including seasonality, crop diversity, yields, animal-source food production, use of harvested produce, women's empowerment, and mental health. Such study would help interested parties better understand which factors mediate the benefits of the project and which agriculture-nutrition pathways have the greatest potential to improve diet quality in complex emergency contexts.
- **Conduct more studies with a larger sample size or quasi-experimental design.** The associations found in this study between an aspect of the agricultural intervention and several household- and individual-level factors, including maternal social support, warrant further investigation and confirmation. To compare and supplement our study findings, additional efforts on cross-sectional studies with large(r) sample sizes or impact evaluations in other complex emergency settings are suggested. If feasible, it would also be useful to design the project and evaluation in a way that assesses the effectiveness of each agricultural component (e.g., training vs. input distribution). See the [Emergency Nutrition Network's review of emergency nutrition interventions](#) for feasible evaluation study options in emergency contexts.
- **Develop survey modules that specifically assess program activities to strengthen monitoring.** For South Sudan, the FSNMS questionnaire was not well aligned with the design of the ELRP and made interpretation of program participation challenging. In protracted crises, there may be opportunities to develop brief, standardized survey modules that can be incorporated into national surveys. Particularly in contexts where there are repeated surveys over time, such standardized data collection tools can be used to evaluate the reach of large-scale programs over time and in response to situational changes. This approach might not be feasible in shorter-term, acute crises, but the longer time horizon of protracted, complex emergencies may warrant greater investment in survey tools designed to evaluate program activities.
- **Consider conducting a study specifically designed to evaluate the effectiveness of emergency agricultural programs.** The study presented in this report used secondary data of a survey that was not explicitly designed to evaluate the program. However, a well-designed study with tailored data collection tools and a well-designed analysis strategy could provide substantial insight and target key implementation questions that could not be addressed through this analysis. Such an evaluation could also assess the effectiveness of different agricultural components (e.g., training vs. input distribution) on dietary outcomes.

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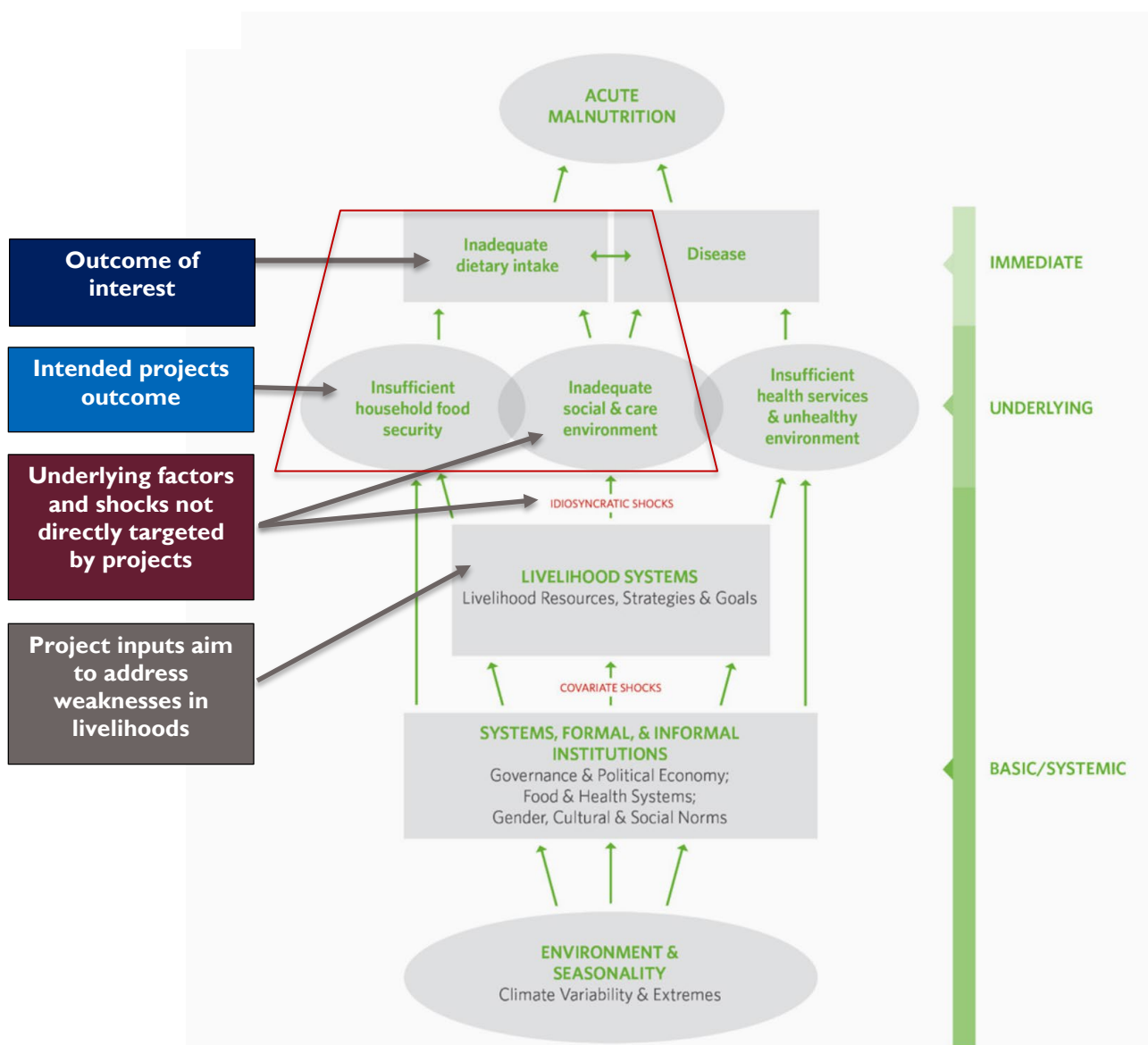
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Annex I. Acute Malnutrition in Africa's Drylands Conceptual Framework

As shown in the conceptual framework (figure 3) below, we identified the components of the framework that were directly targeted by the project and related factors that were not directly targeted by the project but may affect dietary outcomes (as shown by the colored boxes). These mediating factors are idiosyncratic shocks and inadequate social and care environment. In addition to the frameworks described in the Conceptual Framework section of the report, these elements informed the research questions and data collection instruments to develop a more comprehensive understanding of what influences dietary diversity in complex emergency contexts.

Figure 3. Acute Malnutrition in Africa's Dryland Conceptual Framework

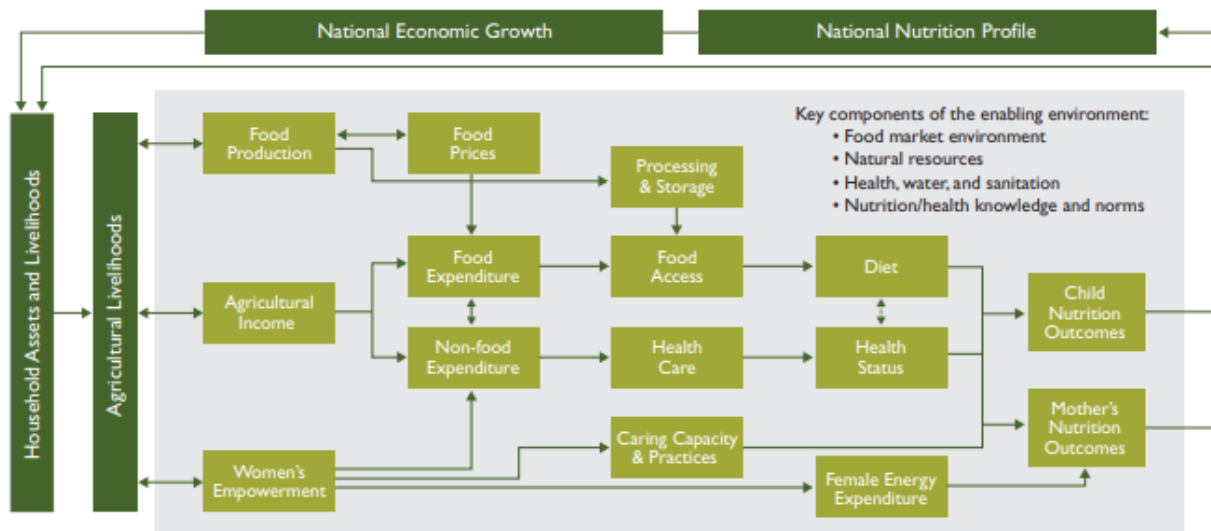


Source: Adapted from Young 2020:15

Annex 2. Agriculture-Nutrition Pathways

The agriculture-nutrition pathways framework below (figure 4) provides an overview of the ways in which agriculture can support nutrition through three pathways—food production, agricultural income, and women’s empowerment.

Figure 4. Agriculture-Nutrition Pathways



Adapted for Feed the Future by Anna Herforth, Jody Harris, and SPRING, from Gillespie, Harris, and Kadiyala (2012) and Headey, Chiu, and Kadiyala (2011).

Source: Herforth and Harris 2014

Annex 3. Household Characteristics

Table 17. Household Characteristics, Cameroon

Household Characteristic	% or Mean (SD)	No.
Woman's age, years	30.23 (8.52)	84
Child's age, months	13.05 (5.43)	40
Household size	8.78 (3.83)	84
Head-of-household status		
IDP	4.76%	4
Host	95.24%	80
Household has a vulnerable member (pregnant or lactating woman, individual with a disability, or IDP)	86.90%	73
Woman's marital status		
Divorced	3.57%	3
Married—monogamy	44.05%	37
Married—polygamy	44.05%	37
Single	3.57%	3
Widow	4.76%	4
Household monthly income, CFA franc		
<15,000	48.81%	41
≥15,000	51.19%	43
Household monthly food expenditure, CFA franc		
<15,000	60.71%	51
≥15,000	39.29%	33
Main source of livelihood		
Agriculture	98.81%	83
Trade	1.19%	1
Type of agriculture practiced		
Rainfed food production	70.24%	59
Off-season crop production	21.43%	18
Market gardening	67.86%	57
Coping Strategies Index	6.14 (7.99)	84

FCS		
Poor	3.57%	3
Borderline	10.71%	9
Acceptable	85.71%	72

Table 18. Household Characteristics among the Full Survey Sample and Analytic Survey Sample of Households with One Female Respondent, South Sudan

Household Characteristic	Subsample <i>n</i> = 9,503		Full Survey Sample <i>N</i> = 14,215	
	% or Mean (SD)	<i>n</i>	% or Mean (SD)	<i>n</i>
Female-headed household	65.2	6,191	63.5	9,027
Household head education				
No formal schooling	67.0	6,371	67.0	9,524
Started but did not complete primary school	21.5	2,038	21.6	3,067
Finished primary school but did not start secondary school	4.8	453	4.6	655
Started but did not complete secondary school	3.2	302	3.2	459
Finished secondary school	2.9	273	2.9	412
Tertiary education	0.7	66	0.7	98
Resident status				
Resident	67.1	6,378	67.7	9,619
IDP	16.5	1,572	15.9	2,257
IDP returnee	12.0	1,144	12.1	1,721
Refugee returnee	4.1	390	4.2	593
Voluntary migrant	0.2	19	0.2	25
Proportion of household expenditure spent on food				
<50%	39.1	3,718	40.8	5,797
50%–65%	31.0	2,942	30.3	4,305
65%–75%	19.1	1,811	18.4	2,616
>75%	10.9	1,032	10.5	1,497
Household shelter				

<i>Tukul</i>	74.0	7,033	73.4	10,430
<i>Rakooba</i>	16.8	1,597	16.9	2,398
Improvised shelter	3.1	293	3.4	482
Semi/concrete building	2.7	254	2.8	402
Community building	0.7	65	0.7	97
Communal shelter	0.8	83	1.0	139
No shelter	1.1	103	1.0	146
Emergency transitional shelter by agency	0.4	41	0.5	72
Other	0.4	34	0.3	49
Household hunger				
Little to no hunger	46.1	4,378	45.6	6,495
Moderate hunger	48.3	4,592	48.5	6,898
Severe hunger	5.6	533	5.8	822
Proportion of food that comes from own production				
<50%	47.3	4,493	46.8	6,663
50%–65%	30.7	2,914	30.5	4,341
65%–75%	15.2	1,443	15.7	2,229
>75%	6.9	653	6.9	982
Household size, median (Q1, Q3)	7	(5, 9)	7	(5, 10)
Number of children aged <18 years	4.5 (2.7)		4.6 (3.0)	
Number of children aged <18 years				
0–1	8.6	819	10.8	1,543
2–4	46.1	4,384	42.2	5,998
5–7	34.6	3,286	33.8	4,803
8–10	8.0	758	9.3	1,329
>10	2.7	256	3.9	558
Household head age, years	35.4 (11.2)		37.7 (12.4)	
Household head age, years				
18–25	20.4	1,942	17.6	2,500
26–40	52.1	4,952	46.9	6,679
41–65	25.7	2,446	32.9	4,690
>65	1.7	163	2.5	362

Number of shocks experienced in the past 6 months				
0	0	0	0.1	16
1	49.9	4,738	49.9	7,095
2	21.5	2,039	21.3	3,030
3	28.7	2,726	28.7	4,090
HDDS	4.3 (2.5)		4.3 (2.5)	
FCS				
Poor	54.2	5,147	53.8	7,651
Borderline	24.5	2,324	24.5	3,491
Acceptable	21.4	2,032	21.7	3,089
Woman's age, years	28.1 (6.7)		28.3 (8.7)	
Child's age, months	13.9 (4.9)		13.8 (5.0)	
Household member with difficulty seeing, hearing, walking, remembering, self-care, or communication	39.6	3,767	42.4	6,031
Household member affected by a safety or security incident	6.6	630	7.0	990
Distressed household member	19.4	1,844	20.4	2,903
Household hosting child, IDP, or returnee	33.9	3,223	34.4	4,901
Household member is part of a social group	17.1	1,627	17.1	2,436
Distance to market				
<15 minutes	14.3	1,360	15.0	2,069
15–29 minutes	13.5	1,286	13.8	1,904
30–59 minutes	16.3	1,546	16.9	2,324
1–2 hours	21.1	2,006	21.8	3,000
>2 hours	31.6	3,004	32.4	4,457
Don't know/prefer not to answer	3.2	301	3.4	477
Land in <i>feddans</i> for cultivation of crops*	7.1 (77.5)		6.8 (71.7)	

* 1 feddan = 0.42 hectares.

Annex 4. Factors Associated with MDD-W and MDD, Cameroon

Table 19. Association of Factors with Women's Dietary Diversity, Cameroon

Variable	MDD-W (n, %; mean, SD)				p-Value
	Less than 5 food groups (n=22)		More than 5 food groups (n=62)		
	% or mean (SD)	n	% or mean (SD)	n	
Woman's age	29.36 (9.47)	22	30.53 (8.22)	62	0.602
Household size	7.36 (3.0)	22	9.27 (3.98)	62	0.011*
Head-of-household status					0.280
IDP	9.09%	2	3.23%	2	
Host	90.91%	20	96.77%	60	
Household has a vulnerable member	81.82%	18	88.71%	55	0.467
Woman's marital status					0.740
Divorced	4.55%	1	3.23%	2	
Married-monogamous	54.55%	12	40.32%	25	
Married-polygamous	36.36%	8	46.77%	29	
Single	0	0	4.84%	3	
Widow	4.55%	1	4.84%	3	
Household monthly income (CFA franc)					0.174
< 15,000	36.36%	8	53.23%	33	
15,000 or greater	63.64%	14	46.77%	29	
Household monthly food expenditure (CFA franc)					0.310
< 15,000	50.00%	11	64.52%	40	
15,000 or greater	50.00%	11	35.48%	22	
Main source of livelihood					1.000
Agriculture	100.00%	22	98.39%	61	
Trade	0.00%	0	1.61%	1	
Coping Strategies Index	4.82 (7.75)	22	6.61 (8.08)	62	0.346
FCS					0.744

Poor	4.55%	1	3.23%	2	
Borderline	13.64%	3	9.68%	6	
Acceptable	81.82%	18	87.10%	54	
Total area of crops grown (acres)	1.89 (1.57)	22	1.56 (1.16)	62	0.359
Type of agriculture practiced					
Rainfed food production	54.55%	12	75.81%	47	0.061
Off-season crop production	18.18%	4	22.58%	14	0.770
Market gardening	59.09%	13	70.97%	44	0.305
Total number of crops grown	1.77 (1.15)	22	1.69 (1.69)	62	0.808
Household experienced any shocks	90.91%	20	75.81%	47	0.216
Total household shocks experienced in the previous 12 months	3.5 (2.18)	22	2.48 (2.64)	62	0.144

*Significant at $p < .05$

Table 20. Association of Factors with Children's Dietary Diversity, Cameroon

Variable	MDD				
	<5 Food Groups (n = 19)		≥5 Food Groups (n = 21)		p-Value
	% or Mean (SD)	No.	% or Mean (SD)	No.	
Woman's age, years	30.16 (7.75)	19	28.6 (6.29)	20	.495
Child's age, months	9.79 (4.02)	19	16 (4.88)	21	.002*
Household size, No.	9.79 (3.05)	19	9.76 (5.43)	21	.984
Head-of-household status					.098
IDP	15.79%	3	0.00%	0	
Host	84.21%	16	100.00%	21	
Household has a vulnerable member	100.00%	19	90.48%	19	.488
Woman's marital status	63.16%	12	23.81%	5	.012*
Divorced	5.26%	1	5.00%	1	
Married—monogamous	26.32%	5	50.00%	10	
Married—polygamous	63.16%	12	25.00%	5	
Single	5.26%	1	0	0	
Widow	0	0	20.00%	4	
Household monthly income, CFA franc					.775

<15,000	52.63%	10	57.40%	12	
≥15,000	47.37%	9	42.86%	9	
Household monthly food expenditure, CFA franc					.170
<15,000	57.89%	11	80.95%	17	
≥15,000	42.11%	8	19.05%	4	
Main source of livelihood					N/A
Agriculture	100.00%	19	100.00%	21	
Trade	0.00%	0	0.00%	0	
CSI	10.47 (10.82)	19	7.14 (7.98)	21	.309
FCS					.664
Poor	0.00%	0	4.76%	1	
Borderline	10.53%	2	19.05%	4	
Acceptable	89.47%	17	76.19%	16	
Total area of crops grown, acres	1.34 (1.20)	19	2.66 (3.83)	21	.002*
Type of agriculture practiced					
Rainfed food production	73.68%	14	71.43%	15	.873
Off-season crop production	31.58%	6	14.29%	3	.265
Market gardening	57.89%	11	66.67%	14	.567
Total number of crops grown	1.79 (1.75)	19	2.05 (1.698)	21	.633
Household experienced any shocks	73.68%	14	95.24%	20	.085
Total household shocks experienced in the previous 12 months	1.74 (2.08)	19	3.62 (2.80)	21	.011*

*Significant at $p < .05$.

Table 21. Factors Associated with MDD-W, South Sudan

Variable	Number of Respondents	Prevalence of MDD-W (%)	Prevalence Ratio (95% CI)	p-Value	Adjusted Prevalence Ratio ¹ (95%CI)	p-Value
Household hunger score				0.839		
Little to no hunger	6,640	32.6	ref			
Moderate hunger	7,091	30.6	0.99 (0.92, 1.07)			

Severe hunger	841	26.3	0.95 (0.81, 1.12)			
Woman's age	14,572		0.989 (0.985, 0.992)	<0.001	0.99 (0.989, 0.995)	<0.001
Total number assets owned by the household	14,572		1.05 (1.045–1.059)	<0.001	1.02 (1.00, 1.02)	<0.001
Household size	14,572		1.00 (0.99–1.01)	0.051	1.02 (1.01, 1.02)	0.001
Resident status				0.400		
Resident	9,869	32.0	ref			
IDP	2,324	29.9	0.96 (0.87–1.06)			
IDP returnee	1,776	28.6	0.94 (0.84–1.04)			
Refugee returnee	576	31.9	1.06 (0.91–1.24)			
Voluntary migrant	27	18.5	0.52 (0.17–1.62)			
Proportion of household expenditure spent on food				<0.001		0.0209
Less than 50%	5,781	34.2	ref		ref	
50%–65%	4,525	33.0	1.09 (1.01–1.17)		0.99 (0.92, 1.06)	
65%–75%	2,709	26.2	0.87 (0.79–0.97)		0.87 (0.79, 0.95)	
>75%	1,577	24.0	0.82 (0.72–0.93)		0.95 (0.83, 1.09)	
Most important source of food and income				<0.001		<0.001
Agriculture	8,286	36.5	ref		ref	
Livestock	713	28.8	0.77 (0.65–0.90)		0.86 (0.74, 1.01)	
Sale of alcoholic beverages	800	26.3	0.78 (0.67–0.90)		0.83 (0.72, 0.96)	

Unskilled casual labor	635	25.0	0.69 (0.58–0.82)		0.80 (0.68, 0.93)	
Skilled labor	236	28.3	0.76 (0.59–0.98)		0.77 (0.60, 0.98)	
Trader/ shop owner	339	35.4	0.98 (0.81–1.18)		0.94 (0.79, 1.12)	
Salaried work	233	40.3	1.03 (0.82–1.29)		0.88 (0.70, 1.10)	
Sale of firewood	799	26.3	0.74 (0.63–0.87)		0.87 (0.76, 0.99)	
Fishing/sale of fish	428	8.4	0.19 (0.14–0.29)		0.28 (0.20, 0.41)	
Support from family/friends/community	187	19.3	0.54 (0.38–0.76)		0.69 (0.50, 0.95)	
Begging	36	41.7	1.16 (0.73–1.86)		1.53 (1.03, 2.29)	
Food assistance	1,272	23.5	0.60 (0.52–0.70)		0.70 (0.60, 0.82)	
Gathering wild food/hunting	483	10.6	0.23 (0.17–0.33)		0.28 (0.20, 0.40)	
Other	125	18.4	0.61 (0.37–0.99)		0.88 (0.53, 1.47)	
Shocks experienced in the last 6 months	14,572		0.99 (0.95–1.02)	0.455		
Receipt of other humanitarian assistance				0.308		
No	8,201	30.3	ref			
Yes	6,371	32.5	0.97 (0.90–1.03)			
Proportion of food that comes from own production				<0.001		0.007
Less than 50%	6,689	29.2	ref		ref	
50%–65%	4,510	33.7	1.28 (1.19–1.38)		1.07 (1.00, 1.15)	
65%–75%	2,340	34.9	1.27 (1.16–1.39)		1.09 (1.00, 1.19)	

>75%	1,033	25.1	0.89 (0.77–1.04)		0.87 (0.76, 1.00)	
Household member with difficulty seeing, hearing, walking, remembering, self-care, or communication				0.372		
No	8,248	31.3	ref			
Yes	6,324	31.2	0.97 (0.91, 1.03)			
Household member affected by a safety or security incident				0.641		
No	13,542	31.3	ref			
Yes	1,030	30.8	1.03 (0.90, 1.18)			
Distressed household member				0.033		0.184
No	11,493	31.8	ref		ref	
Yes	3,079	29.0	0.91 (0.84, 0.99)		0.95 (0.87, 1.02)	
Household hosting child, IDP, or returnee				0.533		
No	9,331	31.2	ref			
Yes	5,241	31.2	0.98 (0.91, 1.05)			
Household member is part of a social group				<0.001		<0.001
No	11,971	29.3	ref		ref	
Yes	2,601	40.2	1.41 (1.31, 1.52)		1.18 (1.10, 1.27)	
Distance to market				<0.001		<0.001
Less than 15 minutes	2,134	31.4	ref		ref	

15–29 minutes	2,025	31.7	1.04 (0.92, 1.18)		1.06 (0.94, 1.19)	
30–59 minutes	2,438	33.6	1.16 (1.02, 1.30)		1.15 (1.03, 1.29)	
1–2 hours	3,094	35.9	1.24 (1.11, 1.39)		1.22 (1.10, 1.35)	
More than 2 hours	4,387	26.7	0.88 (0.79, 0.98)		1.05 (0.95, 1.17)	
HDDS	14,572		1.18 (1.16, 1.18)	<0.001	1.19 (1.18, 1.20)	<0.001

Table 22. Factors Associated with MDD, South Sudan

Variable	Number of Respondents	Prevalence of MDD (%)	Prevalence Ratio (95% CI)	p-Value	Adjusted Prevalence Ratio ¹ (95% CI)	p-Value
Household hunger score				<0.001		0.331
Little to no hunger	2,707	27.5	ref		ref	
Moderate hunger	2,854	21.9	0.79 (0.71–0.89)		0.93 (0.83, 1.04)	
Severe hunger	345	17.1	0.56 (0.42–0.74)		0.85 (0.63, 1.15)	
Child's age	5,906		1.03 (1.02–1.04)	<0.001	1.03 (1.02, 1.04)	<0.001
Child's sex				0.244		
Male	3,017	23.7	ref			
Female	2,889	24.7	1.06 (0.96–1.18)			
Total number of assets owned by the household	5,906		1.06 (1.05–1.07)	<0.001	1.03 (1.01, 1.04)	<0.001
Family size	5,906		0.99 (0.96–1.00)	0.444		
Resident status				0.412		
Resident	4,052	24.0	ref			
IDP	922	25.4	1.06 (0.92–1.23)			

IDP returnee	681	23.2	0.98 (0.82–1.17)			
Refugee returnee	239	26.8	1.20 (0.94–1.53)			
Voluntary migrant	12	0.00	—			
Proportion of household expenditure spent on food				0.024		0.704
< 50%	2,356	25.7	ref			ref
50%–65%	1,823	25.5	1.04 (0.92–1.19)			0.98 (0.87, 1.11)
65%–75%	1,089	20.5	0.88 (0.75–1.03)			0.91 (0.77, 1.08)
> 75%	638	21.2	0.77 (0.62–0.97)			1.03 (0.82, 1.30)
Most important source of food and income				<0.001		0.053
Agriculture	3,324	26.7	Ref			ref
Livestock	303	19.5	0.65 (0.48–0.86)			0.73 (0.54, 0.98)
Sale of alcoholic beverages	317	23.7	0.93 (0.73–1.18)			0.96 (0.76, 1.22)
Unskilled casual labor	251	22.7	0.92 (0.69–1.20)			0.96 (0.75, 1.24)
Skilled labor	105	31.4	1.20 (0.83–1.71)			1.11 (0.79, 1.56)
Trader/shop owner	121	36.4	1.42 (1.08–1.87)			1.20 (0.92, 1.57)
Salaried work	108	30.6	1.22 (0.89–1.67)			0.93 (0.65, 1.32)
Sale of firewood	299	18.7	0.75 (0.57–0.98)			0.93 (0.71, 1.23)
Fishing/sale of fish	159	12.0	0.38 (0.22–0.64)			0.49 (0.28, 0.84)
Support from family/friends/ community	70	17.1	0.62 (0.35–1.09)			0.64 (0.36, 1.16)

Begging	14	28.6	0.80 (0.31– 2.06)		1.24 (0.52, 2.94)	
Food assistance	571	21.2	0.72 (0.58–0.89)		0.84 (0.67, 1.04)	
Gathering wild food/hunting	220	8.6	0.32 (0.19–0.54)		0.53 (0.30,0.94)	
Other	44	15.9	0.51 (0.24–0.28)		0.86 (0.43,1.71)	
Shocks experienced in the last 6 months	5,906		1.00 (0.94–1.07)	0.823		
Receipt of other humanitarian assistance				0.137		
No	3,218	23.0	ref			
Yes	2,688	25.6	1.09 (0.97–1.22)			
Proportion of food that comes from own production				<0.001		0.001
< 50%	2,736	23.1	ref		ref	
50%–65%	1,863	28.0	1.31 (1.16–1.49)		1.16 (1.02, 1.32)	
65%–75%	893	23.0	1.09 (0.92–1.29)		0.97 (0.82, 1.15)	
> 75%	414	16.9	0.70 (0.53–0.92)		0.70 (0.52, 0.93)	
Household member with difficulty seeing, hearing, walking, remembering, self-care, or communication				0.762		
No	3,401	23.7	ref			
Yes	2,505	24.9	1.02 (0.91,1,14)			
Household member affected by a safety or security incident				0.510		
No	5,486	24.0	ref			

Yes	420	26.4	1.07 (0.87, 1.33)			
Distressed household member				0.223		
No	4,731	23.7	ref			
Yes	1,175	26.1	1.09 (0.95, 1.25)			
Household hosting child, IDP, or returnee				0.903		
No	3,694	23.8	ref			
Yes	2,212	24.9	1.00 (0.90, 1.13)			
Household member is part of a social group				<0.001		0.005
No	4,833	22.2	ref		ref	
Yes	1,073	32.9	1.52 (1.34, 1.72)		1.19 (1.05, 1.34)	
Distance to market				<0.001		0.089
Less than 15 minutes	922	27.8	ref		ref	
15–29 minutes	773	24.8	0.88 (0.72, 1.07)		0.92 (0.76, 1.11)	
30–59 minutes	975	28.2	0.95 (0.79, 1.14)		0.95 (0.80, 1.13)	
1–2 hours	1,211	25.4	0.95 (0.80, 1.12)		0.94 (0.80, 1.10)	
More than 2 hours	1,792	18.9	0.62 (0.52, 0.74)		0.79 (0.66, 0.94)	
HDDS	5,906		1.17 (1.16, 1.19)	<0.001	1.17 (1.15, 1.19)	<0.001



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FROM THE AMERICAN PEOPLE

USAID ADVANCING NUTRITION

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October 2022

USAID Advancing Nutrition is the Agency's flagship multi-sectoral nutrition project, addressing the root causes of malnutrition to save lives and enhance long-term health and development.

This document was produced for the U.S. Agency for International Development. It was prepared under the terms of contract 7200AA18C00070 awarded to JSI Research & Training Institute, Inc. The contents are the responsibility of JSI and do not necessarily reflect the views of USAID or the U.S. Government.