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Factors Influencing the Use of Iron and Vitamin A Supplementation and Improved Dietary Practices

Formative Research Findings from Maradi and Zinder, Niger

APRIL 2022

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Acronyms

ANC	antenatal care
ANIMAS SUTURA	*Association Nigérienne de Marketing sociale* (Nigerien Association of Social Marketing)
CHV	community health volunteers
CHW	community health worker
COGES	*Comités de Gestion des Établissements Scolaires* (School Management Committees)
CSB+	Corn-Soy Blend Plus
DRSP	*Direction régionale de la santé publique* (Regional Directorate of Public Health)
FGD	focus group discussions
GAM	global acute malnutrition
HKI	Helen Keller International
IYCF	infant and young child feeding
iCCM	integrated community case management
IFA	iron and folic acid [supplement]
IHC	integrated health center
IRB	Institutional Review Board
JSI	John Snow, Inc.
KII	key informant interviews
MoPH	Ministry of Public Health, Population, and Social Affairs
MDS	multidimensional scaling
MMS	multiple micronutrient supplements
NGO	nongovernmental organization
RFSA	Resilience Food Security Activity
RISE	Resilience in the Sahel Enhanced
SBC	social and behavior change
SMART	Standardized Monitoring and Assessment of Relief and Transitions survey
t-SNE	t-distributed stochastic neighbor embedding
UN	United Nations
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development

VAD	vitamin A deficiency
VAS	vitamin A supplementation
WFP	World Food Program
WHO	World Health Organization
WRA	women of reproductive age

Executive Summary

Objectives

USAID Advancing Nutrition Niger conducted formative research in the Maradi and Zinder regions to better understand factors that support or inhibit the program's desired objectives: reducing the prevalence of anemia among women of reproductive age (WRA) and adolescents and vitamin A deficiency (VAD) among children under five in the USAID Resilience in the Sahel Enhanced (RISE) II zones of intervention.

The study gathered information among communities, health providers, government and United Nations (UN) stakeholders, and USAID funded-projects to inform the design of activities to strengthen capacity among partners and government stakeholders and systems for service delivery, as well as improve key nutrition behaviors. The study focused on understanding specific factors related to increasing the coverage and use of iron and vitamin A supplementation and improving dietary practices, namely to—

- Improve access and adherence to iron-folic acid (IFA) supplementation among pregnant women and adolescent girls (not non-pregnant adolescent girls).
- Improve access and timely use of vitamin A supplementation (VAS) for children under five.
- Increase consumption of iron and vitamin A-rich foods among women of reproductive age, adolescent girls (10–14), and children (6–59 months).

Methodology

This formative research study was qualitative and used a cross-sectional design to explore participant perspectives and experiences at one point in time. The study used a combination of traditional, participatory, and cognitive mapping research methods to gather data with pregnant women, caregivers of children under five, adolescent girls, influential family members and community leaders (traditional, religious) to understand factors that drive uptake of services, adherence to supplementation, and food choices, as well as generate ideas for local solutions.

Research Questions

1. What factors influence the ability of pregnant women (15–49 years) and very young pregnant adolescent girls (10–14 years) to access IFA supplementation through quality antenatal care (ANC) services at health centers and other nutrition services?
2. What challenges reduce, and what support would improve, pregnant women and adolescents' adherence to IFA supplementation?
3. What factors inhibit or enable vitamin A supplementation among children under five?
4. What factors influence consumption of a diet rich in iron and vitamin A among women of reproductive age (15–49 years), very young adolescent girls (10–14), and young children (6–59 months)?

The research team conducted 51 focus group discussions (FGD), pair interviews, and key informant interviews (KII) with 180 respondents. We purposively sampled pregnant women, family and community influencers and adolescent girls in Maradi's Guidan Roumdji district, and in Zinder's Magaria and Damagaram Takaya districts. Within each district, the research team worked with the USAID-funded partners, including Breakthrough RESEARCH and Breakthrough ACTION, and health officials to identify

and validate selection of two communities within their implementation areas with high and low levels of access to supplementation services, that were pastoral and agro-pastoral, and with adolescent girls. Within each district, we split the sample evenly between the two communities selected. We used qualitative data collected through individual and group interviews with the Ministry of Public Health, Population, and Social Affairs (MoPH) national and sub-national staff, UN stakeholders, USAID-funded project staff, health workers, and community health volunteers (CHVs). The sample size allowed us to disaggregate findings overall by district and by four key respondent categories across the districts (however not by each respondent group within each district)—

- **Adult project target population:** 56 pregnant women (15–49 years) and female caregivers of children under five through 6 FGDs
- **Adolescent project target population***:* 34 adolescent girls (10–14 years) through 6 pair interviews and 3 FGDs
- **Family and community influencers:** 44 family members and 61 community leaders through 12 FGD
- **Health workers and stakeholders:** 32 health workers and 12 MoPH and UN stakeholders and USAID implementing partners.

For all research questions, we used applied thematic analysis to analyze the data.

Key Findings

Research Question 1

Pregnant women and female caregivers of young children, and family and community influencers, demonstrated widespread knowledge of the recommendations for IFA during pregnancy, and positive attitudes toward supplements, but acknowledged multiple reasons for incomplete coverage. Community members said that distance to the health centers is especially challenging during pregnancy, as women avoid the risk of traveling by motorcycle, and costs are unaffordable. The supply of supplements was also a major factor inhibiting access. Women said they often need to return to health centers multiple times for their IFA or they would have to purchase through pharmacies.

Few stakeholders had suggestions to address financing barriers, but offered recommendations to increase pregnant women's access to IFA at the community level if supplies are secured—

- Convening government and UN stakeholders to further strategize opportunities to shift reliance from external stakeholders to budgeting and procurement of IFA through the government health system.
- Systematizing roles and responsibilities and coordinating at each level of the health system so that health workers have clear processes and timelines to place and track orders and inform clients.
- Integrating IFA into the roles of CHVs in communities, and other government health activities (integrated community case management [iCCM]) with adequate training and supportive supervision systems.
- Expanding distribution through community platforms such as community-based distribution of contraceptives, food assistance and caravans.

In addition, health workers and many stakeholders recognized that iron deficiency does not cause all forms of anemia in this region and recommended research on the etiology of anemia, before

recommending an extension of IFA supplementation recommendations beyond pregnancy and postpartum.

Research Question 2

Even pregnant women who received IFA noted that many women do not take supplements daily as recommended due to dislike of the smell, side effects and forgetting to take supplements. Yet, women felt that having a family member of their choice to motivate their daily adherence would help overcome these issues. Family members agreed that they would be willing and able to serve as an "adherence partner." This term should be changed with women to be locally meaningful. Counseling by health workers during ANC visits would be strengthened by introducing this concept of family support, and helping women know what side effects to expect and ways to overcome these. In addition, women themselves are able to articulate their own experiences with IFA well, and could share these experiences and tips with peers to shift norms.

Stakeholders suggested using existing USAID funded program activities and platforms to integrate increasing family and community support for pregnant women's IFA uptake and adherence.

Research Question 3

Pregnant women and female caregivers of young children, and family and community influencers, showed high knowledge and appreciation for vitamin A supplementation for young children. Most said that children get vitamin A supplements twice a year during campaigns, although some caregivers shared that they hide children during campaigns due to a fear of the polio vaccine. Many stakeholders acknowledged that the supply of supplements at health centers was dependent on surplus from campaigns. Given the government's shift away from mass campaigns to integration through the health system, and heavy reliance on external funding for vitamin A supplements, supply of vitamin A supplements may face the same challenges as IFA.

Stakeholders made a few recommendations for addressing barriers to access and availability of vitamin A supplements—

- Convene government and UN stakeholders to further strategize opportunities to shift reliance from external stakeholders to budgeting and procurement of Vitamin A through the national health system.
- Support the MoPH in rolling out the Vitamin A supplementation and deworming operational plan and training *relais communautaires* (i.e., community health volunteers [CHV]) to distribute supplements, among other strategies such as mobile clinic outreach days.
- Integrate Vitamin A supplement distribution through USAID program partner activities within communities, of which includes a wide variety of platforms.

Research Question 4

Community and stakeholder respondents agreed that limited food access and affordability are overriding constraints to increase consumption of vitamin A- and iron-rich foods. Community members understood the importance of consuming these foods, were knowledgeable about micronutrient rich foods, and health workers and community leaders recommended their consumption. However, respondents were not able to access these foods due to agricultural yields that do not last all year, high food prices, limited availability of nutritious foods in markets, and difficulty reaching markets. Agricultural production was a major source of food and income for respondent households, but agricultural production was typically not sufficient to meet household needs. Patriarchal gender norms limit women's decision-making power in agricultural production and food purchases. Women are

therefore largely dependent on male decision making and income to access food, and prepare and serve what is made available to them.

Gender and social norms as well as perceptions of health and food influence food allocation for women, adolescent girls, and children—

- Participants see women as a nutritionally vulnerable group, but also expected them to serve themselves last at mealtimes. In a context of scarcity, this means they are not always able to access enough food.
- Participants did not see adolescent girls as nutritionally vulnerable and some male heads of households see feeding them as a burden.
- Participants perceived children as needing nutritious foods, however their consumption is constrained by household food access and purchasing power. Some foods, such as dark leafy green vegetables and eggs, were not seen as good for children.

In addition, the quality of counseling to women and mothers during ANC, postnatal care, and well-child visits, can be improved. Counseling focused on engaging women and often included recommendations to feed children foods that are not accessible.

Government of Niger, UN stakeholders, and implementing partners saw access to and affordability of nutritious foods as significant constraints, caused by high food costs and a lack of water and quality agricultural inputs (particularly seeds). Cultural norms around intrahousehold food allocation also limit what women and girls are able to eat. They provided several recommendations to improve access to nutritious foods through existing USAID partner project platforms and improved multi-sectoral coordination and collaboration.

Recommendations

We identify actions and support that USAID Advancing Nutrition can implement or that other partners could implement with support from USAID Advancing Nutrition. Many of these topics will be further explored through close examination of USAID funded implementing partner program activities, the food environment in which they operate, and opportunities for collaboration, and therefore additional recommendations may emerge in the subsequent workshops with partners. Given that several of the barriers require systematic change (policy, funding) USAID Advancing Nutrition will continue to convene UN and MoPH stakeholders to strategize where changes could be made with commitments and collaboration.

Chapter 1. Introduction

USAID Advancing Nutrition Niger conducted formative research in the Maradi and Zinder regions to better understand factors that support or inhibit the program's desired objectives: reducing the prevalence of anemia among women of reproductive age (WRA) and adolescents and vitamin A deficiency (VAD) among children under five in the USAID Resilience in the Sahel Enhanced (RISE) II zones of intervention.

Study Rationale and Objectives

This research aimed to identify the specific factors that influence access and adherence to iron-folic acid (IFA) and vitamin A supplementation (VAS) and consumption of vitamin A- and iron-rich foods and to suggest acceptable intervention approaches for reaching WRA, adolescents, and caregivers of children under five. The results will inform USAID Advancing Nutrition's social and behavior change strategy (SBC), and various policy and program interventions aiming to improve the coverage and use of iron and vitamin A supplementation and improving dietary practices. This formative research aimed to complement and build upon information gathered during USAID Advancing Nutrition's initial desk review and scoping visit (consisting of key informant interviews [KIIs] and focus group discussions [FGDs]) to develop the first annual work plan.

The objective of this study was to gather information with participants to inform the design of activities to support technical assistance to strengthen systems for delivery in health facilities and communities. The study focused on factors related to improving the coverage and use of iron and vitamin A supplementation and dietary practices, namely to—

- Improve access and adherence to IFA supplementation among pregnant women and adolescent girls (not non-pregnant adolescent girls).
- Improve access and timely use of vitamin A supplementation for children under five.
- Increase consumption of iron and vitamin A-rich foods among women of reproductive age, adolescent girls (10–14), and children (6–59 months).

Background/Country Context

Malnutrition remains a serious problem for WRA and children under five in Niger. According to the most recent national Standardized Monitoring and Assessment of Relief and Transitions (SMART) survey in 2020, global acute malnutrition (GAM) rates in Maradi and Zinder were 13.3 percent and 14.9 percent, respectively, while the highest rate in the country was in Diffa (19.3 percent). The World Health Organization (WHO) defines GAM rates of 15 percent or more as very high. Chronic malnutrition is also high, and prevalence has remained unchanged, with Maradi and Zinder again having the highest prevalence in the country at 58 and 55.8 percent, respectively (INS 2020).

Adolescent girls in Niger have the highest adolescent fertility rate in the world, which is driven in part by the high rates of early marriage—by the age of 18 years, 59 percent of girls are already married. Among women between the ages of 20 and 24 years in Niger, 9 percent gave birth before the age of 15 and 51 percent gave birth before the age of 18 (Barroy et al. 2016).

Fertility rates in Niger are high in general; on average, Nigerien women give birth to more than seven children and more than half (57 percent) of the country's population is below the age of 15. Although declining, maternal mortality still stands at 535 per 100,000 live births and infant mortality is 60 per 1,000 live births in Zinder and 73 per 1,000 live births in Maradi (INS and ICF International 2013).

Anemia and Iron-Folic Acid Supplementation

Data on iron deficiency prevalence in Niger is limited at the national level; however, the prevalence of global anemia among women aged 15–49 is 58 percent, well above the WHO's severe threshold of 40 percent. The most recent Demographic and Health Survey data indicates that 43 percent of women aged 15–49 years are anemic in Maradi and 50 percent are anemic in Zinder (INS and ICF International 2013).

Currently, health facilities provide the IFA supplementation exclusively at antenatal care (ANC) for pregnant women. Preventive supplementation for pregnant women is typically integrated into ANC. Women are instructed to take a daily tablet containing 60 mg of iron and 400 mcg of folic acid during pregnancy, and in areas with prevalence rates of 40 percent or more, to continue for 3 months postpartum. However, the country's low health coverage means that health workers do not reach all pregnant women via ANC. Most women (47 percent) attend 2–3 ANC visits and typically attend their first visit in the fifth month of pregnancy. Among women who attend ANC visits in Maradi and Zinder, 86 percent and 76 percent, respectively, reported receiving IFA supplements during an ANC visit (INS and ICF International 2013).

IFA is included on Niger's essential medicines list and should be budgeted for and procured by health facilities. However, IFA faces the challenges of limited cost-recovery options, as ANC services are free. United Nations Children's Fund (UNICEF), and nongovernmental organizations (NGOs) to a lesser extent, provide some support for the procurement of IFA but do not systematically provide IFA to all areas. This inconsistent supply means that many women who attend ANC find that the necessary supplements are not available at the health facility. Distance to health centers for ANC care is also a commonly reported barrier. In Maradi, about one-third of women (38 percent) reported taking IFA supplements for 90 or more days of pregnancy. In Zinder, again only one-third (30 percent) of women reported taking the recommended 90 days; most women took less than 60 days (31 percent) or between 60 and 89 days (14 percent) (INS and ICF International 2013).

Among those women who receive IFA supplements, adherence remains an issue due to side effects and acceptability. A study in Zinder in 2016 found that among women who received supplements in an ANC visit, 68.6 percent reported daily adherence to recommended IFA supplementation (Begum 2016).

Vitamin A Deficiency and Supplementation

There are little data available on vitamin A deficiency (VAD) in Niger, particularly for children under five. However, the most recent SMART survey includes information on the coverage of vitamin A supplementation, which is 80 percent in Maradi and 66 percent in Zinder. However, coverage varies greatly within Zinder, with a low of 7 percent in Tesker and up to 88 percent in Kantché. Among breastfed children aged 6–23 months, 29 percent consumed foods rich in vitamin A. While higher among non-breastfed children of the same age (43 percent), consumption remains lower than desirable (INS and ICF International 2013).

For more than a decade, the majority of VAS has taken place through government-coordinated mass campaigns with support from implementing partners, often coupled with vaccination campaigns. These mass campaigns, typically organized twice a year, reach up to 80 percent of children aged 6–59 months. However, due to recent progress made against key vaccination campaigns for diseases such as polio, resource availability of funding for mass VAS campaigns has declined. A recent post-event coverage survey conducted by Helen Keller International, based on mothers' recall and health record checks, found that in the last six months, only 37 percent of children aged 6–59 months received VAS.

Improving Diet Quality

Many Nigeriens have poor diets, including low dietary diversity and a high reliance on staple foods. Millet and sorghum constitute a large portion of the calories consumed by Nigeriens, particularly among rural people living in poverty. Wessells et al. found that only one in six women met minimum dietary diversity in Zinder (2019). These women's diets were deficient in a range of nutrients essential for preventing iron deficiency anemia (Wessells et al. 2019).

Diets of infants and young children are also inadequate; as of 2012, just 23 percent of infants under 6 months of age are exclusively breastfed, and only 6 percent of children ages 6–23 months consume a minimum acceptable diet. In Zinder, only 8 percent of children 6–23 months of age consumed foods rich in iron (including meat, fish, poultry, and eggs) and 26 percent consumed vitamin A-rich foods in the previous 24 hours. In Maradi, 11 percent of children 6–23 months of age consumed foods rich in iron (including meat, fish, poultry, and eggs) and 29 percent consumed vitamin A-rich foods in the previous 24 hours (INS and ICF International 2013). Over half of households in Maradi and Zinder (59 to 75 percent in Zinder and 74–79 percent in Maradi) cannot afford a diet that meets nutritional needs (WFP 2021).

Activity Information

At the request of the U.S. Agency for International Development (USAID) Mission in Niger, USAID Advancing Nutrition will undertake an activity to contribute toward improving the nutritional status of WRA, adolescent girls, and children under five years of age in Niger. USAID Advancing Nutrition seeks to reduce the prevalence of iron deficiency among WRA and adolescents, and VAD among children under five in the RISE II zones of intervention in Maradi and Zinder. To achieve this goal, the project will support existing USAID nutrition investments, government, and UN partner agencies with technical assistance to strengthen systems for delivery of quality IFA and vitamin A supplementation and improving dietary practices. Activities will target both health facilities and community-level platforms and actors. Whenever possible, USAID Advancing Nutrition will integrate its activities into, and delivered them via, existing partner platforms.

Chapter 2. Methodology

This formative research study was qualitative and used a cross-sectional design to explore participant perspectives and experiences at one point in time. The study used a combination of traditional, participatory, and cognitive mapping qualitative research methods to gather data to inform the program design. See table 2 for a summary of the areas of inquiry, data collection methods, and data sources used to answer each research question.

We aimed to answer the following research questions through this study:

1. What factors influence the ability of pregnant women (15–49 years) and very young pregnant adolescent girls' (10–14 years) to access IFA supplementation through quality ANC services at health centers and other nutrition services?
2. What challenges reduce and what support would improve pregnant women and adolescents' adherence to IFA supplementation?
3. What factors inhibit or enable vitamin A supplementation among children under five?
4. What factors influence consumption of a diet rich in iron and vitamin A among women of reproductive age (15–49 years), very young adolescent girls (10–14), and young children (6–59 months)?
    a. What behaviors are caregivers, other women, girls, and family members willing to try to improve their diets?

Methodology

The qualitative study aimed to contribute information about how implementers deliver the supplementation activities, and factors that affect supply and demand of supplements and healthy diets among women, adolescent girls, and young children. In other words, why do people practice the current behaviors and what would they be willing to do differently? It also aimed to answer questions about the types of potential activities, including format, length, and content, and what would be feasible for program implementers to integrate within their program platforms.

USAID Advancing Nutrition used the same methodology to answer the four research questions: FGDs and group interviews, including participatory techniques of pile sorts and vignettes. For all research questions, we used applied thematic analysis to analyze the data. USAID Advancing Nutrition analyzed qualitative data collected through FGDs with pregnant women, adolescent girls, family members, and influential community leaders (traditional, religious) to understand factors that drive uptake of services, adherence to supplementation, and food choices, as well as generate ideas for local solutions and new practices to try. USAID Advancing Nutrition used qualitative data collected through group interviews with MoPH national and sub-national staff, UN stakeholders, RISE II partners, health agents, and CHVs to understand supply side factors that influence the quality of services, including supplies of supplements.

Study Population

The study population for research questions were pregnant women and lactating women or female caregivers of children under five, and adolescents, influential family members, and influential community leaders including traditional and religious leaders. We prioritized caregivers and family members participating in a RISE II activity and community leaders. The two regions for this study were Maradi and Zinder, where USAID Advancing Nutrition will focus its efforts.

The study population for these research questions also included UN stakeholders, UNICEF and World Food Program (WFP) staff, MoPH national and sub-national staff, health workers from the district level to health posts, CHVs, as well as implementing partners including RISE II and other health and nutrition partners.

Sampling Plan

Within the two regions, we collected data in the three districts where USAID Advancing Nutrition will focus—in Maradi, this district was Guidan Roumdji, and in Zinder, the districts were Magaria and Damagaram Takaya. These districts represent different agro ecological zones—Guidan Roumdji is in the millet and sorghum agricultural zone, Magaria is in the southern zone of market gardens, and Damaaram Takaya is in the agro-pastoral zone (WFP 2018). Within each district, the team worked with the RISE II partners and health officials to identify and validate the selection of two communities in their implementation areas, one each with: (1) high and low levels of access to supplementation services, and (2) primarily agro-pastoral or agricultural. We were not able to select one agro-pastoral and one agricultural community in each district however. Security was a consideration when selecting communities for data collection. Within each district, we split the sample evenly between the two communities selected.

The sample size estimates presented in table 1 aimed to allow us to disaggregate findings overall by district and by four key respondent categories across the districts (however not by each respondent group within each district):

- **Adult project target population:** Pregnant women (15–49 years), female caregivers of children under five
- **Adolescent project target population:** Adolescent girls (10–14 years)
- **Family and community influencers:** Other family members, community leaders
- **Health workers and stakeholders:** Health workers; CHV; MoPH national, regional and district staff; UNICEF and WFP staff and USAID implementing partners.

As shown in table 1, USAID Advancing Nutrition conducted 21 FGDs, with seven in each district. In each selected community, we requested the contacts of activity participants and group leaders (e.g., mother or farmer group leaders) from the implementing partner operating there. We worked with the implementing partners or the group leaders to purposively select a mix of activity participants to capture the diversity of the types of activity participants in the community. Each FGD included six to ten participants. In each district, we conducted—

- two FGDs with a purposive sample of women who are pregnant or who have a child under five years of age. In total, we conducted six FGDs with 56 women.
- one FGD with a purposive sample of approximately six adolescent girls in each district, totaling three FGDs with 34 adolescent girls
- two FGDs with a purposive sample of family members in each district, for a total of six FGDs with 44 respondents. We aimed to sample 22 fathers and 22 mothers-in-law; however, there were more female family participants than males.
- two FGD in each district with community leaders for 61 respondents, such as village chiefs, imams, village chief advisers, presidents of women's or other community-based groups, and *Les Mamans Lumières*.

Although most community leaders were male, as was true in the communities, we included female leaders in the FGDs to the extent possible. Six FGDs per district with at least six participants each is likely sufficient to capture variation between regions and between respondent categories overall (not by respondent group within each district). A systematic review found that four to eight FGDs per respondent category is sufficient to reach data saturation for key concepts (Hennink and Kaiser 2022).

We purposely sampled 32 health workers from the district to health post levels and CHVs. We used group and individual interviews to interview a total of seven to 15 respondents per district. We also purposively sampled six stakeholders for key informant interviews who play a key role in vitamin A and IFA supplementation in the MoPH and UN agencies (UNICEF, WFP) in addition to USAID implementing partners active in the districts. These are likely sufficient to reach saturation as a systematic review found that nine to seventeen interviews is sufficient to reach saturation among relatively homogeneous populations (Hennink and Kaiser 2022).

Table 1. Sample Size per Respondent Category

Respondent Category	Respondent Group	Total FDGs/ Group Interviews/ KII	Total Female Respondents	Total Male Respondents	Total Respondents
Adult project target population	Pregnant women (15–49 years), female caregivers of children under five	6 (2 FGDs per district)	56	0	56
Adolescent project target population	Adolescent girls 10–14 years	9 (1 FGD and 2 group interviews per district)	34	0	34
Family and community influencers	Other family members	6 (2 FGDs per district)	29	15	44
	Community leaders	6 (2 FGDs per district)	7	54	61
Health staff and stakeholders	District level health officers, Health post health workers, and CHV	16 (5–6 group interviews and/or KIIs per district)	10	22	32
	MoPH national and regional staff, UNICEF and WFP staff, and USAID	12 (6 national level, and 3 per district)	8	4	12

Respondent Category	Respondent Group	Total FDGs/ Group Interviews/ KII	Total Female Respondents	Total Male Respondents	Total Respondents
	implementing partners				
Total respondents		**55**	**144**	**95**	**239**

Data Collection Methods

USAID Advancing Nutrition contracted a data collection firm in Niger, CESAF, to conduct all data collection except for the national and regional level stakeholder interviews, which USAID Advancing Nutrition staff conducted. The FGDs and the group interviews were conducted in Hausa in Magaria and Guidan Roumdji, and in Kanuri in Damagaram Takaya. We assigned data collectors to communities based on their language skills. However, data collectors conducted health worker and stakeholder interviews in French when preferred by participants. We developed the data collection guides in English, before one member of USAID Advancing Nutrition translated them into French, and another staff member reviewed them. Then, the data collection firm translated and back translated the guides into Hausa. The guides were translated verbally by data collectors into Kanuri when applicable. Because Kanuri is spoken in a minority of study communities, we did not translate the guides into Kanuri in advance.

As part of the data collector training, we pretested the data collection guides in a community that was not part of the sample. USAID Advancing Nutrition and the data collection firm finalized the translations of the guides after pretesting. Practicing the exercises helped ensure data collectors understood the objectives and the importance of not intervening in discussions to avoid influencing community members sharing their perspectives. To account for language differences across communities, teams edited words as needed to ensure understanding in participant communities, particularly where written and spoken language differs. Additionally, the pretest allowed the supervisory teams to adapt the wording of questions and improve probes to improve the depth and usefulness of the information garnered.

The FGDs and interviews were audio recorded with consent and the data collection firm produced detailed notes in French for coding and analysis. Quotations in this report are verbatim from the audio recordings.

USAID Advancing Nutrition used FGDs to collect the qualitative data from pregnant and lactating women who are caregivers of children under five, adolescent girls, family members, and traditional and religious leaders. FGDs encouraged participants to share common experiences and generate local solutions. Researchers held FGDs separately for each respondent group and split family members into groups of fathers and grandmothers to reduce the potential for response bias. The FGDs covered the following primary topics:

- the perceptions and experiences of women, girls, and family members—
  - seeking and using health and nutrition services
  - with supplementation

- the perceptions and experiences of women and girls learning about dietary practices, especially related to vitamin A and iron-rich foods
- social networks and key influencers
- household's agricultural production and household food access and intrahousehold food allocation
- the preference of women, girls, and family members on the format and types of activities which promote improved behaviors (nutrition SBC).

The FGDs included a mix of semi-structured questions and interactive, pile sorts and ranking exercises, and participatory exercises, such as completing stories without endings. See Annex 2 for the FGD guides and food lists used for the pile sorts and ranking exercises. The food lists were developed based on staff knowledge of common foods and USAID implementing partner staff input on iron- and vitamin A-rich foods that may have potential to be promoted.

We used the "best friend" approach with adolescent girls, which were group interviews with two adolescent girls who are friends. This interview guide was similar to the FGD guide used with adolescent girls. Researchers tried two different approaches to collect information from adolescent girls who were shy or somewhat reluctant to share information with data collectors: group interviews and FGDs. See Annex 2 for the group interview guide.

USAID Advancing Nutrition used semi-structured individual interviews to collect qualitative data from MoPH stakeholders, UN stakeholders, and USAID implementing partners, and semi-structured individual and group interviews to collect qualitative data from health workers and CHVs. These interviews encouraged participants to share their perspectives in detail and generate their own ideas for solutions. The interviews covered the following primary topics, related to IFA and vitamin A supplements, and iron and vitamin A nutrient-rich foods:

- supply side factors
- service challenges and solutions
- recommendations for services.

See Annex 2 for the interview guides.

Data Analysis

USAID Advancing Nutrition applied thematic analysis to identify the themes and patterns in the narrative data (Guest, MacQueen, and Namey 2012). The research team imported the interview notes into ATLAS.ti, a qualitative data analysis software package, to organize and code the data. We conducted initial coding using deductive codes, identified prior to data analysis based on the research questions and topics of interest, and inductive codes based on the data. We then exported the initial coding for the study team to analyze using matrices in Microsoft Excel to identify emerging themes—and determine whether and how emerging themes and patterns varied by respondent characteristics or region. In analysis, we disaggregated the findings by district and by the respondent groups (however, not by each respondent group within a district, as the sample size did not allow this). We used Python to analyze the pile sort data using similarity matrices, non-metric multidimensional scaling (MDS), and t-distributed stochastic neighbor embedding (t-SNE) (see Annex 3 for details). Next, we shared the preliminary findings with the project staff, Breakthrough ACTION, RISE II implementing partners, and the Ministry of Public Health through a participatory validation workshop, to further refine and develop the findings. After the workshop, we finalized the study findings and developed recommendations for how

to adapt and refine the intervention designs. For the report, we obtained direct quotations from the audio recordings.

Ethics and Confidentiality

USAID Advancing Nutrition submitted the study to JSI's Institutional Review Board (IRB); we received approval after Expedited Review. The Niger *Comité National d'Ethique* (National Ethics Committee) also reviewed and approved the study.

We included an informed consent statement at the beginning of all data collection activities to inform respondents that their participation is voluntary and explain the purpose of the study, how we will use the data, that participating involves minimal risk given the non-sensitive nature of the data collected, and the ask. The informed consent statement also informed respondents that we would keep their identity confidential to the maximum extent possible. We limited the collection of personally identifiable information as much as possible to minimize the risk of respondent identification, given the fact that some respondents may be internally displaced or live in areas with ongoing conflict.

For all unmarried participants under the age of 18 (i.e., minors), we first obtained informed consent from their parents or guardians before data collection. Then, we obtained the adolescents' assent to participate in the research.

We also used the following data security procedures to protect the data and maintain confidentiality. We did not begin recording until obtaining consent. We only recorded personally identifying information about respondents for the purposes of informed consent. We stored all hardcopy data in a locked room whenever possible. We saved electronic data on password-protected devices and used secure Google Drive folders to transfer and store them. We included research ethics, confidentiality, and data security procedures in the data collector training.

COVID-19 precautions were also part of the data collector training. Data collectors wore masks throughout, and they provided masks to participants to wear during data collection. We conducted data collection outdoors or in rooms with outdoor ventilation whenever possible. We instructed data collectors to monitor their health and not work if they were feeling ill.

Limitations

As with all qualitative research, there was a risk of response bias. Respondents may have provided responses that they considered socially acceptable rather than reporting what they actually think or do. For example, male and female family members were included in the same FDGs, which may have influenced how they responded to questions. They may also have provided answers that they thought would help them to receive project support in the future.

To attempt to mitigate these risks, the data collectors provided a clear informed consent and confidentiality statement before conducting data collection. We prepared and secured separate consent forms for parents of adolescent girls. Second, the data collectors asked key questions in multiple ways to triangulate responses. For instance, we asked sensitive questions on intrahousehold food allocation directly and as scenario questions. To reduce bias, questions posed during FGDs and interviews were primarily about general practices and perceptions in the community, rather than personal or individual behaviors.

We faced some data quality issues in Damagaram Takaya, where some of the data collection was conducted in Kanuri. This may have been related to translation challenges or data collector capacity.

The COVID-19 pandemic and insecurity did not limit our ability to implement the sampling plan or complete the research as planned.

Chapter 3. Findings on IFA and Vitamin A Supplementation

In this section, we present the findings related to IFA for pregnant women[1] and young adolescent girls' consumption and vitamin A supplementation for children under five. To provide context, we first present common perceptions of nutrition, which may influence health seeking behavior and adherence to supplementation.

Perceptions of Nutrition

Women and adolescent girls knew many benefits of good nutrition. Most identified good health and less disease for people of all ages, an attractive appearance for girls and women through weight gain, a shiny and radiant body, and smooth skin. Women also said that with good nutrition, a pregnant woman has safer childbirth and a healthier baby. However, respondents did not think members of their community had the characteristics they described.

> Through a person who has had a good diet, you see that they are fat and chubby and their body shines. Here in our group, there is no such person. Everybody is skinny. — *Pregnant woman and/or female caregiver, Magaria*

Women, family members, health workers, and community leaders knew that vitamin A deficiency and anemia are common. Most participants said that anemia is more common than vitamin A deficiency these days, and more serious, especially for pregnant women and young children.

> Anemia is very common in our community. For example, on average, we can count more than 6 out of 10 women who are confronted with the problem of anemia during their pregnancies and childbirth. — *Pregnant woman and/or female caregiver, Magaria*

> We equate anemia with suffering because your body expends more energy than your diet provides, so it goes without saying that your blood runs out. — *Pregnant woman and/or female caregiver, Guidan Roumdji*

However, community members did not distinguish between anemias caused by iron deficiency and sickle cell disease.

Research Question 1: Access to IFA Supplementation

Most women, family members, and community leaders knew that women should take IFA during pregnancy and that they would obtain these supplements at the health facility during their first trimester of pregnancy. However, it was more common for community members to discuss IFA supplementation practices during pregnancy than during lactation. RISE II project partners confirmed they are encouraging women to attend ANC services during pregnancy, but not at other times.

> In order not to see complications, you have to take the IFA. If you have complications, you are evacuated and there you have to pay a lot of money. If your husband has no money, you have to contribute. — *Pregnant woman and/or female caregiver, Damagaram*

Many women, all family members, and government stakeholders and USAID project partners acknowledged that accessing IFA is often a challenge due to long distances to reach services and breaks

[1] While the 2008 national micronutrient policy states that IFA supplementation should continue for three months postpartum in locations where prevalence of anemia is at least 40 percent (Government of Niger 2008), the focus of our research was on IFA supplementation practices during pregnancy given other data suggesting low uptake.

in the supply chain. Women receive 30 tablets at one time, so they must return to health centers repeatedly for IFA. often far from their homes.

> The difficulties encountered by the women of this village to make prenatal consultations are the distance that separates the village from the health center to Guidan Roumdji… women leave on foot for ANC often with an advanced pregnancy. It is not easy because they do not take the risk of riding on motorcycles, which are the most useful means of transport in the locality. — *Pregnant woman and/or female caregiver, Guidan Roumdji*

Most women and family members said that there are times pregnant women reach health centers to find there are no tablets available. In these cases, women explained that they receive a prescription to fill even when they cannot afford to do so. Some family members said that there are also times when health facilities turn women away from services because they are overcrowded.

> Sometimes, we can go up to 3 times or even 4 times without having a consultation because the health agents say that there are too many people. And that you have to come back another day, and even that day, if you leave, it is not sure because the agent may not be there or may be too busy. — *Family member, Guidan Roumdji*

Health workers shared challenges related to the supply of IFA. In some districts, health workers noted a lack of storage facilities and that untimely transport from district stores to health centers can delay supplies. Many also recognized a lack of systematization of roles and responsibilities between different districts and facilities to track and order IFA supply, which could limit coordination. In each district, participants identified different people as responsible for ordering, ranging from the health management team, the district pharmacist, and the reproductive health focal person.

Key Informants

Key informants from the government, UN, and implementing partners shared policies, strategies, and programs related to IFA and vitamin A supplements. The 2008 National Micronutrient Strategy (Government of Niger 2008) remains the guiding document for all stakeholders. It states that women should receive 60 mg elemental iron and 400 µg folic acid daily during the second and third trimesters of pregnancy, and for three months postpartum in locations where prevalence of anemia is at least 40 percent. Stakeholders noted numerous other policies/strategies that reference IFA, including UNICEF's Community Infant and Young Child Feeding Counseling Package and the Essential Nutrition Actions package. However, they all acknowledged that there is no standardized national training on IFA, which could be hindering access.

Stakeholders identified numerous challenges to coverage of IFA, especially the limited supply. They noted that although IFA supplements are part of the essential medicines list, requests from health posts and integrated health centers (IHCs), and supply from district level and above, are not systematic. Some stakeholders noted that supply is assured for health centers supported by UNICEF—and less frequently by NGOs—but not for others.

Stakeholders also identified challenges reaching populations. Current channels include clinic visits for ANC services, mobile clinics to remote populations, and vaccination campaigns, but these are infrequent. Some mentioned that health workers attempt to demand generation through counseling and community sensitization, but these efforts are insufficient to drive demand. Other stakeholders felt that demand is low because of fears of side effects such as taking IFA makes "delivery difficult because fetuses grow big" or lack of awareness of the importance of IFA.

Several stakeholders recognized that the limited data on coverage and uptake make it difficult to track progress and to quantify the gap in supply. Some stakeholders also recognized that there is a lack of

information on the prevalence and types of anemia common in Niger, and they believe "not all anemias require iron."

We received mixed responses as to the type of training community health workers (CHWs) and CHVs receive on anemia and IFA supplementation:

- Several Government of Niger respondents indicated that CHWs receive training on the types and causes of anemia and treatment options, while CHVs receive information on clinical signs of anemia and dosage and duration of treatment, as part of a standard training.
- Many indicated that there is no specific training module on IFA.
- One person mentioned that IFA is included in the prenatal consultation training.
- Half of the NGO staff interviewed mentioned that their programming involves some training on IFA as part of an integrated package, while others do not focus on micronutrients in their programs.
- The health-focused RISE II project plans to support the training of CHVs in community-based distribution of nutritional supplements, deworming, and contraceptives.

Two other projects stated that they promote IFA supplementation use through community groups (CHVs, *Maman Lumières* and infant and young child feeding [IYCF] support groups). Specifically, they train on Essential Nutrition Actions (which includes IFA and vitamin A supplementation), equip community members with communication materials, and monitor activities.

Stakeholders noted several challenges related to IFA distribution, including—

- lack of a training module on IFA
- difficulty of maintaining trained actors
- lack of refresher training
- inability to provide coverage for all villages
- lack of continuity of activities after the project.

Participant Recommendations

Many stakeholders recommended additional policies related to IFA supplementation for adolescents, and expanding the policy to supplement women until 40 days postpartum. (The current policy is actually 60 days postpartum in areas with anemia prevalence of ≥40 percent). However, others recognized the need to understand the etiology of anemia in Niger before implementing such recommendations to avoid harm.

To strengthen the supply chain, health workers suggested creating more intentional coordination between actors at each level, in addition to training on ordering, storing, and distribution on IFA at all levels.

> For the supply to be on time, it is necessary to have a synergy between the various actors in the region, the department and the partners because almost all the requests are discharged to the partners and for these partners it is the delivery which takes time. So it is necessary to get together to define the time and avoid certain breaks… In case of delay or breakage, we are in contact with the partners. We call them to find out what level we are at, what is happening, if

there is a risk that we will not be delivered on time so we can take the necessary measures to remedy the situation, however the problem always remains. — *Health worker, Guidan Roumdji*

It is true that here we have been fortunate to have some agents put in place by certain projects and who work in the management of malnutrition. We have a large IHC with 7 health huts and that all these huts are functional. Imagine if beyond the IHC we managed to train the agents who are at the level of our health huts, it would have a certain impact and it would further improve the quality of services. — *Health worker, Magaria*

There were several recommendations for the government to make the supply of IFA a higher priority. One stakeholder said, "the issue of supply must be a priority for the state and its partners; the state must lead and the partners must follow."

Another frequent recommendation involved expanding the role of CHVs, integrated community case management (iCCM) CHVs, and midwives to support IFA distribution and counseling. If that is not possible, CHVs could communicate to women when there are IFA supplies in stock, so pregnant women do not travel in vain. Additional suggestions include—

- Identify support actors to encourage pregnant and lactating women to seek ANC and IFA—specifically husbands and grandmothers (within households), local leaders (religious).
- Involve all existing community structures, such as *Comités de Gestion des Établissements Scolaires* (COGES), *Comités de Gestion de Santé*, the *Group de Soutien à l'Alimentation du Nourrisson et Jeune Enfant,* in supply chain management.
- Embedding IFA distribution through program interventions such as Nutritional Rehabilitation and Learning Homes, Village Growth Promotion activities, and husband schools to strengthen awareness and mobilize women.

Stakeholder recommendations also included identifying influential people and putting them into the communication and supply chain. They identified opportunities to promote and distribute IFA through a variety of channels such as—

- radio, SMS, and communication "caravans"
- influential community members such as COGES, "matrons", *Association Nigérienne de Marketing sociale* (ANIMAS SUTURA) committees,[2] and community groups (care groups, farmer groups)
- NGO activities such as community-based contraceptive distribution sites and during Resilience and Food Security Activity (RFSA) program food distributions (Corn-Soy Blend plus [CSB+] and oil) to pregnant and lactating women.

There was also a suggestion to partner with key community members and local partners based in communities using a "last mile" delivery system. UNICEF is currently piloting a strategy called "last mile delivery of inputs" in six health districts of the Maradi region, as an attempt to ensure the continuous availability of inputs at all distribution points. They intend to scale this up.

[2] Group of community promoters identified and set up by the Nigerian Social Marketing Association to distribute contraceptives at the community level.

Research Question 2: IFA Supplementation Adherence

Attitudes towards IFA Supplements

Women and family members acknowledged that even when women get IFA tablets, many women do not take the recommended number of tablets. Women described reasons such as a bad smell from the tablet and side effects, such as—

- vomiting/nausea
- dizziness
- muscle and joint pain.

Some women said that they also have a concern that too much blood would flow during childbirth if they complete a course of IFA supplements.

Quality of Counseling

Health workers recognized that women do not adhere to daily use. Some health workers expressed frustration that women do not do what they recommend. Health workers acknowledged that they cannot spend time providing quality counseling on IFA due to the large number of clients. Many government, UN stakeholders, and RISE II partners acknowledged that counseling was non-existent due to lack of training and counseling materials. Partners also mentioned the need for supportive supervision at both the clinic and community level. Similarly, health workers expressed a lack of clear counseling protocols and materials about iron deficiency or IFA adherence to help pregnant women and families overcome adherence challenges at key times, such as the smell, when experiencing initial side effects, and then when feeling better.

> There are a certain number of rules to respect so that the patient feels that you are interested in his problem and in return he will take your advice seriously. It is really an aspect that has been abandoned. It is really regrettable but it is an observation that is there. Whether it is at the level of district hospitals, IHCs and health huts, there is a radical change in the behavior of health professionals in terms of respect for care. — *Health worker, Guidan Roumdji*

Family and Community Support

Family members knew ways to minimize side effects and agreed to be a supporter to pregnant women in taking tablets every day, or an "adherence partner". Women and family members identified partners who could support improved adherence. Women liked the idea of someone to support them to get tablets and encourage them to take these every day. Most felt that husbands, co-wives, elders, or grown children would make good partners.

> Those who can help her are her husband, her co-wife, or her children if they are grown up. — *Pregnant woman and/or female caregiver, Damagaram Takaya*

> The idea of choosing a co-wife as a partner for taking the IFA tablets is good because the co-wife is a colleague, but on condition that the "current goes well" between the two co-wives. This idea is useful especially since the pregnant woman can forget to take these tablets many times, but if she is reminded, she will take them. This would improve the frequency and therefore her health and that of her baby. *Pregnant woman and/or female caregiver, Magaria*

Women had useful advice that they would share to encourage peers. Their positive experiences and wisdom would motivate others and help to shift norms and expectations about adherence, if they have opportunities to share.

> The advice we have to give to women is that when you consume the IFA you will not have any problem of lack of blood during the delivery. We have consumed the IFA. We have not been disappointed and when a woman neglects these tablets we will tell her that all the rumors that there is around the iron are unfounded. I myself have used it and I have been satisfied, so do not neglect the iron tablets. They are good for your health and that of your fetus. — *Pregnant woman and/or female caregiver, Guidan Roumdji*

Key Informants

Key informants from the government, UN agencies, and implementing partners reflected on challenges related to IFA adherence, especially that health workers currently share "heavy", technical recommendations to mothers using difficult modules, without a social and behavior change approach.

Participant Recommendations

Key informants identified a need for quality counseling job aids, updated refresher training, and supportive supervision guides for health workers and CHVs. Some specified post-training after one month to reinforce learning, and regular supervision monthly for the health district and quarterly for others.

Research Question 3: Vitamin A Supplementation

Access

During FGDs, the two ways community members reported accessing vitamin A supplements were—

- supplements are given to children during vaccination campaigns
- during ANC visits when women are given vitamin A supplements to give to their children.

Some health workers shared challenges with consistent supply of vitamin A supplements. They noted that the timing of campaigns depends upon when supply is sufficient. Some said that the supplies are often not adequate for all of the children, so they must prioritize the children who come first for services.

> In practice, if we need 100 children and we have doses for 50 children, there is a shortfall. We give to those present and those absent go to wait. And often when we see a child for consultation that has not received the vitamin, we take the opportunity to give it to him if it is available. — *Health worker, Guidan Roumdji*

No caregivers identified challenges with access to vitamin A supplements. Given the government's effort to shift away from campaigns and to integrating distribution of Vitamin A supplements into routine health services, challenges with the supply of Vit A supplements may be similar to those of IFA.

Attitudes toward Vitamin A Supplements

Most mothers, family members, and community leaders are well informed about vitamin A deficiency and said that their children get capsules twice a year during vaccination campaigns. Pregnant women and caregivers did not see vitamin A deficiency as a significant issue in the study communities because of supplementation.

> Because of the awareness of women who go to ANCs, this prevalence has become very low in our community since the health workers started to vaccinate children with the support of the community relays of the village. — *Pregnant woman and/or female caregiver, Guidan Roumdji*

Women were aware that health workers provided vitamin A supplementation during postnatal consultations and mass vaccination campaigns.

> In order for all children to receive vitamin A supplementation, women must be regular for postnatal consultations and take children out all together on mass vaccination days. — *Pregnant woman and/or female caregiver, Magaria*

A few mothers described hiding children during the vaccination campaigns due to fears of the polio vaccine. Some mothers said that they avoid taking their child for vaccinations due to fever; although they did not specify whether they believed it is the vaccine or the vitamin A capsule that causes fever.

> When they come for the campaign, we even hide the children at the time of the campaigns. They say that the children become unruly. It is at the time of polio [vaccination campaigns]. — *Pregnant woman and/or female caregiver, Damagaram Takaya*

Key Informants

Key informants, including government, UN agency, and implementing partner representatives, recognized the 2008 National Micronutrient Strategy as a guiding document on vitamin A supplementation. Stakeholders noted numerous other policies/strategies that mention vitamin A. Of note is the Government of Niger's recent shift away from polio vaccine campaigns (due to the high cost), and instead toward integrating vitamin A supplementation into the health system. The Government of Niger has five channels through which they propose reaching populations with vitamin A supplements (mobile clinics, community-based management of acute malnutrition, growth monitoring and promotion, well child visits, and mass campaigns).

One newer national guiding document is the *Vitamin A Operational Plan*, which is being rolled out with the support of several NGOs (including HKI). There appears to be limited knowledge of this plan as several national and district level stakeholders were not yet aware. Those who knew suggested the following support to the rollout in addition to the supplements: commitment of actors, funding, training, monitoring/reporting systems, and demand generation.

While beneficiaries did not perceive a supply issue, nearly all government, UN stakeholders, and RISE II partners stated that the lack of supply of vitamin A at health centers limits coverage. Many noted that health centers rely on supplements leftover from campaigns, and some depend on UNICEF or NGOs. Several added that although vitamin A supplements, like IFA, are on the essential medicines list, purchasing does not occur systematically. Similar to IFA, there are concerns about lack of reporting on the number of women and adolescents who receive supplements.

Stakeholders noted that health workers provide most supplementation through vaccination campaigns. Reaching 24–59 month old children is challenging, as only the 0–6 month old children come regularly for infant consultations and vaccinations. One stakeholder shared that caregivers associate harmful effects of vitamin A supplements with harmful effects like sterility because supplementation usually occurs during polio vaccination campaigns.

Half of the MoPH stakeholders indicated that CHWs and CHVs receive training. For CHWs, this training including information about which foods are vitamin-rich, the purpose of vitamin A supplementation, the target and dosages to administer during routine and campaign, and the frequency of supplementation. For CHVs, this training covers foods that are rich in vitamin A, the importance of the vitamin, and the target population for supplementation. The other half of MoPH stakeholders indicated that in some communities there is only a brief training before a campaign.

All but one responding NGO has activities that focus to some degree on vitamin A training:

- using the IYCF package but focusing on promoting foods rich in iron and vitamin A
- clinical integrated management of childhood illness

- For CHVs, community-based distribution is part of their responsibilities. These activities have not yet started (health-focused project).

Several respondents indicated that training modules on vitamin A supplementation exist, however training is inadequate. Reasons for this include—

- lack of communication materials at the level of health facilities and CHVs
- lack of supportive supervision at community and health facility levels
- vitamin A is badly perceived because it is associated with vaccination against poliomyelitis
- mobility of health workers
- lack of training from higher to lower levels within the health system.

Participant Recommendations

Stakeholders raised several recommendations to increase coverage of vitamin A supplements. Most commonly, they suggested utilizing CHVs for community-based distribution. Some stakeholders also recommended emphasizing distribution through routine well child visits, in addition to campaigns, for as a more financially viable opportunity, in line with the transition to routine distribution outlined in national plans.

Some stakeholders also suggested mobile clinic outreach days, door-to-door distribution, and community platforms for distribution. Ideas for community platforms currently supported by projects included community groups, religious, young people and women's associations, schools for husbands, care groups, Village Growth Promotion Teams, and Nutritional Rehabilitation and Learning Homes, and *distribution à base communautaire* sites.

Several key informants suggested promoting vitamin A supplement demand through a variety of communication channels such as radio and community awareness days, as well as community platforms and groups.

To improve health care provider training on vitamin A supplementation, government and UN stakeholders, and RISE II partners suggested the following:

- Conduct counseling for mothers using simplified messages instead of using heavy and often difficult modules to get the message across more accessibly.
- Conduct refresher training of frontline workers.
- Ensure post-training follow-up after one month.
- Ensure regular supportive supervision (of IHCs by health districts and the *Direction régionale de la santé publique* [DRSP]).

Chapter 4. Findings on Consumption of Vitamin A- and Iron-Rich Foods

This section explores the factors that influence consumption of vitamin A- and iron-rich foods by women, adolescent girls, and children under five. First, we explore the food and gender norms that influence consumption, including intrahousehold allocation. Next, we describe how communities access foods and challenges faced. Finally, we investigate factors that influence consumption of vitamin A- and iron-rich foods specifically.

Food Access and Food Norms

Food access, in addition to customs and norms around food and cuisine, influence what and how people eat. In response to open-ended questions and pile sort exercises, respondents shared which foods they eat together and which they see as healthy or nutritious.

Respondents predominantly reported that they consume what they produce through farming, market gardening, and livestock production. Respondents in Guidan Roumdji and in agro-pastoral communities discussed accessing food through their own production more frequently than in the other two districts and agricultural communities. Respondents noted that successful crop production is reliant on good rainfall for both rainy season production and dry season production in flooded valleys and riverbeds. Even respondents farther south in Guidan Roumdji, where rainfall is better than areas farther north, said that rainfall has lessened over time resulting in lower yields. RISE II partners shared that in some of their program areas, "villages are not suitable for the practice of home gardens because of water problems". A few respondents also said that male rural migration, including to gold mines in Mali, reduced families' ability to produce crops. However, others said that husbands were able to provide for their families by sending income home.

Respondents described commonly consumed foods as those produced locally. There is one rainy season from approximately June to September (with variation by livelihood zone and annual rainfall), during which millet, sorghum, cowpeas, and groundnuts are produced. Depending on access to low lying land and irrigation, garden production and harvesting can last well into the dry season. The cool dry season is approximately October to February and the hot dry season is approximately March to May, with variation by livelihood zone (FEWS NET 2011). While their stores lasted, respondents relied on their own production and then on market purchases, as is common each year. This leaves many households dependent on market purchases for eight to nine months out the year (FEWS NET 2014). The lean season occurs from approximately June to September, with variation by livelihood zone[3] (FEWS NET 2013) and increasing unpredictability due to climate change (World Bank 2021). A community leader in Magaria described how quickly they ran out of the harvest this year, a mere three to four months after the main harvest:

> Even millet, which is our staple food and produced locally, is often lacking because the production is generally consumed from May. This year, it will not even exceed covering the month of April. — *Community leader, Magaria*

Compared to Guidan Roumdji, the millet and sorghum production zone, respondents in Damagram Takaya, an agro-pastoral zone, and Magaria, a market gardening zone, discussed accessing food through

[3] In the southern irrigated cash crop livelihood zone along the border with Nigeria in Maradi and Zinder, the lean season is typically June to August. In the rainfed millet and sorghum belt in mid-Maradi and Zinder, the lean season is typically April to September. Farther north in Maradi and Zinder, in the agro-pastoral belt, the lean season takes place from July to September (FEWS NET 2011).

purchases more than their own production. Respondents overwhelmingly described food purchases as expensive and unaffordable for most in their communities. A UN stakeholder shared that "food intake in Niger is partly based on energy foods because nutritious food costs twice as much." Government staff in Maradi described how women in Maradi do not consume animal-source foods due to lack of accessibility. At the time of data collection, "average prices for all products are significantly higher, with increases [this year] of 20–30 percent for millet, sorghum, and maize compared to last year and the five year average." (FEWS NET 2022). Some respondents also said that markets are far away and difficult to access. A few respondents noted that price increases and reduced mobility due to the COVID-19 pandemic had further constrained food purchasing. For example—

> This has changed with the advent of COVID-19 because travel is limited, trade is reduced, and market attendance has been reduced. We can't sell enough animals to buy food in the market. *— Community volunteer, Magaria*

A recent Fill the Nutrient Gap cost of diet analysis completed by WFP estimates that a nutritious diet is not affordable for 59 to 75 percent of households in Zinder (59 percent in agricultural areas, 63 percent in pastoral areas, and 75 percent in agro-pastoral areas). In Maradi, a nutritious diet is not affordable for 74 to 79 percent of households (74 percent in agro-pastoral areas and 79 percent in agricultural areas). This analysis also found that vegetables, fruits, meat, and offal were less available, more variable, and more expensive in markets in agro-pastoral and pastoral areas compared to markets in agricultural areas. Prices were low and stable across markets for less nutritious food such as cereals, roots, pulses, and oils (WFP 2021).

The other minor food sources reported were gathered foods from the wild and received food assistance. Women, adolescents, and sometimes children gather green leafy vegetables and fruits from the wild, particularly in Magaria. A minority of respondents also reported receiving food distributions or food vouchers.

Table 2 presents the foods respondents said are commonly consumed and available locally and the main sources for those foods, although these vary seasonally. We list foods in the row corresponding to the most common source. Within each category, the foods that respondents most frequently indicated their communities consume are in bold. With the exception of milk, animal source foods, including meat, eggs, fish, and cheese, were largely not accessible. Many respondents did not produce these foods and described them as expensive to purchase. Additional foods that respondents said were difficult to access included millet, sorghum, papaya, bananas, guava, carrots, eggplant, potatoes, and locusts. In the pile sort exercises, participants most commonly labeled animal source foods (*kilishi* [dried meat], locusts, meat, liver, and eggs) and oil as luxury foods.

Table 2. Common Foods by Source and Food Group

Food Source	Cereals and Tubers	Legumes and Seeds	Animal Source Foods	Vegetables	Fruit
Own production (farming or gardening)	**Millet** **Sorghum** **Cassava**	**Cowpeas** **Groundnuts**	N/A	**Baobab leaves** **Sorrel** **Squash** **Okra**	**Watermelon** Melon

Food Source	Cereals and Tubers	Legumes and Seeds	Animal Source Foods	Vegetables	Fruit
				Tomato	
Purchase	Rice Sweet potato	Soybeans	**Milk**	Cabbage Lettuce	Orange
Gathered from the wild	N/A	N/A	N/A	*Laptadenia Hastata* (green leaves) *Gui* (green Leaves)	N/A
Food distributions or vouchers	Millet Flour Rice	Beans	N/A	N/A	N/A

We gathered information about how a range of foods are prepared and consumed through the pile sort activities and FGDs. These foods were not all accessible to respondents, however, so this information reflects local food norms and dishes, rather than the variety of what respondents eat day-to-day. See Annex 2 for more information about how respondents sorted foods based on how they are cooked and eaten.

The main cereal staples consumed in Maradi and Zinder—millet and sorghum—are made into dough balls or paste (resembling a stiff flour porridge like polenta), or traditional couscous. Additional ingredients in the dough balls may include soybeans, cheese, milk, sesame seeds, baobab fruit, guinea corn, cowpeas, and wheat. Some people consume maize dough, rice, or pasta as the starch in the meal, but more this is commonly, they consume millet and sorghum. Nigeriens eat the starch with sauces made with vegetables, legumes, tubers, or less frequently meat, for lunch, dinner, and sometimes breakfast. Adolescents also reported eating porridge, particularly for breakfast, and women discussed feeding children porridge. For example, an adolescent girl described when she eats different cereal dishes:

> In the morning, we eat porridge for the most part. At noon, we eat the traditional couscous made of millet, sorghum or corn, and in the evening we eat millet, sorghum or corn paste. — *Adolescent girl, Magaria*

Respondents described a range of ingredients that they use in sauces, provided the foods are accessible. The vegetables used in sauces are fresh or dried green leafy vegetables such as sorrel; baobab leaves; amaranth leaves; moringa leaves; and other vegetables like tomatoes, okra, or pumpkin. Legumes used in sauces include cowpeas, soybeans, and groundnuts. Tubers used in sauces include potatoes, taro, and cassava. They also add onion, oil, and other flavoring like Maggi cubes. Common sauces named by respondents include baobab leaf sauce, okra sauce, “red” sauce (i.e., tomato based), “black” sauce (with

a base of dried leaves like baobab, or okra, which gives a sticky consistency). Ingredients for what respondents described as good leaf sauce (*kayan tabshe*) were groundnuts, sorrel, dried tomatoes, amaranth leaves, pumpkin, onion; they may also include onion, meat or fish, or other greens like moringa leaves or cabbage.

Other foods are fried, such as fish, locusts, yam, eggs, and soybean powder donuts (*awara*). Respondents also consume fruits like watermelon.

In pile sort exercises, respondents also grouped foods into categories based on their health properties. Table 3 shows the types of health and nutrition properties on which respondents based their pile creation. Respondents categorized a range of foods into each category. The table below shows foods most commonly placed in each category. Respondents made the most piles for foods that are generally nutritious and food for the body, foods that increase blood and fight anemia, foods that give strength and build the body, and foods that have vitamins.

Table 3. Foods by Health and Nutritional Properties

Health or Nutrition Property	Food
Increasing fat (*kara maski*)	**Legumes and seeds:** Tiger nut, groundnut
Fights hunger (*yana fidda gniwa*)	**Animal source foods:** *kilishi* (dried meat), eggs, liver, fish, meat **Cereals:** Rice, wheat, sorghum, millet, guinea corn, sweet potatoes (vitamin A orange flesh) **Legumes and seeds:** Sesame seeds, cowpea
Gives energy	**Animal source foods:** Liver, meat **Cereals:** Rice, wheat **Tubers:** Sweet potatoes (vitamin A orange flesh), taro, cassava
Gives strength (*karhi*) or builds the body	**Animal source foods:** Cheese, eggs, liver, locusts, milk **Fruit:** Baobab fruit **Vegetables:** Cabbage, moringa leaves
Good for growth (*kayan gina jiki*)	**Fruit:** Papaya, cantaloupe, watermelon, mango, guava, orange, banana, baobab fruit **Legumes and seeds:** Soybean curds **Tubers:** Yam **Vegetables:** Wild eggplant, eggplant, carrots, pumpkin, dried tomatoes, cabbage, lettuce, onions, tomatoes
Has vitamins (*maganin gniwa*)	**Legumes and seeds:** Tiger nut, cowpea, groundnuts **Vegetables:** Carrots, dried tomatoes
Improves vision	**Fruit:** Papaya, orange, cantaloupe, banana, watermelon, guava **Tubers:** Taro, cassava, yam **Vegetables:** Eggplant, wild eggplant, carrots, tomatoes, moringa leaves, sorrel, cabbage, amaranth leaves, pumpkin, onion, lettuce

Health or Nutrition Property	Food
Increases blood (*yana kara gini*) or fights against anemia (*kara jini*)	**Fruit:** Guava, papaya, watermelon, mango, orange, banana, cantaloupe **Vegetables:** Wild eggplant, eggplant, carrots
Increases vigor (*kara karfin jiki*) or liveliness (*hamzari*)	**Animal source foods:** Milk, cheese **Cereals:** Guinea corn **Fruit:** Baobab fruit **Legumes and seeds:** Cowpea **Tubers:** Cassava, yam, sweet potatoes (vitamin A orange flesh), taro, potatoes
Nourishes skin (*yana djara fata*)	**Animal source foods:** Liver, *kilishi* (dried meat) **Fruit:** Papaya, cantaloupe, guava, mango **Legumes and seeds:** Tiger nut, sesame seeds, groundnuts Oil **Tubers:** Cassava, yam, sweet potatoes (orange flesh) **Vegetables:** Tomatoes, cabbage, amaranth leaves, pumpkin, lettuce

Gender Norms and Intrahousehold Food Allocation

Gender norms influence the roles family members play in sourcing, preparing, and allocating foods at mealtimes (See table 4). We asked respondents to describe the characteristics of an ideal man and woman and who is responsible for providing for the nutrition of the family. Respondents consistently identified the husband or father of the family as the person responsible for the nutrition of the family, and indeed for all of the family's needs. Mothers and wives provide a supporting role by preparing and serving food to the family. Husbands are supposed to appreciate wives and treat them well. Wives are supposed to care for the family, be considerate, patient, discrete, and respectful towards their husbands, in-laws, and other family members. Indeed, a study of power distribution within households in Niger found that all household members should be obedient to the head of household (Wouterse 2016).

Table 4. Characteristics and Responsibilities of Men and Women

Topic	Females	Males
Ideal characteristics	• Respect her husband (*tarbiya*) and other household members (*ladabi*), particularly her in-laws • Considerate, patient, and obedient • Discrete and does not share family problems outside of the family • Contribute to functioning of the household, including doing household chores	• Spend all of his earnings on taking care of his family • Ensure his wife and children have access to nutritious foods • Appreciate his wife and do not quarrel with or mistreat her

Topic	Females	Males
	• Care for the family, particularly for children	
Nutrition-related responsibilities	• Take care of the health and nourishment of her family. • Prepare food and share food with others before herself. • Help produce food and sometimes contributes to decision making about what foods to produce. • Gather food from the wild.	• Provide food, including nutritious food, for all family members. • Primary decision maker about what foods to produce and purchase • Produce food for the family.
Example quotes	In our village, a good woman is the one who prepares food and distributes it to other family members before herself. She is also the one who takes good care of her husband, her children and her parents-in-law. She ensures the hygiene of the household, including clothing. — *Pregnant woman and/or female caregiver, Magaria* It is when she is at home that you notice that she is a good woman. — *Pregnant woman and/or female caregiver, Damagaram Takaya*	The ideal husband is the one who provides for his family and takes care of all the family's needs such as health, education, food, clothing. He cannot have peace of mind when the family is in a critical situation. — *Family member, Guidan Romdji* In our village, a good husband is one who takes care of all the household chores. He looks for food and makes it available to the wife who prepares it for the rest of the family, dresses all the members of the family, provides health care within the limits of his capacity and maintains his wife well without mistreating her or quarreling with her. Therefore, the one who takes care of the whole family. He is the good "Ogga", that is to say the good boss. — *Pregnant woman and/or female caregiver, Magaria*

Men were the primary decision makers about what food to purchase and what crops to grow according to respondents. Women helped men with agricultural production and respondents said that women sometimes contributed to decision making about what crops to produce. Another study in Niger found that men dominate millet production and control cash crops, including millet, sorghum, cowpeas, and watermelon. Women produce secondary crops, only control production on small portions of land, and control production of crops like sorrel, okra, groundnuts, and squash (Walters 2017).

Gender and age norms influence intrahousehold food allocation. Households eat common dishes prepared for the whole family. These meals are served by dividing them into portions for different groups of the household, who sit together to eat. Groups are based on gender and age and depend on household composition. The average household size in rural Niger is 5.9, although this varies based on family structure. The highest rate of polygamy in the country is in Maradi, where 52 percent of women

are in polygamous unions. In Zinder, 31 percent of women are in polygamous unions (INS and ICF International 2013). In Niger, it is typical to have a husband and wife, co-wives (if applicable), children, and the husbands' parents and siblings living in one household (Wouterse 2016). Respondents explained that women divide the meal into different portions for these groups, typically in the following order: (1) husband; (2) husband's parents, brothers, and sisters; (3) boys; (4) girls; and (5) wife. In some cases, women divide the food into more groups, with young children and adolescents served separately as well, and older children served more food than younger ones. Women serve sisters of the husband before the wife, if they are present in the household. For example, women in Magaria explained how women in their community distributed food at meals:

> The wife prepares the meal for the whole family and distributes food to the other members of the family before herself. — *Family member, Magaria*

> Beginning with the husband, his brothers if they live together, the grandparents, children, and then [the wife] last. This is our custom, and we believe it is the same in most households. — *Pregnant woman and/or female caregiver, Magaria*

Community leaders in Guidan Roumdji noted that families often divide dishes into 10 portions, the highest number reported. In FGDs, respondents did not explain how this distribution varies in polygamous vs. non-polygamous households. Family members explained that women take pride in serving themselves last, even if that means they do not receive enough food. Family members in Magaria explained:

> Women prepare [the food] and serve other family members before themselves, and they are proud to do so, even if they receive less food than other family members. — *Family member, Magaria*

Some female respondents noted that their mothers-in-law and sisters-in-law were not supportive of their husbands providing them with adequate food, indicating intra-household tension about women's entitlement to food depending on their position in the household. Women in a FGD in Guidan Roumdji explained this tension,

> Husband's family members are those who do not like the husband to support his wives in the consumption of rich foods. We can cite the husband's sisters-in-law and the wives of the husband's brothers, they are called " kishiyan samdi" i.e. the wives of 2 brothers. — *Pregnant woman and/or female caregiver, Guidan Roumdji*

In a few FGDs, family members and women said they were able to reserve a sufficient amount of food for themselves. A few respondents noted that if there was not enough food for everyone in the household, they prioritize children over adults.

Key Informants

Government of Niger, UN stakeholders, and implementing partners saw access to and affordability of nutritious foods as significant constraints, caused by high food costs and a lack of water and quality agricultural inputs (particularly seeds). Cultural norms around intrahousehold food allocation also limit what women and girls are able to eat.

They provided several recommendations to improve consumption of nutritious foods:

- Engage many sectors to address the availability and access of foods.
- Improve community [groups'] access to microcredits to facilitate the acquisition of small processing units to make processed products more accessible to households.

- Engage both the public sector (ministries) and private sector (by increasing production of locally fortified foods).
- NGOs have a number of platforms through which they aim to improve household consumption, such as—
  - establishing hut gardens, farmers' school fields (collective fields) household gardens, market gardens to promote production of foods like moringa and baobab
  - holding seed fairs to improve household access to agricultural inputs
  - providing of processing units for market garden products
  - providing of small ruminants to increase animal husbandry opportunities
  - improving household access to locally fortified flours (g*arin yara*)
  - conditional distribution (CSB+ and vegetable oil enriched with vitamin A) to pregnant and nursing women, and children under 24 months.
- Improve communication with interministerial authorities and multi-sectoral actors on the production of foods with high nutritional value.

Research Question 4: Consumption of Vitamin A-and Iron-Rich Foods

Women's Consumption of Vitamin A- and Iron-Rich Foods

Behavior and Attitudes

As noted in Chapter 1, one study found that only 16 percent of pregnant and 15 percent of lactating women had adequate dietary diversity in Zinder. In addition, 52 percent of pregnant women and 89 percent of lactating women consumed inadequate amounts of vitamin A. Iron intake was inadequate for 47 percent of pregnant women but only 1 percent of lactating women (Wessells et al. 2019).

Women and family members consistently reported that women are largely restricted to consuming what is available in the home. (See table 2 above). While women predominantly eat at home, they occasionally purchase premade foods like donuts at the market and eat at community ceremonies like weddings. As discussed in the previous section, locally produced foods are primarily available in the home, in addition to affordable foods purchased in local markets. Men primarily are responsible for purchasing food and making decisions about what to purchase. Women are responsible for gathering wild greens and fruits, which could be nutritious. For example, yodo (*Cerathotheca sesamoides*) is one type of indigenous dark green leafy vegetable that women gather that can contribute substantially to meeting iron and partially to vitamin A requirements (Sena et al. 1998).

Respondents identified a range of vitamin A- and iron-rich foods as good, nutritious foods for women. However, respondents did not consider many of these foods affordable. In pile sorts, pregnant women and caregivers also identified which foods they saw as a source of vitamin A and iron. Women in all focus group discussions correctly identified one or more foods as sources of vitamin A and iron. See table 5 below for the foods with vitamin A and iron that respondents most commonly saw as good for women and that women correctly identified as sources of vitamin A and iron.[4] The classifications that

[4] These iron and vitamin A classifications were determined based on whether the food contains adequate iron or vitamin A to contribute toward meeting daily values of these nutrients (5 percent or greater of estimated average requirements) in this highly food insecure

we provide for vitamin A- and iron-rich foods focused on whether the foods contribute toward meeting the recommended daily values for these micronutrients in this highly food insecure environment. As such, the classifications include foods that are not strictly considered vitamin A- and iron-rich.

Table 5. Foods with Vitamin A and Iron Seen As Good for Women and Micronutrient Source

Topic	Foods with Vitamin A	Foods with Iron
Good for women	Milk Oil (assuming fortified) Guava Fish Mango Moringa leaves Pumpkin Liver Papaya Okra	Millet Baobab fruit Cowpea Meat Fish Guinea corn Moringa leaves Liver Soybeans
Source of micronutrients	Milk Cheese Moringa leaves Sweet potatoes (orange flesh) Oil (assuming fortified) Baobab leaves Liver Sorrel Amaranth leaves	Cowpeas Eggs Soybeans Liver Fish Moringa leaves Locust Taro Tiger nut Meat Potatoes

Respondents explained the importance of consuming nutritious foods for the health of women and their children, particularly for pregnant women. Community leaders said they encourage husbands to provide their pregnant wives with iron- and vitamin A-rich foods. As noted previously, preventing anemia was the second most common health benefit identified for food in the pile sort exercise. For example, a woman in Magaria said:

> The foods suggested for pregnant women are given to them because they prevent anemia and improve the physical appearance of the woman's body. She becomes bright and beautiful to look at. Those given to pregnant women strengthen the health of the mother and the child. They also promote the growth of children. — *Pregnant woman and/or female caregiver, Magaria*

However, women reported that people are not able to eat good diets in their community and thus do not show the physical signs of good nutrition.

environment. These classifications do not take into account nutrient requirements for different ages and may vary based on the species and if the food is fresh or dried.

Despite an understanding of the importance of consuming micronutrient-rich food, particularly during pregnancy, women and family members said that limited access prevents women from eating these foods. Respondents said that husbands are responsible for and wanted to provide nutritious foods for their families. However, their incomes were not sufficient to provide these foods, or they migrated for work and were unable to support them while they were away. Community leaders noted a few cultural norms around food consumption during pregnancy that may deter consumption of some nutritious foods; however, respondents also said these norms are not followed as much today. These include that pregnant women should not eat—

- eggs because they can cause the child to stutter
- salty sauces until the baby is weaned because it can cause a fatal allergy
- meat of a female animal that has been slaughtered because the woman may risk the same fate.

In addition, women who steal eggs to eat when pregnant will give birth to a child with an egg-shaped bump on its head. This tradition extends to not accepting eggs as a gift.

Participant Recommendations and Enablers

Participants primarily focused on the need to improve access to nutritious foods to improve the women's consumption of nutritious foods. A few noted that this should occur through increased food assistance.

Social norms largely support husbands providing sufficient nutritious food to pregnant women, and community leaders suggested encouraging husbands to provide pregnant wife with iron- and vitamin A-rich foods. However, family support is not high and women's status in the household overall is low. In this highly food insecure context, women have limited entitlement to food as they are typically expected to prioritize providing food for other family members over themselves. A few participants noted that women should advocate for getting a fair portion of the family meal when pregnant so they do not put their own health and that of their baby at risk.

Adolescent Girls' Consumption of Vitamin A- and Iron-Rich Foods

Behavior and Attitudes

Like women, adolescent girls and family members consistently reported that adolescent girls are largely restricted to consuming what is available in the home and eat the same foods as other household members. (See table 2 above). As one adolescent girl explained:

> What we eat is not different from what other members of our families eat because we eat what we have prepared and it is the same pot. — *Adolescent girl, Guidan Roumdji*

A few girls said that they sometimes eat food at friends' houses or at community events and ceremonies. They also sometimes gather wild foods, such as the tuberous roots of *katchala*, an aquatic grass that grows in waterways. A minority said that they would ask their fathers for particular foods if they wanted them.

As with women, adolescents did not often have access to nutritious foods because their parents could not afford them. As they largely relied on their family's agricultural production for food, their access to food varied seasonally; as one adolescent girl explained:

> What we eat differs in quantity depending on the period and the type of food. The quantity is greater during the harvest period because there is an abundance of food, and during the lean

> season, what we eat today differs in quantity from what we can eat the next day. For foods that are eaten occasionally, such as meat, the quantity varies according to the quantity prepared. — *Adolescent girl, Guidan Roumdji*

A few girls noted that when the household does not have enough food, they eat less preferred foods or skip meals. The monotony of their diet and quality of food also reduces the quantity they consume, because they prefer to eat dishes that are different from the usual millet and sorghum, and they do not eat as much when the dishes do not taste good.

In pile sorts, respondents in Guidan Roumdji identified a range of foods with vitamin A and iron as good, nutritious foods for adolescent girls. However, they also said girls have limited access to these foods because of household food insecurity. Adolescent girls in all but one FGD correctly identified one or more foods as sources of vitamin A- or iron-rich, despite not receiving nutrition counseling. Adolescent girls also did a listing and ranking exercise for their favorite vitamin A- and iron-rich foods. See table 6 below for the foods with vitamin A and iron that respondents in Guidan Roumdji saw as good for adolescent girls, that adolescent girls correctly identified as sources of vitamin A- and iron-rich,[5] and that adolescent girls said they preferred.

Table 6. Foods with Vitamin A and Iron Seen As Good for, a Micronutrient Source, and Preferred by Adolescent Girls

Topic	Foods with Vitamin A	Foods with Iron
Good for adolescent girls	Mango Papaya Locusts Amaranth leaves Carrots Sorrel Guava Cantaloupe Baobab leaves Sweet potatoes (orange flesh)	Locusts Amaranth leaves Sorrel Baobab leaves Taro Tiger nut
Micronutrient source	Moringa leaves Sweet potatoes (orange flesh) Oil (assuming fortified) Baobab leaves Liver Sorrel Amaranth leaves Locusts Carrots Dried tomatoes Mango	Eggs Soybeans Cowpeas Liver Fish Moringa leaves Millet Taro Meat Potatoes *Kilishi* (dried meat)

[5] These iron and vitamin A classifications were determined based on whether the food contains adequate iron or vitamin A to contribute toward meeting daily values of these nutrients (5 percent or greater of estimated average requirements) in this highly food insecure environment. These classifications do not take into account nutrient requirements for different ages and may vary based on the species and if the food is fresh or dried.

Topic	Foods with Vitamin A	Foods with Iron
	Papaya Cantaloupe Okra	
Preferred by adolescent girls	Oil Locusts Mango Papaya Cantaloupe Okra	Cowpeas Meat Eggs Potatoes

Adolescent girls recognized the value of eating nutritious foods for their own health. They were motivated to consume healthy foods, and wanted to feel healthy and fulfilled like the girls shown in pictures during the FGD exercises. However, they did not know any girls who ate a good diet.

> All girls who eat a good diet are different from others. You can see this by their body shape. But in our village, we don't know the girls who have a good diet because we are in the countryside. — *Adolescent girl, Magaria*

Respondents noted that they rarely receive advice on nutrition. Largely, communities do not see adolescent girls as having unique nutritional needs, or as a population vulnerable to undernutrition or micronutrient deficiencies. A few adolescent girls think they should eat good foods once they begin menstruating to improve their health, be healthier, and find a suitor. As with other family members, adolescent respondents saw it as the father's responsibility to provide nutritious foods for them. While a few respondents described the father's general responsibility to provide for the family as a "burden," this was particularly the case for unmarried adolescent girls. Once they are married, girls become their husband's "burden". One respondent noted that parents and grandparents have different perceptions of adolescent girls' nutrition and right to food.

> There is a difference between the perceptions of the parents and those of the grandparents on the nutrition of the teenagers insofar as certain foods "*mayyé*" (ball of millet to which certain plants are added) according to our grandparents should not be given to the teenagers who are in the age of menstruation to delay the occurrence of the period. They have the right to eat it only when they are going to get married. We still hold on to our traditions because they are our values and they exist in our community until now. — *Family member, Guidan Roumdji*

Participant Recommendations and Enablers

Girls expressed interest in learning about nutrition and said that they would follow advice they received. In the FGDs and group interviews, we asked adolescent girls to complete three activities that implementing partners could use as part of social and behavior change interventions with adolescent girls. One involved providing a "gift" to girls, which was a box or basket with photos of healthy girls. The interviewer explained the benefits they would obtain from eating iron-rich foods every day like beans or moringa leaves, especially if they ate this food with lime or fruit. Eating these foods would be like giving a gift to themselves because they would help them look like the girls in the pictures, feel good every day, perform better in school, concentrate better, have more energy, and feel less tired. Another activity was a listing and ranking exercise in which participants listed all of the foods containing iron and vitamin A and then ranked their favorites from one to ten. In the last activity, girls received paper and markers

to make a poster that would encourage their siblings to eat healthy food each day. The girls said they liked all of the activities and found them interesting. They particularly enjoyed the ranking and listing exercise and making the poster. One said the listing and ranking exercise was like a game. Several girls said they would share what they learned with their friends and siblings. However, one noted that while these activities were appropriate for girls who have gone to school, but they may not be feasible for girls who have not.

Children's Consumption of Vitamin A- and Iron-Rich Foods

Behavior and Attitudes

As noted in Chapter 1, a minority of children 6–23 months in Zinder and Maradi consume iron- and vitamin-A rich foods. In Zinder, only 8 percent of children 6–23 months of age consumed foods rich in iron (including meat, fish, poultry, and eggs) and 26 percent consumed vitamin A-rich foods in the previous 24 hours. In Maradi, 11 percent of children 6–23 months of age consumed foods rich in iron (including meat, fish, poultry, and eggs) and 29 percent consumed vitamin A-rich foods in the previous 24 hours (INS and ICF International 2013).

Respondents reported that children largely eat what the rest of the family eats, as they are restricted to consuming what is locally available. However, children's diets vary somewhat by age. Under the age of two, children breastfeed and once they begin complementary feeding, a few respondents noted that children should receive porridge, milk, water, and fruit. Respondents shared mixed perceptions about whether young children should not eat certain foods. The most common foods that respondents thought children should not eat were eggs, leafy green vegetables, and meat. Some said that children should not eat eggs and that mothers do not follow health workers' advice to give kids eggs because they can cause them to stutter or have delayed speech, while others said that tradition is less prevalent. The concern respondents reported regarding green leafy vegetables, particularly sorrel, was that they can cause diarrhea.

> We also do not give eggs to children under 5 years old, otherwise the child will be locked up like an egg, that is to say, it takes a long time before it starts to speak. — *Community leader, Allah Karbo*

> If the child is too small, it consumes its mother's milk, and if necessary, it is given porridge, but it should not be given *yakuwa* because it is a food that constipates them and causes diarrhea. This can be detrimental to their growth and development. — *Community leader, Magaria*

> In the past, our parents did not give sorrel and certain traditional products because these products like sorrel cause diarrhea in children. This product (sorrel), even now, is not recommended to be given to children. — *Community leader, Magaria*

In general, respondents thought that milk, eggs, fruit, liver, beans, and vegetables were nutritious foods for children. Table 7 shows the foods with vitamin A and iron foods that respondents listed as good, nutritious foods for children.[6]

Table 7. Foods with Vitamin A and Iron Seen as Good for Children

[6] These iron and vitamin A classifications were determined based on whether the food contains adequate iron or vitamin A to contribute toward meeting daily values of these nutrients (5 percent or greater of estimated average requirements) in this highly food insecure environment. These classifications do not take into account nutrient requirements for different ages and may vary based on the species and if the food is fresh or dried.

Topic	Foods with Vitamin A	Foods with Iron
Good for children	Eggs Fish Mango Carrots Guava Cantaloupe Oil Pumpkin Cheese Moringa leaves Liver	Eggs Fish Groundnuts Cowpea Moringa leaves Liver Sesame seeds

Respondents reported that fathers are responsible for providing nutritious foods for children and mothers are responsible for caring and feeding them. Respondents recognized children require nutritious foods to ensure proper growth and development. Accordingly, respondents perceive children as vulnerable to malnutrition and micronutrient deficiencies. As for other family members, respondents said affordability was a significant factor that limited their ability to feed children nutritious foods, as shown in the responses below.

> The children in our village eat these foods if they can get them, but it is the local context that limits their consumption. I would like to allude to the poverty that limits the purchasing power of their parents. — *Family member, Magaria*

> The main difficulties encountered by the women for children from 6 months and over is mainly the parents' lack of financial means to buy good food for the children, and also the availability of these foods. We give them certain foods that are not appropriate, and this creates the problem of malnutrition. — *Pregnant woman and/or female caregiver, Guidan Roumdji*

> Children have more problems accessing food, especially when it is rich… we consume more millet than other foods because it is what we have most often. For some rich foods, we have to buy on the market and we don't have the financial means to do so. — *Pregnant woman and/or female caregiver, Magaria*

Participant Recommendations and Enablers

Women discussed receiving instruction on how to prepare enriched porridge for children during group meetings, and CHVs instruct mothers on feeding children nutritious foods. However, mothers cannot necessarily follow this advice because they cannot access recommended foods. One CHV in Magaria explained:

> Nutrition is an integral part of the activities we carry out. But we encounter some difficulties in the exercise of this activity, especially in the sense of sensitization activities on nutrition... Some women go so far as to tell us that we are disturbing them and that we don't bring anything to them when we try to explain the different dishes that should be given to the children such as porridge, fruits, vegetables, etc. There is a lot of reluctance on the part of the women. There is a lot of reluctance on the part of women. This is often justified by the low purchasing power of women at the community level because health services are often not free and food is not available locally; they have to go to the market. — *Health worker, Magaria*

Chapter 5. Conclusions and Recommendations

Everyone who participated in interviews held positive attitudes toward good nutrition, mentioning physical appearance, less disease, and, for pregnant women, a safer childbirth.

Community members, including women and girls, demonstrated good knowledge about anemia prevention and treatment through IFA supplements during pregnancy. Community members were also well-informed about vitamin A deficiency causes and consequences. Participants said elders and pregnant women suffer from night blindness and want more vitamin A supplementation for young children. Participants helpfully identified reasons limiting uptake of supplementation and iron and vitamin A-rich diets. The main barriers are at the structural and social levels, not at the individual level. Therefore, change requires activities directed to solutions for barriers related to consistent supply chains, service quality, and family and community support. Notably, sensitization, awareness-raising, or education will likely have little impact and should not be part of the strategy.

Below we present conclusions and recommendations by topic. While many findings may be known to partner locally, these are presented as recommendations that could be acted upon by partners within the health system and socio-cultural context for effective services and programs. The findings will be used to inform a social and behavior change strategy, complementing the national SBC communication strategy that is inclusive of vitamin A supplementation and children's dietary diversity. With this strategy, USAID Advancing Nutrition will further explore and develop the recommendations and next steps through consultation with USAID-funded implementing partners to identify opportunities to adapt program activities and collaborate. Implementation of the recommendations is subject to discussion and agreement with the Government of Niger, USAID/Niger, and other USAID implementing partners.

IFA Supplementation

Supply of IFA Supplements

Many women do not complete the full course of IFA during pregnancy, largely due to difficulties accessing it. To reduce breaks in supply of IFA, financing for procurement and logistics to deliver supplements to health facilities systematically is critical.

Health workers recommended better coordination on supply at all levels between health centers and districts, and the identification of a point person for ordering at each level. Stakeholders requested having a data system to effectively track coverage as well as to facilitate orders throughout the health system. Considerations for ensuring that IFA is included in the routine orders at various administrative levels should be further discussed with key stakeholders in the next phase of support to strengthen the supply chain.

In addition, stakeholders requested a nation-wide survey to better understand the prevalence and etiology of anemia in Niger to better target services. There was also strong interest in better understanding opportunities to support IFA supplementation among adolescents. Global evidence and research in-country should be conducted prior to any policy change on adolescent supplementation to avoid harm.

The distance women must travel to health centers for IFA, sometimes repeatedly because of lack of supply or health workers' availability, is a major access barrier. Health workers and stakeholders recommended engaging CHVs and iCCM Relays to reduce the distance and time constraints. Some stakeholders also recommended engaging key community members and local partners using a "last

mile" delivery system. Incorporating distributions through USAID project partner activities could improve access to IFA (food distributions, reproductive health activities, peer support groups). UNICEF's "last mile delivery of inputs" strategy, piloted in 2021 in six health districts of the Maradi region (UNICEF 2020) to improve child immunization coverage, provides mechanisms to ensure the continuous availability of inputs at all distribution points at the operational level, and could be scaled up.

Strengthening community-based distribution will require building a system that extends supplies to these volunteers and communities and provides regular training and supervision. Health workers and CHVs requested expanded protocols to enable CHVs to distribute IFA as well as vitamin A supplements. This would require training, supportive supervision, and monitoring systems. Upon implementation, projects and services could help women know when to travel to facilities by establishing lines of communication between CHVs and communities about when IFA is in stock. In addition, programs could encourage husbands to take on the responsibility of supporting travel to the health center for IFA to help to reduce the burden on pregnant women.

Demand for IFA

Even women who receive supplements do not complete the full course of IFA despite good knowledge about anemia and the benefits of IFA. Their lack of adherence is due to the unpleasant smell, side effects, and fears, or forgetting to take it. However, they were open to the idea of selecting someone as an "adherence partner." This concept should be renamed to be locally meaningful. Women said they would select a husband, a co-wife, or an elder woman, according to who is trusted and helpful to them. The person would encourage and remind them to refill supplements and take supplements daily. Family members agreed that they would be willing and able to serve this role if selected. Programs could make this change with minimal cost and resource inputs through orientation to health workers and simple take-home materials for pregnant women and the partners they select.

In addition, the quality of counseling warrants attention. Counseling skills and content with messaging could be included in planned training for health workers and CHVs. For IFA, the content should include how to assuage women's concerns about side effects, and selection of family members as "adherence partners." Job aids for each type of counseling contact (ANC, postnatal care, well child visit, home visit) addressing these barriers and supports would strengthen counseling. These could be integrated into existing packages or special materials. They should emphasize postpartum IFA as there was very little acknowledgement by stakeholders of the current micronutrient policy that recommended continuing to supplement women for 3 months postpartum in areas with at least 40 percent prevalence of anemia during pregnancy.

At the community level, programs can leverage women's ability to offer clear and helpful advice about IFA. Simply by creating opportunities for women to share testimonials and advice with peers through women's groups, with family members and through community dialogues or events, this will showing social proof and shift social norms around IFA adherence

Recommendations:

To inform decisions about timing and types of supplements:

- Participate in the planning and implementation of a survey on the prevalence and etiology of anemia in Niger.

To strengthen supply chains:

- Partners, including USAID Advancing Nutrition, can support the Government of Niger to conduct costing analyses for supplementation or advocate for increased budget allocations for supplementation.
- Support the MoPH to establish routine (quarterly) meetings for stakeholders (national, regional, district) to improve coordination, such as around quantifying stocks used, replenishment needs, transportation logistics, and assuring timeliness of the communication of information across the supply chain.
- Convene stakeholders to evaluate the utility of the current supply chain database to and make recommendations for improvements related to ordering, storing and distribution of IFA at HP, IHC, district and regional level.
- Support the MoPH in developing a national level IFA module (vis a vis the 2008 micronutrient policy) to be integrated into the vitamin A and deworming strategy/ operational plan and support the MoPH in rolling out training for health workers and CHV. (FY21 work plan)
- Support the MoPH in developing supportive supervision training and tools. Supervision should be conducted monthly by the health district and quarterly by the regional health directorate).
- Assess activities of each USAID implementing partner to identify where IFA could be distributed through existing community-based activities. Support those partners as needed to refine their approaches and training and counseling tools. (FY21 work plan)

To increase demand and use of supplements:

The findings from the research show that women and families are aware of IFA and associate this strongly with pregnancy; therefore, further sensitization is not recommended. Partners and government services should improve demand and adherence for IFA with the addition of a small, but powerful, addition of family support and normative change.

- **Strengthen the quality of counseling:** The Government and partners can make each contact with the health system more effective by strengthening the quality of counseling on specific behaviors that clients can do in their daily lives. This requires capacity strengthening on soft skills and specific content related to supplementation and healthy diets specific to the life stage. The content, with recommendations, should focus on what is possible within women's and children's contexts, and ways they can get more support. Job aids with these recommendations would support quality counseling, along with supportive supervision and monitoring. Partners could bolster this change by assessing quality services and recognizing improvements through community-health center accountability mechanisms such as a scorecard or regular reflections.
- **Increase family support:** The Government and partners should engage husbands in seeking IFA supplements for their wives as their role in ensuring the health and nutrition of their family. Husbands could support their wives' transportation to ANC visits and/or be able to collect supplements with her health card in case supplies are not in the health center when she goes for ANC. Husband schools, farmers groups, and other platforms that engage male and female influential household members should be considered for strengthening support to access and utilization of IFA supplements. In addition, the term 'adherence partner' should be reframed to be locally meaningful, with take-home materials for the person each woman selects. This approach should be introduced during health facility-based counseling during ANC visits and reinforced in homes and communities by CHVs. Husband schools, farmers groups, and other

platforms that engage male and female influential household members should be considered for strengthening family support.

- **Shift social norms:** Provide social support to shift social norms around IFA adherence through intentional opportunities for family members and women to share experiences and testimonials with other women about IFA adherence during Care groups and community events.

Vitamin A Supplementation

Supply of Vitamin A Supplements

Health workers and stakeholders noted that there are times when supplies are not available. To reduce supply disruptions and ensure greater consistency in availability, health financing is critical.

Health workers and stakeholders also suggested greater coordination on supply at all levels. This would make vitamin A supplements offered through routine services more consistent and sustainable. Stakeholders recommended support for training CHWs and CHVs on the benefits of vitamin A supplementation, the target groups, and dosages to administer during routine health services and vitamin A campaigns, and the periodicity.

Demand for Vitamin A Supplements

Caregivers and community members expressed concern about vitamin A deficiency and want supplementation for children and others. Caregivers said most children receive vitamin A supplementation twice a year through vaccination campaigns, although a few caregivers hid their children due to fear of the polio vaccine.

An outstanding policy consideration relates to switching from IFA to multiple micronutrient supplements (MMS) during prenatal care. Women in this study described signs of night blindness during pregnancy as norms in their communities. MMS would address both iron and vitamin A deficiency during this critical period.

Recommendations

To inform decisions on the type of supplements:

- Participate in discussions with national stakeholders about a policy change to MMS to address pregnant women's needs for vitamin A.

To improve the consistency of supply chains:

- In facilitating the shift from campaign-based delivery to supplementation through routine services, provide technical and logistic support to enable the MoPH to roll out the Vitamin A operational plan, including cascade training (refresher where it already exists) for health care workers and CHVs to how to distribute supplements and counsel community members on the benefits. (FY21 work plan)
- Support the MoPH in establishing a supportive supervision plan (monthly by the health districts and quarterly by the regional directorate).
- Support the MoPH to establish routine (quarterly) meetings for stakeholders (national, regional, district) to improve coordination such as around quantifying stocks used, replenishment needs, transportation logistics, and assuring timeliness of the communication of information across the supply chain.
- Contribute to training of health personnel on use of the supply chain database system to improve ordering, storing and distribution of vitamin A at the health post, integrated health center, district, and regional levels.

To increase demand and use of vitamin A supplements:

As high demand for vitamin A supplementation exists, partners should not invest in further awareness-raising or sensitization about vitamin A.

- Enhance efforts to promote supplementation through program activities and referrals to routine child health services. (USAID Advancing Nutrition could support this through reviewing partners' existing program activities, FY21 work plan)
- Strengthen the programmatic focus within USAID funded implementing partners' programs to collaborate with the health system to ensure children under five access health services in order to receive vitamin A supplements in a timely manner. This may include supporting partners to train peer support group leaders and CHVs and health care workers to make referrals to vitamin A supplements within existing program platforms (care groups, farmer groups, husband schools, food distributions, voucher schemes). (FY21 work plan)

Iron- and Vitamin A-rich food consumption

Community and stakeholder respondents agreed that limited food access and affordability are overriding constraints to increase consumption of vitamin A- and iron-rich foods. Community members understood the importance of consuming these foods, were knowledgeable about micronutrient rich foods, and health workers and community leaders recommended their consumption. However, respondents were not able to access these foods due to agricultural yields that do not last all year, high food prices, limited availability of nutritious foods in markets, and difficulty reaching markets. Agricultural production was a major source of food and income for respondent households, but agricultural production was typically not sufficient to meet household needs. Climate change has decreased access to water and made seasons increasingly unpredictable. Due to patriarchal gender norms, male household heads are in charge of agricultural production; while women contribute labor to agricultural production, they often do not play a significant role in making decisions about what the household produces. Men also primarily make food purchasing decisions. Women are therefore largely dependent on male decision making and income to access food. Women then prepare what is available and feed it to the family.

Beyond access to food at the household level, gender and social norms influence intrahousehold food allocation for women and girls. Although participants saw women as a nutritionally vulnerable group, they serve themselves last at mealtimes and have to ensure other family members are fed in a context of scarcity. Family members typically see serving others before themselves as part of women's responsibility and a point of pride. Women serve adolescent girls food just before themselves. Participants did not see adolescent girls as nutritionally vulnerable, and some male heads of households see feeding them as a burden.

Participants perceived children as needing nutritious foods, however their consumption is constrained by household food access and purchasing power. Health concerns about children consuming dark green leafy vegetables may be related to water and hygiene practices.

In addition, the quality of counseling to women and mothers during ANC, postnatal care, and well-child visits, can be improved. Counseling skills and content with messaging could be included in planned training for health workers and CHVs. The content should focus on locally available foods that are acceptable for women and children to eat, how women and children can get more, and how to engage family members, especially husbands, co-wives, and elders, to support more equitable intrahousehold food distribution. The findings in this study on motivations to have good nutrition to be 'bright and beautiful' and avoid illnesses can be used in counseling as motivations.

Like counseling job aids for IFA, each type of counseling contact (ANC, postnatal care, well child visit, home visit) should address these barriers and supports, and be integrated into existing packages where possible.

Recommendations

To improve household food access:

- Identify and prioritize micronutrient-rich foods (imported and locally produced/grown) for promotion. This can be done jointly with partners in the same areas or districts to support their purchase, production, and consumption through existing multi-sectoral program activities. Foods identified as having potential to promote are cowpeas, baobab, sorrel, moringa, and indigenous dark leafy greens and fruits (see reasons for selection in Annex 1). (USAID Advancing Nutrition could facilitate this prioritized list when reviewing partner activities, and better understanding food access and availability factors, FY21 work plan).
- Continue to increase and diversify the local production, processing, and post-harvest storage practices of prioritized vitamin A- and iron-rich foods as USAID-funded RISE II project activities are doing (market gardens, household gardens, distributing and raising of small ruminants managed by women) to help improve household access to nutritious foods. Agricultural production support should use climate smart approaches to help address key agricultural and climate constraints. These activities should be closely linked to recommendations below focused on women's participation in decision making and consumption.
- Enhance the promotion of gathering, producing, drying, storing, and consuming prioritized wild, indigenous dark leafy green leaves, fruits, and tubers. (USAID Advancing Nutrition could support these plans across areas, FY21 work plan).

To increase women's consumption:

- Strengthen the quality of counseling during ANC and PNC visits by promoting locally available foods and realistic actions that women can take based on their household and family context. This likely requires family support similar to the adherence partner idea for IFA,
- Build on existing religious norms that support women's care and desires for good nutrition to increase husbands and women's agency to promote women saving sufficient food for themselves when dividing food for meals and to encourage women to eat nutritious snacks.
- Prioritize and promote nutritious foods women plan and control in their home gardens and can collect in the wild.
- Integrate women's nutrition and care, especially during the first 1,000 days, into existing activities such as women's groups, schools for husbands, farmers groups, and community events or dialogues. This is critical to shift both women's agency to care for themselves by eating more food and help families support women, given some women's concern that their mothers and sisters-in-law would not support them to eat more nutritious food.
- Increase joint decision making on agricultural production and household food purchases to increase women's role in decision making on how to use limited household resources.

To increase adolescent girls' consumption:

- Promote the importance of adolescent girls' nutrition and their value to the family and

community to reduce the perception of them as a burden on the household and increase allocation of food, including through sensitization and dialogue with community leaders and elders.

- Engage adolescent girls in participatory activities that build their confidence, strengthen social support among them, and promote feasible actions they can take to improve their diets. These can be integrated into any platforms already working with girls in these districts.

To increase children's consumption:

- Co-create improved young child feeding recommendations with caregivers and families to include micronutrient rich foods in their diets that are shown through household behavioral trials to be available, accessible, and culturally acceptable. Integrate these locally identified, feasible recommendations into counseling by health workers and CHVs, and other existing program platforms for caregivers and their families.
- Shift norms about what children can and should eat to expand options for what families are willing to add to children's meals, how and how often, through community reflection and dialogue, with household and community elders and influencers. Complement these with testimonials from families who make these changes to show change is becoming common, and champions who continue to encourage this. These can be integrated into existing community platforms and activities by partners in the districts.
- USAID Advancing Nutrition can support USAID implementing partners to integrate these recommendations for women's, girls', and children's consumption into their activities through a co-creation process with user-friendly materials and job aids. (FY21 work plan).

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Annex 1. Potential Foods to Promote

The foods presented in the table below are those that have the potential to be promoted to increase consumption of vitamin A- and iron-rich foods. These foods were identified based on the following criteria: (1) iron and vitamin A content, (2) availability and accessibility, (3) food perceptions and preferences, (4) agronomic suitability, and (5) gender norms related to production. While the foods below present feasible starting points as foods that are already part of local food practices, relatively available, and liked, animal source foods are largely missing from the diet and provide significant nutritional benefits. USAID Advancing Nutrition and USAID implementing partners can explore the possibility to support the production and consumption of animal source foods, such as through fish ponds or dairy production.

Table 8. Foods with Potential to Promote

Food	Iron and vitamin A per 100 g	Evidence from study	Evidence from literature
Cowpeas	• **Iron:** 6.2 mg (rich source) • **Vit A RAE:** 1 mcg	• Liked, commonly consumed food • Commonly grown and consumed from own production. • Seen as a food that fights hunger and increases vigor. • It is seen as iron-rich locally and as good for women and good for children. • Adolescent girls particularly like cowpeas.	• It is seen as more of a cash than consumption crop (Walters 2017; FEWS NET 2011), so activities will need to promote its consumption. • Tolerates a range of soil types and can tolerate lower rainfall better than any major crop in the Sahel. One of the quickest maturing grain crops (Rio and Simpson 2014). • Intercropped with millet and sorghum (FEWS NET 2014).
Baobab	Leaves: • Iron: 13.7 mg (rich source) • **Vit A RAE:** 213 mcg (rich source) Fruit:	• Commonly produced and both leaves and fruit are consumed locally from own production. • Seen as a food that is fattening and that nourishes the skin. • It is seen as vitamin A-rich. • Its leaves are seen as good for adolescent girls and its fruit is seen as good for women.	• Leaves can be sourced for consumption all year for humans and livestock feed (Garrity and Bayala 2019). • Fruit is one of the most nutritious fruits in the world, leaves are rich in protein, and baobab pulp is a nutritious ingredient to add in porridge (World Agroforestry Centre n.d.). • As a tree crop, it can provide a source of fuel wood and save women time, source of income

Food	Iron and vitamin A per 100 g	Evidence from study	Evidence from literature
	• **Iron:** 6.4 mg (rich source) • **Vit A RAE:** 6 mcg		for women (women can own trees and control income over sales), and can help combat climate change and desertification (Reij, Tappan, and Smale 2009; Bernard et al. 2019).
Sorrel (hibiscus leaves)	• **Iron**: 5 mg (rich source) • **Vit A RAE**: 218 mcg (rich source)	• Commonly consumed and sourced from own production. • Seen as a vitamin A rich food locally that can help improve vision. • Seen as good for adolescent girls, although some think that it can cause diarrhea in young children.	• Secondary crop that is primarily controlled by women and valued equally for its consumption and potential for sale (Walters 2017).
Moringa	Leaves: • **Iron:** 10.3 mg (rich source) • **Vit A RAE:** 1,640 mcg (rich source)	• Seen as vitamin A- and iron-rich foods locally and a food that helps improve vision. • Seen as good for children. • Mostly purchased however so not commonly consumed.	• All parts of the tree can be consumed—bark, pods, leaves, nuts, seeds, tubers, roots, and flowers. Oil can be made with the seed and seed cake can be used to purify drinking water (FAO n.d.). • Leaves can be sourced for consumption all year for humans and livestock feed (Garrity and Bayala 2019). • Fast growing tree crop (Ho 2013). • As a leguminous tree crop, it can fix nitrogen in the soil and increase crop yields, provide a source of fuel wood and save women time, source of income for women (women can own trees and control income over sales), and can help combat climate change and desertification (Reij, Tappan, and Smale 2009;

Food	Iron and vitamin A per 100 g	Evidence from study	Evidence from literature
			Bernard et al. 2019; Nkonya, Ru, and Kato 2018).
Indigenous dark leafy greens and fruits	Varies	• Range of wild leaves and fruits are gathered by women, adolescent girls, and sometimes children. • There are wild foods available in the dry and rainy seasons.	• Wild foods can be high in micronutrients, such as *yodo* (*Cerathotheca sesamoides*), has 1.24 mg/g dry weight of iron (Sena et al. 1998). • Ingenious crops can be an important part of a healthy food system in Africa (Akinola et al. 2021).

Note: Micronutrient content is for the raw form of the food (Vincent et al. 2020). The Codex standard for identifying a food as a source of a nutrient is if the food provides 15 percent of the Nutrient Reference Value per 100g solid food of the nutrient. Foods with at least 60 retinol activity equivalents (RAE) per 100 g are considered a source of vitamin A and foods with at least 120 RAE are a rich source according to this criteria. Foods with at least 2.1 mg of iron per 100g are considered a source of iron and foods with 4.2 mg of iron per 100 g are considered a rich source (Lewis 2019). Note that values vary by the form of the food (e.g., raw, cooked) and bioavailability of micronutrients may vary.

Annex 2. Data Collection Guides

Informed Consent Scripts

Participant Script

Hello, my name is ____ and I work for USAID Advancing Nutrition. It is a global nutrition project funded by the United States Agency for International Development (USAID) and it is implemented by Helen Keller International in Niger. We are conducting a study in Maradi and Zinder to learn about nutrition services and activities, especially related to micronutrients. The results of this study will be used to add or adapt activities in services and programs for people like yourselves.

We would like to learn more about your ideas and recommendations. This discussion will take about 1 to 1.5 hours to complete. Your participation is entirely voluntary. You can decline to participate without losing any benefits or services. You are free to not answer certain questions or stop participating at any time without any penalty. There is no direct benefit to you for participating.

Please note that any personal information that you give us, such as your name, will remain strictly confidential and will only be used for the purpose of this study. Your personal information will not be shared outside the study team. A report will be produced at the end of this data collection and shared with partners, USAID, government officials, and the public. It will present the overall ideas and recommendations for activities for the future. Upon your request, you can also be informed of the results of the study you participated in.

Do you have any questions about participating?

- If yes, answer any questions the respondents might have.
- If no, move to the next question.

Do you agree to participate?

- If yes, thank them for agreeing to participate and move to the next question.
- If no, thank them for their time and politely leave.

Can we audio record the conversation? That will help us to think more about what we learn here after we leave.

- If yes, proceed with audio recording.
- If no, say that it is no problem and proceed without audio recording.

If you have any questions about the study, you may contact me, _____ at ____, or you may also contact the study lead, xx, at xx@hki.org or Tel/WhatsApp +xx. (You can provide a business card with this information if available).

Parental Script

Hello, my name is ____ and I work for USAID Advancing Nutrition. It is a global nutrition project funded by the United States Agency for International Development (USAID) and it is implemented by Helen Keller International in Niger. We are conducting a study in Maradi and Zinder to learn about nutrition services and activities, especially related to micronutrients. The results of this study will be used to add or adapt activities in services and programs for people like yourselves.

We are speaking with adolescents in the area to learn about how nutrition services and programs can better serve adolescent girls. We would like to talk with your adolescent daughter about nutrition. This discussion will take about 1 to 1.5 hours to complete and will include other adolescent girls in this community. Her participation is entirely voluntary. You can decide you do not want her to participate without losing any benefits or services. During the interview, she will be free to not answer certain questions or stop participating at any time without any penalty. There is no direct benefit to her or your family for participating.

Please note that any personal information that she gives us, such as her name, will remain strictly confidential and will only be used for the purpose of this study. Her personal information will not be shared outside the study team. A report will be produced at the end of this data collection and shared with partners, USAID, government officials, and the public. It will present the overall ideas and recommendations for activities for the future. Upon your request, you can also be informed of the results of the study your daughter participated in.

Do you have any questions about your daughter's participation?

- If yes, answer any questions the respondents might have.
- If no, move to the next question.

Do you agree to allow your daughter to participate?

- If yes, thank them for agreeing to allow their daughter to participate and move to the next question.
- If no, thank them for their time and politely leave.

If you have any questions about the study, you may contact me, _____ at ____, or you may also contact the study lead, xx, at xx@hki.org or Tel/WhatsApp +xx. (You can provide a business card with this information if available).

Focus Group Discussion Guides

Adolescent Girls (10–14 Years)

Section A: Activities

First, please tell us about what girls usually do on a typical day.

1. In the mornings? Afternoons? Evenings?
2. Does this change by season or time of year?
3. When do you see your closest friends?
4. What community events or activities are you looking forward to in the future? Why?

Activity 1: Drawing Their Dream for the Future—Provide the participants with some paper and markers. Ask them to draw what they dream of for their future. Once they draw what they dream for in the future, ask them to label the picture with a description of what they drew. Once they share about their drawings, collect the drawings, and later, take photos of each drawing.

Now, I would like to learn about what you as girls dream of for your future. Please draw a picture of your future. If your future could be whatever you want, what would it be?

5. Please tell us about what you want for your future.

Section B: Nutrition

Now, let's talk about food and the health of girls.

6. What is your favorite food? When do you get to eat this?
7. What do girls here usually eat in a day?
    a. How many times do they usually eat in a day?
8. What food do girls eat at each meal?
9. Is what girls eat different from what other family members eat? How so?
10. What are girls advised to do to have good nutrition, if anything? From who?
11. What are girls advised to do to avoid *karamcin jini*? From who? When?
    a. Are you able to do these things? If not, what keeps you from being able to do these things?
12. Are girls advised to eat differently when they are of an age when they begin menstruating? If yes, how are they advised to eat differently?
    a. Are girls advised to eat differently when they become pregnant? If yes, how are they advised to eat differently?
    b. Are you able to do these things? If not, what keeps you from being able to do these things?
13. What are the benefits to girls when they have good nutrition and the consequences when they do not?

Activity 2: Food Pile Sort—Lay picture cards of foods on the table or ground for the group to see. Read the label on the cards to them if they are unsure what food is on a card. Ask the group to sort the cards into piles. They should create piles of foods that they think go together. They should create piles however they think is appropriate. Do not suggest categories to them about how to group the foods together. There are no right or wrong answers. While the participants are creating the piles, take notes on their discussion. Once the participants make the piles, ask them to explain the groups they made and why they grouped different foods together.

Please group the foods into different piles based on which foods go together. You can create as many piles as you want, however try to have at least two foods in each pile. There are no right or wrong answers. We just want to understand which foods are similar to each other and which are different.

14. Please explain each pile. What name would you give each pile? Why are the foods in this pile similar? How is this pile different from the other piles?

Activity 3: Show Cards of Vitamin A and Iron-Rich Food Cards—Pick up all of the cards. Look on the back of each card and place the ones that say they are vitamin A or iron-rich back on the table or ground for the participants. Place the cards face up and do not tell the participants which ones are vitamin A or iron-rich yet. Lay out the cards so participants can see all of the foods. Ask them to point to the ones that are good for different types of people.

These cards are foods that are rich in vitamin A and iron. We would like to learn more about what you think of these foods and who should eat them.

15. Do girls here eat all of these foods? If not, which do they not eat? Why not? Which ones do they not eat? Why not? (Probe for: availability, seasonality, cost, preparation time, taste/food preferences)

    a. If any of these foods are not available in the household, but the girl would like to eat it, whom could she ask? Would girls try this?

    b. Do girls your age eat anywhere outside home? If yes, where? (Probe: What food? Where? How often?)

Section C: Health and Nutrition Education

Now we will try a few short activities. I would like your advice about which activities could be good for other girls your age.

Activity 4: Intervention Test 1—Place a covered or wrapped box or basket on the table (Note: Cover this box or basket in anything—just keep it covered. Inside the box or basket, place pictures of healthy, happy girls). Sound excited when you introduce it. Act as if the wrapped box or basket is something exciting and special. Tell them that the box or basket is a gift and ask them some questions about it.

Introduce the wrapped box or basket in an exciting way. Ask—

Would you like to receive a gift even bigger and better than the one in front of you? I am thinking of a gift that keeps on giving and has the ability to change your life every minute of every day.

In response to their positive answers, tell them: Feeling good is the best gift of all—and it's a gift you give yourselves each time you take two actions:

- Eat food with iron each day (such as green leaves, beans, moringa leaves...).
- Eat this food with lime or fruit.

Open the box or basket and show pictures of healthy, happy girls. Ask—

- Would you like to feel good every day?
- Would you like to do better in school?
- Would you like to be able to concentrate better?
- Would you like to have more energy and feel less tired?

Summarize by saying—

These are the "gifts" you receive from taking these two actions.

16. What do you think of these gifts? Can you take these actions regularly?

    a. Are the "gifts" worth the time and effort to make these small changes? (Probe: See if they really like it; it is ok if they do not.)

Activity 5: Intervention Test 2—Give participants a paper and markers. Ask them to plan to make a poster together that encourages their siblings to eat healthy food each day. Give them a few minutes (note—encourage as needed), and then ask them to share their poster. Congratulate them on their work!

17. What will you tell your friends about these activities?

18. What was fun about these? What was not so fun or interesting? What would you change?
19. Would you recommend these activities with other girls? Which ones? Which groups would like these?

Section D: Closing Questions

20. Is there anything else that you would like to share?
21. Do you have any questions for us?

Thank you!

Community Leaders (Traditional, Religious)

Section A: Nutrition

First, we would like to learn about the food and nutrition in your community.

1. Where do households in your community learn about health and nutrition?
2. What are the main challenges limiting good nutrition of young children? Girls? Women?
3. Has the situation changed over time? How so?
4. To what extent do you think community members are affected by *karamcin jini*?
    a. Which people are affected by *karamcin jini* (anemia) have difficulties with nutrition?
    b. What are the consequences of having *karamcin jini* (anemia)? At what ages or times in life?
5. To what extent do you think community members are affected by *karamcin sindarin ariyan ciyon doundoumi* (vitamin A deficiency)?
    a. Which people are affected by *karamcin sindarin ariyan ciyon doundoumi* (vitamin A deficiency)?
    b. What are the consequences of having *karamcin sindarin ariyan ciyon doundoumi* (vitamin A deficiency)? At what ages or times in life?

Activity 1: Food Pile Sort—Lay picture cards of foods on the table or ground for the group to see. Read the label on the cards to them if they are unsure what food is on a card. Ask the group to sort the cards into piles. They should create piles of foods that they think go together. They should create piles however they think is appropriate. Do not suggest categories to them about how to group the foods together. There are no right or wrong answers. While the participants are creating the piles, take notes about their discussion. Once the participants make the piles, ask them to explain the groups they made and why they grouped different foods together.

Please group the foods into different piles based on which foods go together. You can create as many piles as you want, however, try to have at least two foods in each pile. There are no right or wrong answers. We just want to understand which foods are similar to each other and which are different.

6. Please explain each pile. What name would you give each pile? Why are the foods in this pile similar? How is this pile different from the other piles?

Activity 2: Show Cards of Vitamin A and Iron-Rich Food Cards—Pick up all of the cards. Look on the back of each card and place the ones that say they are vitamin A or iron-rich back on the table or ground for the participants. Place the cards face up and do not tell the participants which ones are vitamin A or iron-rich yet. Lay out the cards so participants can see all of the foods. Ask them to point to the ones that are good for different types of people.

These cards are foods that are rich in vitamin A and iron. We would like to learn more about what you think of these foods and who should eat them.

7. Do all women here eat these? If not, which do they not eat? Why not? (Probe for: pregnancy, breastfeeding, availability, seasonality, cost, preparation time, taste/food preferences) What should a woman eat compared to others in the household?
8. Do all adolescent girls in this area eat these? If not, which do they not eat? Why not? (Probe for: availability, seasonality, cost, preparation time, taste/food preferences; how food is shared in the family between elders and children, girls and boys)
9. Do all men in this area eat these? If not, which do they not eat? Why not? (Probe for: availability, seasonality, cost, preparation time, taste/food preferences)
    a. Do all children in this area eat these? If not, which do they not eat? Why not? (Probe for: availability, seasonality, cost, preparation time, taste/food preferences)
10. Which of these foods are not good for children from 6 to 23 months? Why not?
11. Who advises people which foods are good for them? Anyone else?
12. What are the traditional beliefs about these foods for women and children?
13. Have you seen any change in recent times? Please explain.
14. How do leaders like yourself serve or reach the community? *(For each mentioned*, ask: How often? Who attends?)

Section B: Health and Nutrition Services

Next, we are interested in learning more about health and nutrition services.

15. What health and nutrition services do women usually use? Why?
16. When pregnant, when are women advised to go to the health center for a check?
17. When children are young, how are households advised to go for nutrition services?
18. What do leaders like yourselves advice about using nutrition services, if any?
    a. What advice do you give about IFA tablets for pregnant women?
    b. What advice do you give about IFA tablets for pregnant girls 10–14 years?
    c. What advice do you give about vitamin A supplementation for children under five?
    d. What kind of advice do you give about other kinds of nutrition services?

Section C: Closing Questions

19. How do people in this community get news? (Probe for: phones, radio, other) Which source do they trust most?

20. Is there anything else that you would like to share about supplementation or nutrition in your community?
21. Do you have any questions for us?

Thank you!

Family Members

Section A: Nutrition

First, we would like to learn about food and nutrition in your communities.

1. Whose role it is to ensure good nutrition in women?
    a. Why did you select this person? What is their role?
    b. Next, select cards to show who is responsible for supporting this person. What should they do? What do they usually do?
        i. *If not mentioned, ask*: What is the role of the fathers/grandmothers? Who advises them?
    c. How are these roles different for nutrition of girls 10–14 years? Children under five?

Activity 1: Food Pile Sort—Lay picture cards of foods on the table or ground for the group to see. Read the label on the cards to them if they are unsure what food is on a card. Ask the group to sort the cards into piles. They should create piles of foods that they think go together. They should create piles however they think is appropriate. Do not suggest categories to them about how to group the foods together. There are no right or wrong answers. While the participants are creating the piles, take notes about their discussion. Once the participants make the piles, ask them to explain the groups they made and why they grouped different foods together.

Please group the foods into different piles based on which foods go together. You can create as many piles as you want, however, try to have at least two foods in each pile. There are no right or wrong answers. We just want to understand which foods are similar to each other and which are different.

2. Please explain each pile. How would you describe each pile? (Probe for: What name would you give each pile? Why are the foods in this pile similar? How is this pile different from the other piles?

Activity 2: Show Cards of Vitamin A and Iron-Rich Food Cards—Pick up all of the cards. Look on the back of each card and place the ones that say they are vitamin A or iron-rich back on the table or ground for the participants. Place the cards face up and do not tell the participants which ones are vitamin A or iron-rich yet. Lay out the cards so participants can see all of the foods. Ask them to point to the ones that are good for different types of people.

These cards are foods that are rich in vitamin A and iron. We would like to learn more about what you think of these foods and who should eat them.

3. Do all women here eat these? If no, which do they not eat? Why not? (Probe for: pregnancy, breastfeeding, availability, seasonality, cost, preparation time, taste/food preferences)
    a. What should a woman eat compared to others in the household? Girls? Children?
2. Do all children here eat these? If not, which do they not eat? Why not?

Now, I would like to ask you more about what foods people eat in the community and where they get this food.

3. Where do people in this community get food?
    a. Which of these foods are usually grown or raised at home? (Probe for: Which season? Who grows them?)
    b. How do families/households decide what to grow/raise or purchase?
    c. Which of these foods are gathered in the wild? (Probe for: Which season? Who collects?)
    d. Which of these foods are usually purchased at the market? (Probe for: Which season? Who purchases them? Why or why not?)
4. Do you belong to any groups? Which ones?
    a. Which are the most interesting types of group sessions you remember?
    b. Could nutrition information be included in the group activities sometimes? How?

Activity 3: Family Story—Explain that you will read a short story and ask participants to create the ending. There is no right or wrong answer. We want to know what they think of the story and what they think the characters should do. Please read the story in a traditional story-telling manner or another interesting way.

Macé is the wife of Namiji. Macé is pregnant with their third child. The family is happy to welcome another child soon, and everyone gives Macé advice about what to eat and what not to eat. Namiji brings home sorghum for the family, and sometimes, other food like beans and meat. Macé always serves him first, and then elders, and then other family members before herself. She is proud to be a good wife and mother and care for her family, although it means she is often hungry. Her mother-in-law tells her it is good to eat less.

5. What should Macé do? Why?
6. What should Namiji do? Please explain.
7. Is this story usual here? What is the same or different?
8. How do people here describe a good woman or ideal woman? Why are these qualities important?
9. How do people here describe a good or ideal man? Why are these qualities important?
10. What would happen if a woman ate more good food like vegetables, sorghum, and dried fish during pregnancy? During other times?
    a. Who could support her to do this? How?
    b. Who might not support her, or say bad things about her? What would they say? Who could talk to them?

Section B: Health and Nutrition Services

Next, we are interested in learning more about health and nutrition services.

2. When pregnant, when are women advised to go to the health center for a check?
    a. What challenges do women face when trying to use these services?

3. What do you hear about iron-folic acid supplements? (Show IFA tablets.)
    a. When do women start to take the tablets?
        i. Where do they get the tablets?
        ii. What are their motivations for starting to take them?
    b. What challenges do women face taking 90 tablets during pregnancy?
        i. What happens if a pregnant woman goes to the health facility but there are no tablets at the time? Does she return for tablets? Why or why not?
    c. Please give advice! How can these challenges be overcome?

Activity 5: IFA Adherence Partner Poster—Show the IFA adherence partner poster and then read the story. Please read the story in a traditional story-telling or other interesting way.

Do you remember Macé, the wife of Namiji? Macé learns about getting an IFA adherence partner, meaning someone to support her to take tablets in a group meeting she attends. She thinks it would be helpful if someone supported her to take the tablets. She wonders who to ask—her husband or her co-wife. She picks her co-wife and her co-wife agrees to be her partner. The co-wife reminds Macé every day—"Sister, have you taken the tablet today?" She also goes with her to the health center to get more tablets even when Macé feels stronger because she shares Macé's hope for a healthy baby.

4. Would this idea be useful here?
    a. Would fathers/grandmothers like you be willing to help women take tablets? Why or why not?

Now, I would like to ask you about vitamin A supplementation.

5. Can you tell me about current vitamin A supplementation for children?
    a. What do people say about these services?
    b. What challenges do families face getting supplements for all children on time? Have these challenges changed recently?
    c. Where would you like to learn about the services?
    d. Please give advice! How can all households ensure that children get vitamin A supplementation on time? Who should provide this support? How would you want to find out about this support?

Section C: Closing Questions

6. Is there anything else that you would like to share about supplementation or nutrition in your community?
7. Do you have any questions for us?

Thank you!

Pregnant Women and Caregivers of Young Children

Section A: Nutrition

First, we would like to learn about nutrition in your communities.

1. How do you know if someone has good nutrition or not?
    a. Which people have good nutrition? At what ages or times in life?
    b. Which people have difficulties with nutrition? At what ages or times in life?
2. To what extent do you think community members are affected by *karamcin jini*?
    a. Which people are affected by *karamcin jini* (anemia)?
    b. What are the consequences of having *karamcin jini* (anemia)? At what ages or times in life?
3. To what extent do you think community members are affected by *karamcin sindarin ariyan ciyon doundoumi* (vitamin A deficiency)?
    a. Which people are affected by *karamcin sindarin ariyan ciyon doundoumi* (vitamin A deficiency)?
    b. What are the consequences of having *karamcin sindarin ariyan ciyon doundoumi* (vitamin A deficiency)? At what ages or times in life?
4. Whose role is it to ensure good nutrition in women?
    a. What should they do?
    b. Who is responsible for supporting this person? What should they do? What do they usually do? (Probe: producing/buying, preparing, etc. Who is responsible for which foods?)
    c. What should the woman herself do? How do women learn this?
    d. Is the same person responsible for good nutrition in children under five? If no, who is responsible? What should they do?
    e. Now, whose role is it to ensure good nutrition in girls 10–14 years?
    f. Is the same person responsible for good nutrition in adolescent girls? If no, who is responsible? What should they do?

Activity 1: Food Pile Sort—Lay picture cards of foods on the table or ground for the group to see. Read the label on the cards to them if they are unsure what food is on a card. Ask the group to sort the cards into piles. They should create piles of foods that they think go together. They should create piles however they think is appropriate. Do not suggest categories to them about how to group the foods together. There are no right or wrong answers. While the participants are creating the piles, take notes about their discussion. Once the participants make the piles, ask them to explain the groups they made and why they grouped different foods together. Record the piles in the data collection form.

Please group the foods into different piles based on which foods go together. You can create as many piles as you want, however, try to have at least two foods in each pile. There are no right or wrong answers. We just want to understand which foods are similar to each other and which are different.

5. Please explain each pile. What name would you give each pile? Why are the foods in this pile similar? How is this pile different from the other piles?

Activity 2: Vitamin A and Iron Rich Food Cards—Pick up all of the cards. Look on the back of each card and place the ones that say they are vitamin A or iron-rich back on the table or ground for the participants. Place the cards face up and do not tell the participants which ones are vitamin A or iron-rich yet. Lay out the cards so participants can see all of the foods. Ask them to point to the ones that are good for different types of people. Record the piles in the data collection form.

These cards are foods that are rich in vitamin A and iron. We would like to learn more about what you think of these foods and who should eat them.

6. Do all women here eat these? If not, which do they not eat? Why not? (Probe for: pregnancy, breastfeeding, availability, seasonality, cost, preparation time, taste/food preferences) What should a woman eat compared to others in the household?
7. Do all adolescent girls in this area eat these? If not, which do they not eat? Why not? (Probe for: availability, seasonality, cost, preparation time, taste/food preferences; how food is shared in the family between elders and children, girls and boys)
8. Do all men in this area eat these? If not, which do they not eat? Why not? (Probe for: availability, seasonality, cost, preparation time, taste/food preferences)
9. Do all children in this area eat these? If not, which do they not eat? Why not? (Probe for: availability, seasonality, cost, preparation time, taste/food preferences)
    a. Which of these foods are not good for children 6 to 23 months? Why not?

Now, I would like to ask you more about what foods people eat in the community and where they get this food.

10. What should a child eat compared to others in the household?
11. What are the main challenges for women to feed children 6 months and older?
12. Where do people in this community get food?
    a. Which of these foods are grown or raised at home? (Probe for: Which season? Who grows them?)
    b. How do families/households decide what to grow/raise or purchase?
    c. Which of these foods are gathered in the wild? (Probe for: Which season? Who collects them?)
    d. Which types of these foods are usually purchased at the market? (Probe for: Which season? Who purchases them? Why or why not?)
    e. Which of these foods are collected through services such as vouchers or food distribution?
    f. Do women like you eat anywhere outside home? (Probe: What food? Where? How often?)
13. Do you belong to any community groups? Which ones?
    a. Which are the most interesting types of group sessions you remember?
    b. Could nutrition information be included in the group activities sometimes? How?

Activity 3: Family Story—Explain that you will read a short story and ask participants to give the ending. There is no right or wrong answer. We want to know what they think of the story and what they think the characters should do. Please read the story in a traditional story-telling manner or another interesting way.

Macé is the wife of Namiji. Macé is pregnant with their third child. The family is happy to welcome another child soon, and everyone gives Macé advice about what to eat and what not to eat. Namiji brings home sorghum for the family, and sometimes, other food like beans and meat. Macé always serves him first, and then elders, and then other family members before herself. She is proud to be a good wife and mother and care for her family, although it means she is often hungry. Her mother-in-law tells her it is good to eat less.

14. What should Macé do? Why?
15. What should Namiji do? Please explain.
16. Is this story usual here? What is the same or different?
17. How do people here describe a good or ideal woman? Why are these qualities important?
18. How do people describe a good or ideal man? Why are these qualities important?
19. What would happen if a woman ate more good food like vegetables, sorghum, and dried fish during pregnancy? During other times?
    a. Who could support her to do this? How?
    b. Who might not support her, or say bad things about her? What would they say? Who could talk to them?

Section B: Health and Nutrition Services

Next, we are interested in learning more about health and nutrition services.

2. When do most women go for their first ANC visit?
    a. What challenges do women's face trying to use these services?
    b. What challenges do women face knowing when to go?
    c. What challenges do women face going early in their pregnancy?
    d. How can these challenges be overcome?

Activity 4: IFA Tablets and Cards with Women—Show a packet of IFA tablets so women know what you are asking about. Put out the cards showing different women so participants can see all of the cards at once. You will ask the group to pick a woman to answer the first two questions below. This is intended to help open discussion with a picture, so people can feel comfortable talking. It should be a quick reaction. They should not think too much.

3. What do you hear about iron-folic acid vitamins? (Show to the tablets and lay out the cards showing the women.)
    a. Which of these women take these? Why?
    b. Which do not take these? Why?

c. When do women start to take the tablets?
    i. Where do they get the tablets?
    ii. What are their motivations for starting to take them?
d. What challenges prevent women from taking the recommended 90 tablets during pregnancy?
    i. Are there certain times when women stop taking tablets? (Probe for: difficult to start, bad taste, after side effects, feel better after, forget)
    ii. What happens if a pregnant woman goes to the health facility but there are no tablets at the time? Does she return for tablets? Why or why not?
e. Please give advice! How can these challenges be overcome?

Activity 5: IFA Adherence Partner Poster—Show the IFA adherence partner poster and then read the story. Please read the story in a traditional story-telling manner or another interesting way.

Do you remember Macé, the wife of Namiji? Macé learns about getting an IFA adherence partner, meaning someone to support her to take tablets in a group meeting she attends. She thinks it would be helpful if someone supported her to take the tablets. She wonders who to ask—her husband or her co-wife. She picks her co-wife and her co-wife agrees to be her partner. The co-wife reminds Macé every day—"Sister, have you taken the tablet today?" She also goes with her to the health center to get more tablets even when Macé feels stronger because she shares Macé's hope for a healthy baby.

4. Would you have picked the same or a different person as Macé? Why?
    a. Would this idea be useful here, or not?
    b. How can we help women anticipate or learn how to manage the side effects (e.g., stomachache, constipation, black stool) or stay motivated to take all of the recommended tablets even after they are feeling better?
    c. Please give advice! Are there other ways to help women take the tablets? Who should provide this support? How would you want to find out about this support?

Now, I would like to ask you about vitamin A supplementation.

5. Can you tell me about vitamin A supplementation for children? (Show the capsules.)
    a. What do people say about these services now?
        i. Has this changed from previously? If yes, how has it changed?
    b. Who takes the child? Why?
    c. What challenges do women face getting all children the supplements on time?
    d. Please give advice! How can all households ensure that children get vitamin A supplementation on time? When would they go/how often? Who should provide this support? How would you want to find out about this support?
        i. Probe: If not mentioned, ask about the role of CHWs.

Section C: Closing Questions

6. How do people in this community get news? (Probe for: phones, radio, other) Which source do they trust most?
7. Is there anything else that you would like to share about nutrition activities?
8. Do you have any questions for us?

Thank you!

Interview Guides

Adolescent Girls (10–14 years)

Section A: Activities

First, please tell us about your friendship:

1. How do you know each other?
2. When do you usually see each other?
3. What makes you good friends?

Activity 1: Drawing Their Dream for the Future—Provide the participants with some paper and markers. You will ask them to draw what they dream of for their future. Once they draw what they dream for in the future, ask them to label the picture with what they drew. Once they share about their drawings, collect the drawings, and later take photos of each drawing.

Now, I would like to learn about what you as girls dream of for your future. Please draw a picture of your future. If your future could be whatever you want, what would it be?

4. Please tell us about what you want for your future.

Section B: Nutrition

Now, let's talk about food and the health of girls.

5. What is your favorite food? When do you get to eat this?
6. What do you usually eat in a day?
    a. How many times?
2. What food do you eat at each meal?
    a. Is this type of food and amount usual for girls here? Why do you say that?
3. Do you and your friend here eat together sometimes? When is that?
    a. What do you eat?
4. Is what you eat different from what your other family members eat? How so?
5. Are there foods girls should avoid? What foods?
    a. Why should girls avoid them?
    b. Who tells girls to avoid them?

6. What advice have you received about how to have good nutrition, if anything? From who?
7. What are girls advised to do to avoid *karamcin jini?* From who? When?
    a. Are you able to do these things? If not, what keeps you from being able to do these things?
8. Are girls advised to eat differently when they are of an age when they begin menstruating? If yes, how are they advised to eat differently?
    a. Are girls advised to eat differently when they become pregnant? If yes, how are they advised to eat differently?
    b. Are you able to do these things? If not, what keeps you from being able to do these things?
9. What are the benefits to girls when they have good nutrition and consequences when they do not?
    a. Do you know some girls here that have good nutrition? How do you know?

Activity 2: Food Pile Sort—Lay picture cards of foods on the table or ground for the group to see. Read the label on the cards to them if they are unsure what food is on a card. Ask the group to sort the cards into piles. They should create piles of foods that they think go together. They should create piles however they think is appropriate. Do not suggest categories to them about how to group the foods together. There are no right or wrong answers. While the participants are creating the piles, take notes on their discussion. Once the participants make the piles, ask them to explain the groups they made and why they grouped different foods together.

Please group the foods into different piles based on which foods go together. You can create as many piles as you want, however try to have at least two foods in each pile. There are no right or wrong answers. We just want to understand which foods are similar to each other and which are different.

10. Please explain each pile. What name would you give each pile? Why are the foods in this pile similar? How is this pile different from the other piles?

Activity 3: Show Cards of Vitamin A and Iron-Rich Food Cards—Pick up all of the cards. Look on the back of each card and place the ones that say they are vitamin A or iron-rich back on the table or ground for the participants. Place the cards face up and do not tell the participants which ones are vitamin A or iron-rich yet. Lay out the cards so participants can see all of the foods. Ask them to point to the ones that are good for different types of people.

These cards are foods that are rich in vitamin A and iron. We would like to learn more about what you think of these foods and who should eat them.

11. Do girls here eat all of these foods? If not, which do they not eat? Why not? Which ones do they not eat? Why not? (Probe for: availability, seasonality, cost, preparation time, taste/food preferences)
    a. If any of these foods are not available in the household, but the girl would like to eat it, whom could she ask? Would girls try this?
    b. Do girls your age eat anywhere outside home? If yes, where? (Probe: What food? Where? How often?)

Section C: Health and Nutrition Education

Next, we are interested in learning more about health and nutrition services.

12. Have you heard about *karamcin jini*? What have you heard about it?
    a. What do you think causes it?
2. Have you heard about iron-folate supplements? What have you heard?
    a. Who takes these?
    b. What are the good things you hear?
    c. What are the challenges of taking these tablets?
3. If girls like you were to take these, where could you get them?

Activity Test—Food List. Instruct the participants to make a list of all of the foods that have iron and vitamin A for about three minutes. Then ask them to rank their favorite ones from 1–10 (one as the best and 10 as the lowest.) Congratulate the girls for their list!

Now we will try a short activity. I would like your advice about whether this activity could be good for other girls your age. First, list all of the foods that have iron and vitamin A. Then, rank your favorite ones, from one to ten, with one as the best and ten as the lowest.

4. Are you surprised how many foods you know and like?
    a. Which ones do you have at home?
5. What will you tell your friends about this activity?
6. What was fun about this?
    a. What was not so fun or interesting?
    b. What would you change?
7. Would you recommend that we try this activity with other girls? Who would like this?
8. What should we change for other girls?

Section D: Closing Questions

9. Is there anything else that you would like to share?
10. Do you have any questions for us?

Thank you!

Health Workers (Health Post Health Workers, CHV)

Section A: General

1. Can you tell us about this health post and the communities served? (Probe for: number and type of health workers or CHV [number of positions filled], population, livelihoods)
2. How many clients do you see in a day? Does this vary by days or season? Please explain.
3. What are the main nutrition issues you prevent and treat?

    a. Has this changed since the COVID-19 pandemic began? Please explain.

4. Do you see nutrition as a part of routine services for all patients? If not, why not?
    a. What difficulties do you face including nutrition questions or services in all consultations?
5. What training have health workers/CHV here received on nutrition? When was this?

Section B: IFA

Now I would like to ask you specifically about iron-folic acid supplements.

6. To what extent are women in these communities are affected by anemia?
    a. Which people have anemia due to poor nutrition?
    b. What are the consequences of having anemia? What ages or times in life?
7. What training have health workers/CHV here received on IFA supplementation?
    a. Who provides training?
    b. How frequently is training provided?
    c. What is covered in the training?
    d. To what extent are you able to do what you learn in the training? What challenges do you face?
8. What training have health workers received on the supply chain for IFA?
9. What data do you collect and record on IFA supplements? May I see the records? (Note: frequency of recording, where it is recorded, if entries are complete)
    a. Observe the records and record:
        i. Type of record book used:
        ii. Frequency of recording:
        iii. Portion of entries that are complete:
    b. How are these data reported up?
    c. How are these data used by district health officials?
10. When do you counsel women on IFA?
    a. How do you counsel them?
    b. Where do you counsel them?
    c. What do you tell them about IFA? Can you role-play with each other to show me what you say?
11. Whose role is it to prescribe IFA?
    a. Where do women get IFA after it is prescribed?
12. What do you do if you prescribe IFA and the facility does not have it in stock? (Probe for: Call the district? What happens?)

13. What other challenges do you face when trying to support women to access IFA?
    a. What challenges do you face when trying to support women to complete IFA?
    b. What solutions do you think could help address these challenges?
14. What recommendations do you have for health workers or CHV in other locations to deliver quality IFA services?

Section C: Vitamin A Supplementation

Now let's talk specifically about vitamin A supplementation.

15. To what extent are young children in these communities affected by vitamin A deficiency?
    a. Which people are affected by vitamin A deficiency?
    b. What are the consequences of having vitamin A deficiency?
16. What training have health workers/CHV here received on vitamin A and vitamin A supplementation?
    a. Who provides training?
    b. How frequently is training provided?
    c. What is covered in the training?
    d. To what extent are you able to do what you learn in the training? What challenges do you face?
17. What training have health workers received on how to order and stock supplies?
    a. Who is responsible for stocking vitamin A supplementation?
    b. Who is trained on ordering and stocking supplies?
    c. How frequently is training provided?
18. How do you usually organize vitamin A supplementation distribution?
    a. Who is vitamin A supplementation provided to?
    b. How commonly is it delivered through facility visits?
    c. How commonly is it delivered through community outreach?
    d. What works well?
    e. What are the challenges?
19. What data do you collect and record on vitamin A supplementation distribution? May I see the records?
    a. Observe the records and record:
        i. Type of record book used:
        ii. Frequency of recording:
        iii. Portion of entries that are complete:

b. How are these data reported up?

c. How are these data used by district health officials?

20. Have you seen times when there was a plan and schedule to distribute, but no vitamin A supplementation was available? What did you do then?

21. What other challenges do you have when trying to help children access vitamin A supplementation on time when they need it?

    a. What solutions do you think could help address these challenges?

22. What recommendations do you have for health workers or CHV in other locations to deliver quality vitamin A supplementation services?

    a. Could *relais* successfully distribute vitamin A supplements?

23. How could district leaders or policymakers support your health post or community to better access IFA and vitamin A supplementation?

Section D: Closing Questions

24. Is there anything else that you would like to share about supplementation or nutrition in your community?

25. Do you have any questions for us?

Thank you!

Health Workers (District Level Health Officers)

Section A: General

1. Can you tell us about this health area?
    a. How many health facilities and communities are there?
2. To what extent are community members affected by anemia?
    a. What are the consequences?
3. To what extent are community members affected by vitamin A deficiency?
    a. What are the consequences?

Section B: Supplementation

4. What training do health workers receive on IFA and vitamin A supplementation? What does the training cover?
    a. How often is the training?
    b. Who delivers the training?
    c. How many of the current health workers have completed it?
5. What training do CHV receive on IFA and vitamin A supplementation? What does the training cover?
    a. How often is the training?
    b. Who delivers the training?
    c. How many of the current CHV have completed it?
6. In your experience, what other training content, or type of training would be useful to support full IFA coverage?
7. What other training content or type of training would be useful to support Full vitamin A supplementation coverage?
8. Whose responsibility is it to request and stock supplies of IFA?
    a. How does requesting and stocking work?
    b. How often do they have to order new stock?
    c. How often do the stocks arrive?
    d. What are the challenges in stocking IFA?
    e. What do health workers do if there are no supplies at the health post?
9. Whose responsibility is it to request and stock supplies of vitamin A supplements?
    a. How does requesting and stocking work?
    b. How often do they have to order new stock?
    c. How often do the stocks arrive?

d. What are the challenges in stocking vitamin A supplements?

e. What do health workers do if there are no supplements at the health post?

10. Have you seen examples when health posts receive IFA and vitamin A supplements according to the schedule?

    a. How often does this happen?

    b. What helps ensure that supplies arrive on time?

11. What is the role of the health workers (by type) in IFA counseling? What about CHVs?

    a. Do some health workers do things differently from the expected role and practice related to IFA counseling? How so?

    b. Do some CHVs do counseling on IFA differently than expected? How so?

    c. What are the challenges to quality counseling on IFA for women?

12. What is the role of the health workers (by type) in vitamin A supplementation distribution? CHV?

    a. What are the challenges to quality counseling on vitamin A supplementation for families?

13. What would you recommend to improve these services?

Section C: Closing Questions

14. Is there anything else that you would like to share about supplementation or nutrition in your community?

15. Do you have any questions for us?

Thank you!

Pile Sort Food Cards

Card number	English name	Hausa name	Iron source food	Vitamin A source food
1	Rice	*Shinkafa*		
2	Oil	*Mai*		X
3	Wheat	*Alkama*	X	
4	Cassava	*Rogo*		
5	Peanuts	*Gujia*	X	
6	Baobab leaves	*Miya kuka*	X	X
7	Eggs	*Koye*	X	X
8	Soy beans	*Waken awara*	X	
9	Cowpea	*Wake*	X	
10	Liver	*Anta*	X	X
11	Fish	*Kihi*	X	X
12	Milk	*Nono*		X
13	Cheese	*Tchuku*		X
14	Locusts	*Fara*	X	X
15	Moringa leaves	*El makka*	X	X
16	Sorrel	*Yakua*	X	X
17	Baobab fruit	*Kuka*	X	
18	Millet	*Hatsi*	X	
19	Guinea corn	*Ja-dawa*	X	
20	Sorghum	*Fara-dawa*	X	
21	Carrots	*Karoti*		X
22	Cabbage	*Kabeji*		
23	Sweet potatoes (orange flesh)	*Dankali*		X
24	Dried tomatoes	*Toumati boussasa*	X	X
25	Mango	*Mangoro*		X
26	Papaya	*Godda*		X
27	Orange	*Lemu*		
28	Amaranth leaves	*Dangnan haki*	X	X

Card number	English name	Hausa name	Iron source food	Vitamin A source food
29	Yam	*Doya*		
30	Cantelope	*Malo*		X
31	Banana	*Banana*		
32	Eggplant	*Yalon Tourawa*		
33	Taro	*Gwaza/mankani*	X	
34	Wild eggplant	*Yalo*		
35	Pumpkin	*Kabewa*		X
36	Tiger nut	*Aya*	X	
37	Okra	*Kubewa*		X
38	Meat	*Nama*	X	
39	Potatoes	*Dankalin turawa*	X	
40	Onions	*Albassa*		
41	Soybean curds	*Awara*	X	
42	Jerky	*Kilishi*	X	
43	Watermelon	*Kankana*		
44	Guava	*Gwaba*		X
45	Sesame seeds	*Ridi*	X	
46	Lettuce	*Salati*		
47	Tomatoes	*Toumati*		

Annex 3. Pile Sort Analysis and Results

In the unconstrained pile sort activity, we asked respondents to sort the 47 food cards (see Annex 2) into groups based on how they think the foods "go together" (*des aliments qui vont ensemble*). This resulted in 216 piles across 21FGDs. We used techniques in Python data analysis software to visualize and qualitatively analyze the pile sorts. First, we created an aggregate similarity matrix and used MDS to generate an aggregate proximity matrix (Borgatti 2002). However, the results of this analysis did not show strong patterns. The MDS results had a stress of 0.35, which indicates a poor goodness of fit (Borgatti n.d.). There are limitations of visualizing high dimensional data using MDS, a low-dimensional matrix map, so we applied t-SNE as a newer, alternative method of multidimensional scaling that aims to address these limitations (van der Maaten and Hinton 2010). The t-SNE maps show useful clustering, although there were still a few outliers (Figure 1).

We also explored whether the pile sort analysis was limited by the fact that the pile sort exercise was unconstrained, which effectively meant that respondents were creating piles based on different types of internalized, unstated criteria. We categorized each pile using the pile name and description respondents gave for each, and used t-SNE to visualize piles for each of the most common categories (Figures 2 and 3). The two most common were the eating/cooking category (n=101) and health/nutrition category (n=96). The other categories were general food groups, agricultural production, luxury foods, and foods for children, however these categories had a smaller number of piles than the two main categories.

Figure 1. Pile Sort Results (t-SNE): All Piles

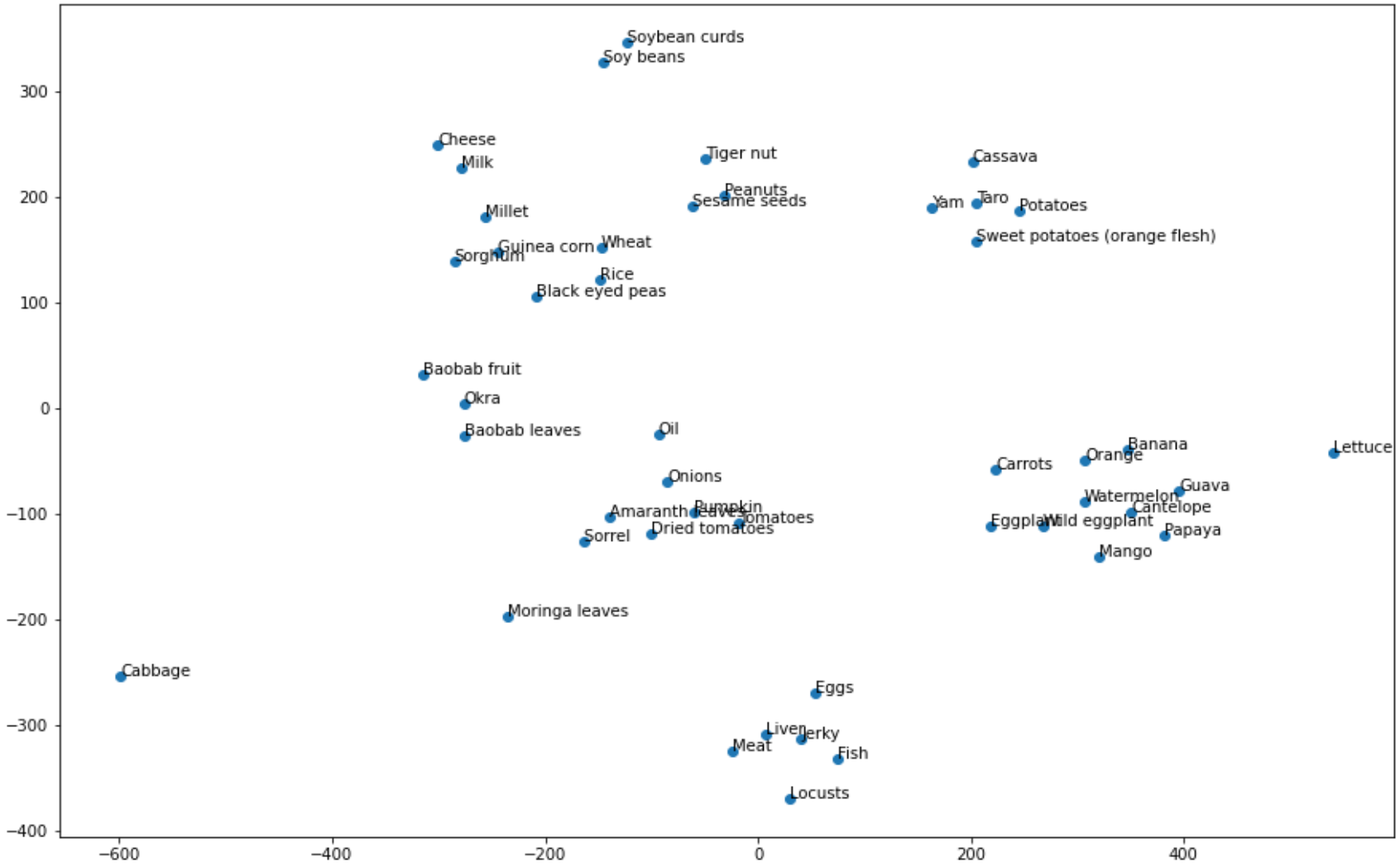

Figure 2. Pile Sort Results (t-SNE): Eating and Cooking Piles

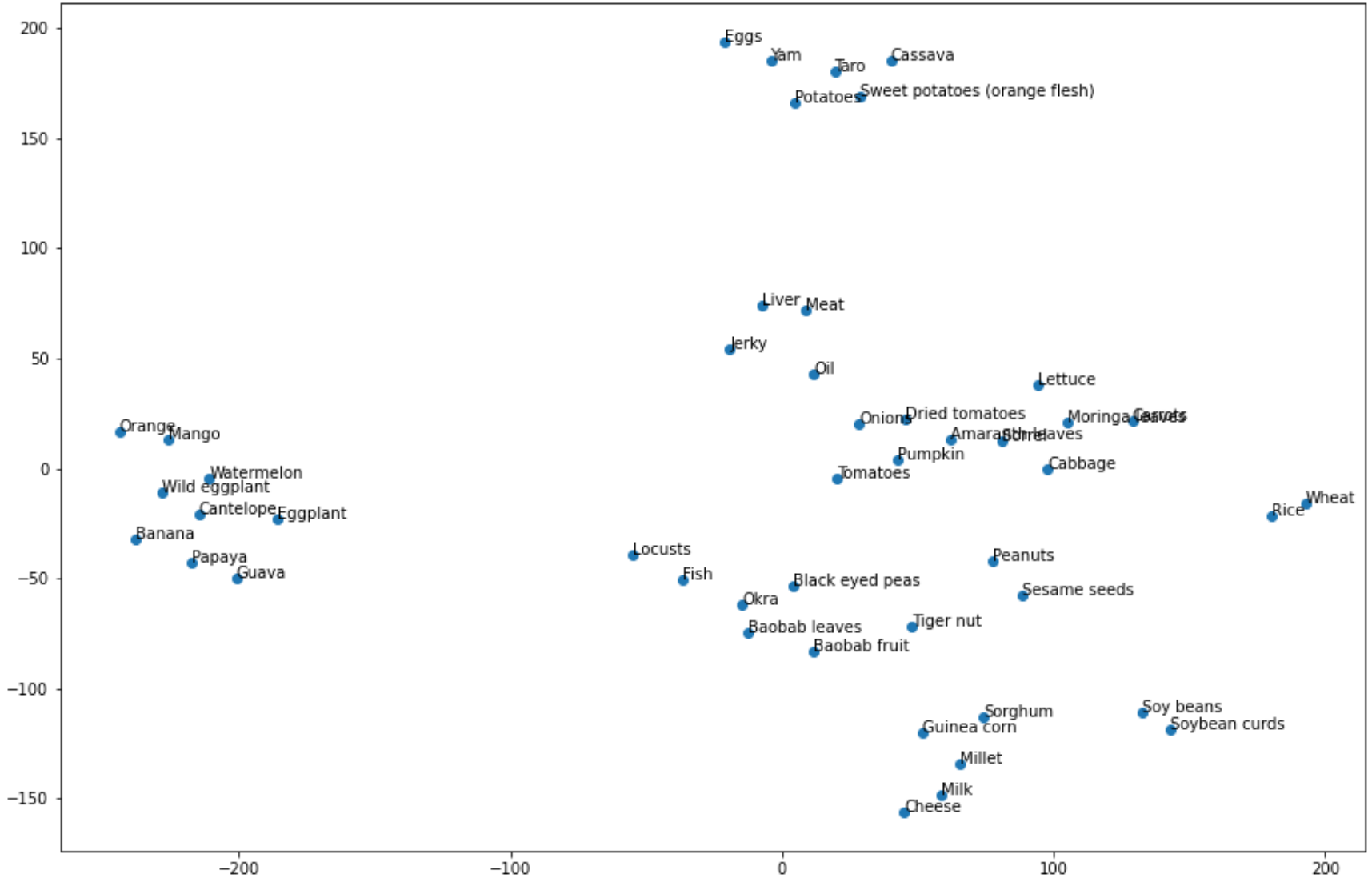

Figure 3. Pile Sort Results (t-SNE): Health and Nutrition Piles