



Report

Formative Assessment on

Nutrition Behaviours of Smallholder Cowpea Farmers in Nigeria



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Acronyms

AAR	After Action Review
AATF	African Agricultural Technology Foundation
AFDB	Africa Development Bank
ADP	Agricultural Development Project
AADP	Adamawa Agricultural Development Project
CCSI	Centre for Communication and Social Impact
CRS	Catholic Relief Services
FGD	Focus Group Discussion
GAIN	Global Alliance for Improved Nutrition
IDI	In-depth Interview
IITA	International Institute of Tropical Agriculture
IDB	Islamic Development Bank
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
GIZ	German Agency for International Cooperation
KII	Key informant Interview
KNARDA	Kano Agricultural and Rural Development Authority
KSADP	Kano State Agricultural Development Project
KWADP	Kwara Agricultural Development Project
KWMA	Kwara State Ministry of Agriculture
LGA	Local Government Area
RIFAN	Rice Farmers association of Nigeria
SAA	Sasakawa Africa Association
SBC	Social and Behaviour Change
SEM	Socio-Ecological Model
SHF	Small Holder Farmer
SWODEN	Society for Women Development & Empowerment of Nigeria
UNDP	United Nations Development Project
WB	World Bank
WOFAN	Women Farmers Advancement Network

Executive Summary

According to the World Bank, agriculture and nutrition are interrelated. This is because food is a key output of agricultural activities and contributes to proper nutrition. However, accessibility to food crops/staples does not ensure good nutrition. Smallholder farmers, who produce over 70 percent of the world's food, are often neglected by development policy and account for most of the world's poor, hungry and malnourished. These farmers and their households consume mostly what they cultivate due to a lack of resources and limited capital to purchase other nutritious food, and this is why they are malnourished. Many nutritious crops are produced and consumed in Nigeria, and she remains the largest producer and consumer of cowpea in the world. However, this has not translated to farmers consuming nutritious foods and having an improved livelihood.

The African Agricultural Technology Foundation (AATF) is driven by the vision of a prosperous and food-secure Africa, where smallholder farmers' livelihoods are transformed by innovation. The foundation's goal is to use appropriate technology to improve agricultural productivity in Africa. AATF supports farmers, especially smallholder farmers in Africa in their quest for access to the best agricultural technology. To further understand the nutritional habits of value chain actors, this study aimed at identifying the determinants, willingness and ability of cowpea smallholder farmers, their households, and processors to cultivate, consume, and sell nutritious foods. The research also sought to document the barriers and enablers to the uptake of nutrition-sensitive interventions carried out by other organizations and identify the most effective communication platforms and channels for disseminating SBC messages across the food value chain.

The study was a cross-sectional study that used qualitative data collection procedures (Focus Group Discussions (FGDs), In-Depth Interviews (IDIs), and Key Informant Interviews (KIIs)). The study was conducted in three LGAs (Local Government Areas) in Adamawa, Kano, and Kwara states. The category of respondents were smallholder farmers between the ages of 18 and 29 years, other smallholder farmers (30 years and above), smallholder farmers' households, processors, representative of Agricultural Development Project (ADP) in Adamawa and Kwara, Kano Agricultural Rural Development Authority (KNARDA) representative and Agriculture extension agents. A total of 18 FGDs, 27 IDIs, and 9 KIIs were conducted among 180 participants (93 males and 87 females). For respondents, three LGAs were randomly selected from a list of 10 purposively selected LGAs that are cultivating cowpea in each of the three states using a random numbers table. Interview guides were developed for each category of respondents and were used to facilitate the discussions during the interviews. Interviews were facilitated by trained interviewers in English and local languages (Hausa, Nupe, and Yoruba) and all audio recordings were anonymized, translated into the English language, and developed into transcripts by a team of transcribers. Transcripts were analysed using Dedoose 9.0. Informed consents were also obtained prior to the interviews from the study participants.

Findings from the formative research

The findings showed that smallholder farmers were aware of the foods that are considered nutritious. Expenses on non-food items affect smallholder farmers purchasing power for nutritious food as they are not able to afford these foods. Smallholder farmers use Purdue Improved Crop Storage (PICS) bags, closed airtight containers and jerricans for cowpea storage while pesticides, habanero pepper, neem leaves, potassium and sun drying are used to preserve cowpea. The promotion of strong and healthy men, women, and children including adult diabetic patients and supply of blood were commonly mentioned as benefits of consuming cowpea by the smallholder farmers, their households, and processors.

The factors that enabled smallholder farmers to cultivate nutritious foods were access to arable farmlands, capital, and incentives (seeds, fertilizers, pesticides) from NGOs and farmers' associations while demand and profits were the major factors that encourage processors to engage in processing of nutritious foods. On the roles that gender play in farming, men are involved in ploughing, cultivation, and sales of farm produce because they are considered stronger while women engage in the business of harvesting and processing of farm produce. Men make the major decisions as regards the household more than females because of the patriarchal system of their communities. The barriers faced by smallholder farmers were majorly financial constraint, herdsmen invasion, natural disasters (drought, flooding, and erosion), and bad infrastructure. Processors are affected by seasonality which results in a scarcity of products. There are no social norms hindering the cultivation of cowpea and other nutritious crops across the three states where the study was conducted. In the three states, dogs, pigs, monkeys, donkeys, and vultures are prohibited from consumption because they are considered unclean.

The focus of both government and non-governmental organizations implementing nutrition-sensitive interventions is on farmers, women, children, and the entire household. Numerous non-governmental organizations and donor agencies collaborate with both federal and state government institutions to implement nutrition-related interventions. These interventions include nutrition assessments, training on nutrition and quality diet and demonstration plots on new varieties of crops for farmers, and distribution of seeds, fertilizer, pesticides, grants, and farming items. Also, barriers to the implementation of nutrition-sensitive interventions vary by location, however, lack of funding was mentioned in all states for government agencies. Other barriers to implementation included religious and cultural norms, lack of transportation for extension agents, and a limited number of female extension agents. The barriers mentioned to hinder the uptake of interventions are inadequate funds for carrying out farming activities and inadequate access to farmlands. Activities that facilitate the uptake of interventions include advocacy visits to community leaders, the distribution of seeds, grants, livestock, and food items, access to loans, demonstration plots, and training for farmers and households on nutrition.

The most effective communication platforms to reach farmers, their households, and processors on nutrition, current market prices, and the latest agricultural innovations and technologies, are radio, market/marketers, farmers' associations, agricultural extension agents, and NGOs. Other platforms highlighted were mobile phones messages, WhatsApp, and traditional/religious leaders.



Recommendation

1

Reinforcement of the benefits of consuming nutritious foods while adopting state-specific frequently consumed meals combination to make them more nutritious.

2

Farmers should be trained on the right use of pesticides/storage practices with emphasis on measures used to maintain the nutritional value of cowpea during preservation and storage.

3

Working closely with policy makers to create an enabling environment such as access to loans for both farmers and processors, this can enhance agricultural productivity and the consumption of nutritious foods.

4

Creation of gender sensitive programmes to sensitize community members on the importance of women's participation in agriculture and their ability to negotiate and make decisions around food consumed in the household.

5

Designing programmes where loans can be assessed by both men and women which will in turn promote food security.

6

Collaboration with existing state government and non-governmental organizations currently involved in Nutrition Sensitive Agriculture (NSA) and leverage their systems and structures to fast track AATF activities such as advocacy and mobilization of relevant stakeholders.

7

Incorporation of context-specific testimonies and success stories of farmers into SBC messages and materials to facilitate the uptake of interventions and utilize practical sessions to engage the audience.

8

Leveraging existing state-specific radio stations to disseminate information by engaging agricultural extension agents and farmer's associations to co-create radio dramas and live interactives (call-in shows) to pass vital information relating to agriculture and nutrition.

9

Leverage state-specific Agricultural Development Project (ADP) structures to continue training and providing technical support to smallholder farmers.



Introduction

According to the World Bank (2015), agriculture and nutrition are interrelated. This is because food is a key output of agricultural activities and contributes to nutrition. However, accessibility to food crops/staples does not ensure good nutrition. Reinforcing the relationship between agriculture and nutrition significantly impacts on the nutritional security of a population (Ojo et al., 2022). The Food and Agriculture Organization FAO (2014) defined nutrition-sensitive agriculture as a “food-based approach to agricultural development that puts nutritionally rich foods, dietary diversity, and food fortification at the heart of overcoming malnutrition and micronutrient deficiencies”. Smallholder farmers (working on less than 2 hectares of land) who produce about 70-80% of the world’s food (Ricciardi et al., 2018), are often neglected by development policies and accounts for most of the world’s poor and hungry (Gomez y Paloma et al., 2020).

These farmers are usually faced with a mix of interrelated risks and challenges such as limited capital, infrastructure, market, and technologies that threaten their livelihood, nutrition, and food security (Fan & Rue 2020). Smallholder farmers and their households are more at risk of malnutrition because they consume mostly what they cultivate due to a lack of resources and limited capital to purchase other nutritious foods (FAO, WFP, & IFAD, 2012, Adenegan et al., 2018).

In Africa, smallholder farmers are responsible for about 80% of agricultural production and women represent the largest percentage of the workforce (Mucavele & Mugege, 2022). Although women play a significant role in agriculture and in the food value chain (production, consumption, processing, and marketing), and are notably the backbone of rural and national economic development, they do not have access to and control over all lands and productive resources, unlike the men (Mohammed et al., 2019). Women’s marginalization is predominant in all spheres of the economy in Africa (Kane, 2022). Also, in working rates women experience a higher rate of unemployment, fewer opportunities for a career, and lower wages making women more vulnerable to poverty and malnutrition. This substantial gender gap exists in six key resources and inputs for agriculture: land, labour, credit, information, extension, and technology (Huyer 2016).

In Nigeria, women in agriculture face lots of challenges due to several traditional and cultural norms that impose serious limitations on them (Obayelu et al., 2020). The patriarchal society of the nation gives men unfair advantages over women as they play dominant roles and often have full control over the resources in society. In addition, it is important to emphasize that when advocating for gender equality in agriculture, it is not the case of targeting only women as many believe but is aimed at bridging the gap between men and women, resulting in benefits for both genders. Increasing inclusivity within the value chain to expand opportunities for both men and women, would encourage cooperation to a substantial extent and increase the volume of nutritious food being produced and consumed (Nyasimi & Huyer, 2017). The consumption of nutritious crops like cowpea, maize, guinea corn, etc. has a significant nutritional impact on the well-being of smallholder farmers, women, and their households at large. (FAO, 2014; Joyce, 2021; Martin et al., 2021). The recognition that cowpea has the potential among other crops to make a significant contribution to food/nutritional security has gained momentum over the last decade (Coulibaly

& Loewenberg-DeBoer, 2022). Nigeria is the biggest producer and consumer of cowpea in the world (Akah et al., 2021). The demand for cowpea in Nigeria is increasing because of high population growth, from the urban areas, and because of poverty and the demand for low-cost food (IITA et al., 2018). Cowpea is a nutritious grain whose contribution to food security has been limited due to many constraints like poor access to inputs such as improved seeds, product markets for widespread distribution of improved varieties, and integrated pest management innovations to reduce crop losses and improve product quality IITA, et al., 2018. Cowpea farmers are burdened by low productivity due to the plague of many pests at various stages of the plant's lifecycle. The most catastrophic damage to cowpeas which causes about 80–90% yield loss for farmers can be traced to a lepidopteran insect called Maruca pod borer (*Maruca vitrata*). The development of the Genetically Engineered (GE) pod borer resistant (PBR) cowpea through agricultural technology and initiatives targets providing a sustainable solution to the devastating pest problem (Ahmed, 2021.).

African Agricultural Technology Foundation (AATF) is driven by the vision of a prosperous and food-secure Africa, where smallholder farmers' livelihoods are transformed by innovation. The foundation believes that the use of appropriate technology can improve agricultural productivity in Africa. AATF supports farmers, especially smallholder farmers in Africa in their quest for access to the best agricultural technology. Through various projects, the foundation has united key stakeholders and positioned technology transfer as a priority for Africa's agricultural progress. AATF's projects cover a diversified crop portfolio that combines cereals, roots and tubers, legumes, and horticultural crops. In addition, the foundation is active in 23 countries of East, Southern, and West Africa, currently addressing challenges bedeviling key staples in Sub-Saharan Africa that include maize, rice, cassava, cowpeas, bananas, and potatoes. AATF formative assessment will give a perspective of smallholder farmers, their households, processors and extension agents' consumption, storage, and processing of nutritious foods. To support AATF in its mission, the Centre for Communication and Social Impact (CCSI) was engaged by Tanager to conduct a formative assessment in some of the AATF project states in Nigeria (Adamawa, Kano, and Kwara). The formative assessment will inform the design of a Social and Behaviour Change Strategy that will address barriers to optimal dietary practices and contribute towards improved nutrition outcomes among smallholder farmers, processors and consumers. This strategy will focus on achieving the following AATF nutrition-sensitive goals:

1

Promoting the adoption and production of diverse, and nutrient-rich foods in the target populations.

2

Facilitating behaviour change for improved consumption of a diverse, safe, and nutritious diet among target populations.

3

Facilitating the creation of an enabling environment for enhanced access to nutritious and safe foods in Africa.

4

Enhancing gender equality in nutrition-sensitive interventions in Africa.

Study objectives

1

Determine factors that influence the willingness and ability of farmers, farmer households and processors to purchase, or consume nutritious foods (affordability, availability, taboos, nutrition knowledge). Interrogate consumer diet patterns, related social norms, and preferences, supply and demand characteristics with a focus on cowpea farming households.

2

Identify barriers and enablers related to social and behavior change for nutrition and identify promising interventions that address key gendered barriers hindering the adoption of improved nutrition practices, including support for increased availability, access, and affordability of cowpea products and other nutritious foods.

3

Explore the household and community food environment including markets and community priorities related to agriculture and nutrition.

4

Provide operational recommendations for strengthening gender and nutrition integration within the AATF project areas, including developing an action plan and an aligned monitoring plan of key gender-responsive and nutrition indicators to assess if the project generates the intended benefits for men and women.

5

Document interventions and focus of organizations working on nutrition-sensitive agriculture/nutrition interventions in the study areas including barriers and facilitators of uptake of these interventions.

6

Identify appropriate communication platforms and channels for disseminating SBC messages.



Research questions

1

What are the current nutritional knowledge and dietary patterns among smallholder farmers, their households, and processors?

2

What factors influence the willingness and ability of small-holder farmers, farmers households and processors to purchase, or consume nutritious foods including cowpea?

3

What are the gender roles in the value chain and how do they serve as either barriers and enablers to social and behaviour change for consumption of cowpea and other nutritious foods?

4

What are the socio-cultural norms preventing the consumption of cowpea and other locally produced nutritious foods?

5

What are the current focus areas and interventions being implemented by other organizations in the study area to improve the uptake of nutrition-sensitive agricultural interventions? Including barriers and facilitators of uptake of these interventions.

6

What are the most effective communication platforms used to reach the target audience with SBC messages?





Methodology

Study Design

This was a cross-sectional study that used qualitative data collection procedures (Focus Group Discussions (FGD), in-depth interviews (IDI), and key informant interviews (KII) to elicit information about the determinants (barriers and enablers) to the uptake of nutritious foods, nutrition-sensitive agricultural interventions carried out by other organizations in the selected states and the most effective communication platforms to reach the value chain actors across the states.

Study Location

The study was conducted in three (3) Local Government Areas (LGAs) in each of the three focus states, (Figure 1); Adamawa (Fufora, Song, Yola south LGAs), Kano (Gwarzo, Karaye, and Sumaila LGAs) and Kwara (Ifelodun, Ilorin east, and Edu LGAs). The states were selected considering the intensity of cowpea farming in these areas.

Adamawa state's tropical climate consists of both dry and rainy seasons. The major economic activity of the population is agriculture and the main food crops grown are maize, millet, rice, cowpea, groundnut, sweet potatoes, and cassava.

Kano state lies in the Sudan Savannah zone. Cowpea is grown by most farmers in Kano and serves as an important source of income and food. The state is home to Dawanau market, which is the biggest international cowpea grain market in West Africa. The climate of Kano state is characterised by variability in rainfall between drought and near drought conditions. Subsistent and commercial agriculture are mostly practised in the outlying districts of the state. Some of the food crops cultivated are millet, cowpeas, sorghum, maize and rice for local consumption while groundnuts and cotton are produced for export and industrial purposes. **Kwara** state has vegetation which is well suited for the cultivation of a wide variety of staple crops like cassava, maize, cowpea, fruits, and vegetables. Rice and guinea corn are significant cash crops planted in the state.

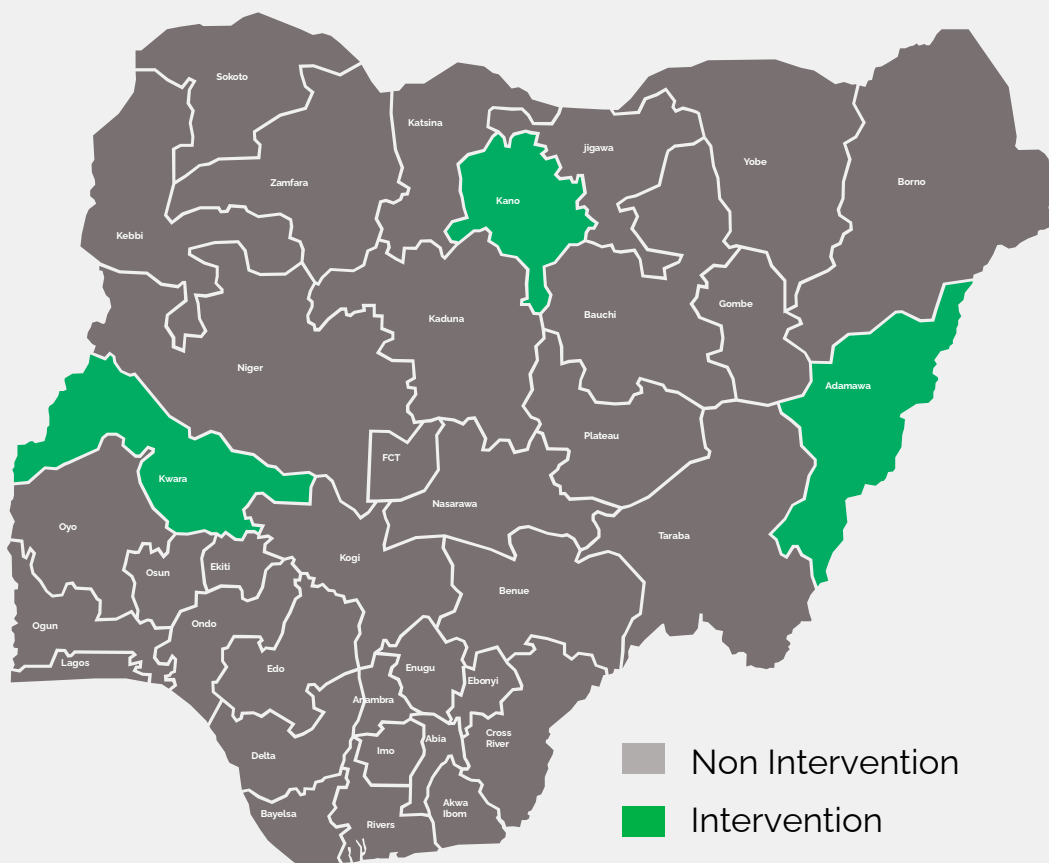


Figure 1: Map showing study sites

Study Population and Sample Size

The study population included youth smallholder farmers between the ages of 18 to 29 years (National Youth Policy, 2019), other smallholder farmers (30 years and above), households (HH) of these smallholder farmers, food processors, State Agricultural Development Project (ADP) representatives (Kwara and Adamawa), Kano Agricultural Rural Development Authority (KNARDA) representatives and Agriculture extension agents representing each of the three states. Each FGD session comprised of eight (8) participants including youths and other farmers while the KIIs and IDIs were one-on-one interviews with farmers' HH members, processors, extension agents, ADP, and KNARDA representatives (Table 1).

The criteria for inclusion for FGD included smallholder farmers growing cowpea in the target locations and have less than two hectares of farming land. For the IDIs, farmers' HH members were included. Only experienced agricultural extension agents, state ADP and KNARDA representatives with five years and above were included in the KIIs. The processors included in this study were those have been exposed to some level of training in food processing by agriculture Non-governmental organization. There was a total of 180 participants (93 male and 87 females) in the whole study.

The table below shows the distribution of interviews and participants per state:

Table 1: Interview distribution

Distribution of Interviews per state				
Interview Type	Adamawa	Kano	Kwara	Total
FGD (Youth & other farmers) (8 participants each)	6	6	6	18
IDI (HH Member & Processor) (1 Participant each)	9	9	9	27
KII (Ext. Agent, ADP, and KNARDA) (1 Participant each)	3	3	3	9
Total	18	18	18	54

Table 2: Participant distribution

Distribution of participants per state							
Interview Type	Adamawa		Kano		Kwara		Total
	Male	Female	Male	Female	Male	Female	
FGD Youth and other farmers (8 participants each)	24	24	24	24	24	24	144
IDI Household member (1 Participant each)	3	3	3	3	3	3	18
IDI Processor (1 Participant each)	2	1	1	2	2	1	9
KII Ext. Agent (1 Participant each)	1	1	2	Nil	2	Nil	6
KII ADP and KNARDA staff (1 Participant)	1	Nil	1	Nil	Nil	1	3
Total Male= 93, Female=87	31	29	31	29	31	29	180

Sampling Approach

For this study, purposive sampling approach was adapted due to AATF's focus on cowpea farmers in these three states. To ensure adequate representation of respondents, a list consisting of 30 LGAs (10 distinct LGAs per state) was developed based on cowpea cultivation which is the primary focus of the study. Three LGAs were randomly selected from each state using a random number table. A total of nine (9) LGAs supported by AATF and where cowpea is cultivated in Adamawa, Kano and Kwara were selected. Smallholder farmers, their households, processors, extension agents and officials of the ADP and KNARDA who participated in FGDs, IDIs, and KIIs were purposively selected across the study locations. Security consideration was factored in the selection of the LGAs.

Pre-test and Data Collection

A pre-test was carried out for the purpose of testing the content validity of the interview guides in the states. The research team pre-tested the interview guides with at least a sample interview (1 FGD, 1 KII and 1 IDI). The FGD guide was pretested among a group of farmers, the KII guides were pretested with an extension agent, ADP and KNARDA representatives and the IDI guides were pretested with HH members and processors. None of these pre-test participants were included into the main study. Relevant and appropriate changes to the interview guide was done as necessary before undertaking the main field exercise. The pre-test was conducted in one randomly selected LGA not selected for the main field exercise.

The research team conducted the interviews with the target audience across the states using interview guides to facilitate the discussions. The guides were precisely tailored to elicit information related to the research questions. CCSI's research team worked with AATF focal persons or assigned contact in each project location to identify suitable participants who can provide rich information. Interviews were conducted in both English and local languages (Hausa, Nupe and Yoruba).

The interview sessions were recorded using a recording device and notes were taken to complement the recording. Each FGD session was homogenous comprising of 8 participants. A total of 18 FGD, 27 IDIs and 9 KIIs were conducted, and the interviews averagely took 60, 45, and 45 minutes, respectively.

Data Quality and Management

CCSI identified and engaged interviewers from its pool of consultants to facilitate the interviews. To ensure quality of the study, a two- day virtual synchronous session via Zoom for research assistants and supervisors was organized. Topics covered theoretical concepts related to producing valid and reliable data using qualitative methods, the objectives and reasons for the study, and practical instruction on conducting open-ended interviews including probing techniques.

Next, the guides were explained to interviewers, and followed by practice and feedback. The process of informed consent was also reviewed. The interviewers were allowed to take guides home to practice them, and a few minutes were set aside each day before and after data collection for debriefing to share experiences and problems that might have arisen from the interview guide administration. The interviewers also engaged in role plays to understand the flow of questions and appropriate areas to probe. The interviews were conducted by trained interviewers who can communicate fluently in the local language (Hausa, Nupe and Yoruba). Each interview session was recorded and complemented with the notes by the

note taker while the CCSI research team provided support to the interviewers and ensured the appropriate study materials were completed. At the end of each day's work, recordings were uploaded onto a secure server; these recordings were reviewed daily to ensure quality. Training and fieldwork in each state was done sequentially to enable lessons to be learnt from one data collection site to the next.

● **Data Transcription, Coding and Analysis**

The goal of data analysis is to understand respondents in relation to the research objectives, to provide answers for the research questions, and to know whether these answers were similar across the category of participants. All audio recordings were anonymized and developed into transcripts by a team of trained transcribers. Individual interviews were audio-recorded, transcribed, and translated into English where necessary. For another layer of quality check, audio-recordings were selected randomly by a member of the research team and back-translated for selected transcripts. All transcripts were reviewed and uploaded to Dedoose 9.0 (a web-based qualitative software) for coding and analysis. The research team conducted inter-rater reliability for coders; provided oversight to the coding process and performed spot checks by reviewing coded excerpts and identifying opportunities for new codes. The team also conducted a framework analysis to identify themes and patterns concerning the research questions.

● **Ethical Considerations**

In line with ethical procedures, informed consent was obtained from individual participants, having provided detailed information about the study to them. Participants were informed about the confidentiality of the data collected, the length of the sessions, and the right to withdraw from the study at any time. After ensuring that the subject understood the information, a freely given written informed consent was obtained from the participants. Interviews were only conducted after a written consent was received from the respondents.

● **Limitation of the study**

This study has potential limitations. The sampling method deployed was a non-probabilistic sampling which might affect the generalizability of this study. A quantitative method with an appropriate sampling approach and statistical sample size estimation would reduce bias, give room for assessing confounders that might have affected the nutritional habits of the respondents, and produce more insightful results. This method will also assess the validity of instruments for the study.

Also, the particular interest in cowpea affects the study as the results can only be related in cowpea smallholder farmers settings. The purposive selection of the location of study was based on the interest in cowpea farmers. Further mixed method research might be required to provide room for triangulation and bivariate or multivariate data analysis. A mixed method approach will also address the issue of confounders and reduce sampling bias.

Lastly, no ethical approval was obtained from an Ethical Review Board for this research. Getting a retrospective approval might be explored if the results of this research will be presented to a wider audience.

Definition of Terms



Nutritious food

A nutritious food is defined as food when consumed by an individual it provides beneficial nutrients and minimises potentially harmful elements (Global Alliance for Improved Nutrition, 2017).



Small-holder farmers

Youth Farmers: This refers to farmers within the age of 18-29 years of age who cultivate cowpea, including other nutritious crops on a small plot of land less than 2 hectares.

Other farmers: This refers to adult farmers above 29 years and above who cultivate cowpea, including other nutritious crops on a small plot of land less than 2 hectares.

Farmers household: This refers to a family member (male or female) of a farmer involved in the cultivation cowpea, including other nutritious crops.



Farmers household

Persons who reside in the household of a person whose primary occupation is farming.



Processor(s)

This refers to a person(s) involved in purchasing and transforming agricultural nutritious products including cowpea into other forms for sale or consumption. The processor(s) can transform crops such as cowpea into flour, yam into yam flour etc.



Agricultural Development Project (ADP)

This refers to state government ministry of agriculture officials, or other related government agencies providing technical support to farmers in Adamawa and Kwara State.



Kano Agricultural Rural Development Authority (KNARDA)

Established by agricultural development project, its focus is to improve the supply of agricultural inputs for technology adoption.



Extension Agents

This refers to an officer with agricultural expertise employed by the government through the Ministry of Agriculture to offer technical advice and back stopping to farmers and supply them.

Findings

Current nutritional knowledge and dietary patterns among small-holder farmers, their households, and processors

This section focuses on the nutritional knowledge and dietary patterns of farmers, their households, and processors. It also elaborates their attitudes and patterns of nutritious foods consumption. Generally, cowpea smallholder farmers and their households were knowledgeable about nutritious foods. They mentioned that food like rice contains carbohydrate; beans, chicken, fish, and egg contain protein; and the importance of consuming fruits and vegetables. Similarly, they mentioned that in situations where they do not have access to varieties of food, the farmers tend to be creative in preparing nutritious meal. For example, they can prepare a pot of vegetable soup using spinach with crayfish instead of fish, chicken or beef. In addition, they consume fruits to ensure they are eating a balanced meal.

Farmers nutritional knowledge and dietary patterns

In the three states, smallholder farmers were very expressive about the nutritious crops cultivated and consumed within their locality. They emphasized on the importance of consuming nutritious foods because it builds the body, gives strength, and repairs the body tissues.



Adamawa

In Adamawa, the participants who participated in the FGDs mentioned foods such as guinea corn, cowpea, groundnut, cassava, nuts (bambara), millet, rice, maize, vegetables (carrot and tomatoes) and fruits (banana and watermelon) as nutritious foods consumed in their communities due to their popularity, availability and the soil type which supports their growth. They emphasized that guinea corn, millet and rice are rich in carbohydrate which gives the body strength, while cowpea and groundnut are rich in protein.



Kwara

Participants in Kwara highlighted cowpea, guinea corn, soya beans, maize, yam, yam flour (elubo), vegetables (okra, jute leaves (ewedu), carrot) and fruits (watermelon and orange) as the known crops which are frequently cultivated in the state. They also mentioned that in their locality, crops like rice, beans, guinea corn and maize grow well due to the nature of the soil.



Kano

In Kano, participants mentioned soya beans, benniseed, guinea corn, maize, vegetables, cassava, rice, Maize, yam, groundnut, fish, meat, apple, orange, and watermelon as the nutritious foods consumed within their communities. Based on the traditions and norms of the society, these foods are culturally acceptable for consumption. They noted that soya beans, when grinded produce milk which builds the body and that their community encourages them to eat vegetables when they fall ill as it is believed that it supplies blood to the body. Reiterating this, a farmer expressed that:



"We saw that, even if a person is sick at the hospital, they'll tell us to cook vegetable with fish and serve the person to eat. We are also advised to give the person orange, apple and so on. Then, we'll see that the body recovers quickly". FGD Adult Female farmer, Kwara

Farmers' household nutritional knowledge and dietary patterns.

Across the three states, members of the farmers households noted that oftentimes, they consume pap (is a Nigerian fermented cereal pudding made from maize or millet) mixed with tamarind and sugar along with kosei, awara or moi-moi (beans pudding). See table 3 for the local food contents.

Adamawa and Kano States

Similar foods are consumed in Adamawa and Kano for lunch and dinner. The foods mentioned were, "tuwon masara", "tuwon shinkafa", "tuwo dawa", and "danmbun" which can be combined with varieties of soups like "groundnut soup"; "taushe soup"; "Baobab soup" or "Okra soup"; rice, beans, and guinea corn.



Figure 2: HH locally consumed foods in Adamawa and Kano state

Kwara State

In Kwara, meal such as “amala”, “wheat” or “semo” with “gbegiri”, “vegetable” or “okra soup”, “pap” with “moi-moi” or “akara”, “rice” with “cowpea” or “vegetables soup” are frequently consumed. These combinations are a result of their culture and traditions which is deeply rooted in most of their activities.

The consumption of guinea corn was popular in the three states, for instance, farmers and members of their HH in Kano and Adamawa stated that guinea corn, when eaten, prevents individuals from getting hungry fast. Guinea corn is also used for processing the popular local drink Kunun Zaki and local beer, Burukutu. Similarly, in Kwara guinea corn is used for making pap which is very common in the area.

The household members were asked how they combine their food to ensure it is nutritious. They mentioned adding crayfish to cook their soups or porridge; eggs, fish or meat as protein to be added to their regular meals and having a side of fruits. Although some of the household members stated that this is not always the case daily, they try to make it as nutritious as possible when they can. On the combination of different foods with nutritional benefits, a member of farmers household said:

“Concoction rice for instance, for me, the way I did this morning’s own, I added fish, I added vegetable oil. I did the stew separately, the fish present will give me protein while the rice will give me carbohydrate”- **IDI, farmer household female, Kwara**



Figure 3: HH locally consumed foods in Kwara State

The table below gives a detailed description of foods consumed by member of farmers and their households.

Table 3 : local food and their related contents

Foods commonly mentioned	Content and preparation process
Tuwon masara	Swallow made with maize or corn- corn or maize meal made by mixing maize/ corn flour with boiling water to a thick consistency and cooking under low heat.
Tuwon shinkafa	Swallow made with Maize or corn- a soft rice variety that becomes sticky when cooked. This is so that the grains can be easily mashed to make a mass of tuwo
Tuwon dawa	Swallow made with guinea corn and pap made with guinea corn- it is ground guinea-corn made thick and solid
Taushe soup	A type of soup cooked using spinach, peanut butter, maggi, pepper
Baobab soup	A type of soup cooked using dried baobab leaves, crayfish, locust beans, meat and seasoning
Okro soup	A type of soup cooked using Okro vegetable, crayfish, pepper, fish, cow skin and other protein of choice can be added
Gbegiri	The beans is peeled and boiled till extremely soft and palm oil is added
Fufu	A type of swallow made from cassava- the skin of the cassava is peeled and cut into small cubes for easy processing in a blender. Once a smooth batter is formed, it is used to make a semi-solid paste
Elubo/amala	Made with yam flour, cassava or unripe plantain- Tubers of yams are peeled, sliced, cleaned, dried and then ground into flour.
Semo	Swallow made from maize or wheat
Ewedu	Soup made from jute leaves- the leaves are plucked and boiled till it is soft and then blended
Pap	A semi-liquid food made from maize, guinea corn or millet- depending on preference, either corn is fermented and blended to make a thick paste
Kosai	Cowpea/beans cake- the beans is peeled and grinded and fried on low heat
Soya beans cake (also known as Awara, Tofu or Beske)	A type of cheese made from soya beans
Moi-moi	Cowpea/beans pudding – the beans is peeled, then palm oil is added along with other seasoning. The paste is put in banana leaves and boiled under low heat
Kulikuli	Groundnut snacks made solely with groundnut
Kunun Zaki	Healthy drink made from guinea corn
Burukutu	Alcoholic beverage, brewed from the grains of guinea corn

Processors nutritional knowledge and dietary patterns.

Processors across the states mill foods popularly consumed in the respective states. The processors process soya beans, groundnut, cowpea, rice, cassava and maize in small scales. In Adamawa and Kano, the processors mentioned that for soya beans processing, it is grinded and milled to soya milk, for maize, the chaff is sold for people that make dambun, biscuits and sometimes fed to livestock animals. These crops are popularly processed because they are frequently cultivated and consumed. On the processing of soya beans a processor said:



"I process soyabeans and make soyabeans cake to eat. I thresh beans and maize and for the maize I grind and process it into flour, then sell the chaff to people. You can use it for dambu and biscuits"-
IDI, Male Processor, Kano

For beans (cowpea), it is soaked in water to remove the skin, grinded and necessary ingredients are added depending on purpose which could be either to make bean cake or beans pudding (moi-moi). Cassava processing is also quite popular as it is processed into garri (cassava flakes) or fufu (fermented cassava). For millet, especially for pregnant women, it is washed and ground to make pap with addition of a little tamarind for consumption. In addition, a processor complained about the state of the raw food they purchase due to them being sprayed heavily with pesticides and some beans being mixed with sand. Regarding the amount lost or damaged during processing, they highlighted that they experience spillage issues when grinding. However, the amount of spillage usually depends on the skill of the individual. The study also revealed that most processors still need to improve their processing skills to increase productivity.

Reiterating this, some of the processors said:



"Yes of course. There was a time I had a problem when processing and the ones that got spoilt in the engine will be up to 15Kg -
IDI, female Processor, Adamawa

Another processor said:



"It depends on the type of machine used to process the cowpea. Some machines have bigger teeth than the others, the bigger teeth damages the cowpea. I have used both, that's why I know this".-
IDI, female Processor, Kwara



Locally grown crops in the community

Across the three states, smallholder farmers, their households and processors were able to mention the locally grown crops in their communities. According to them, these locally grown crops are usually available and accessible except for the seasonal crops.

Adamawa

Adamawa state smallholder farmers mostly grow calorie rich crops like rice and maize. The farmers also grow soya beans, cowpea, sesame, guinea corn (mostly used for the local drink kunun zaki and local beer (burukutu), groundnut, musukum (special kind of millet), cassava, potatoes, cocoyam, garden egg, vegetables (red bell pepper, spinach, moringa, okra, tomatoes) banana, and orange (Figure 4). All the crops and fruits mentioned are very common in the area and have been actively grown for years. On the crops mostly grown in Adamawa, a farmer said:



“Maize is the most grown food followed by rice. This maize is believed by experts to be very nutritious in body building and we have grown to see our elders farming it. Our parents also advised us to grow guinea corn because of its sweetness in the mouth unlike the maize. The guinea corn is cultivated mostly and processed into the local drink (kunun zaki) and local beer (Burkutu). They use the guinea corn mostly for that purpose.” IDI, Farmer Household Male, Adamawa

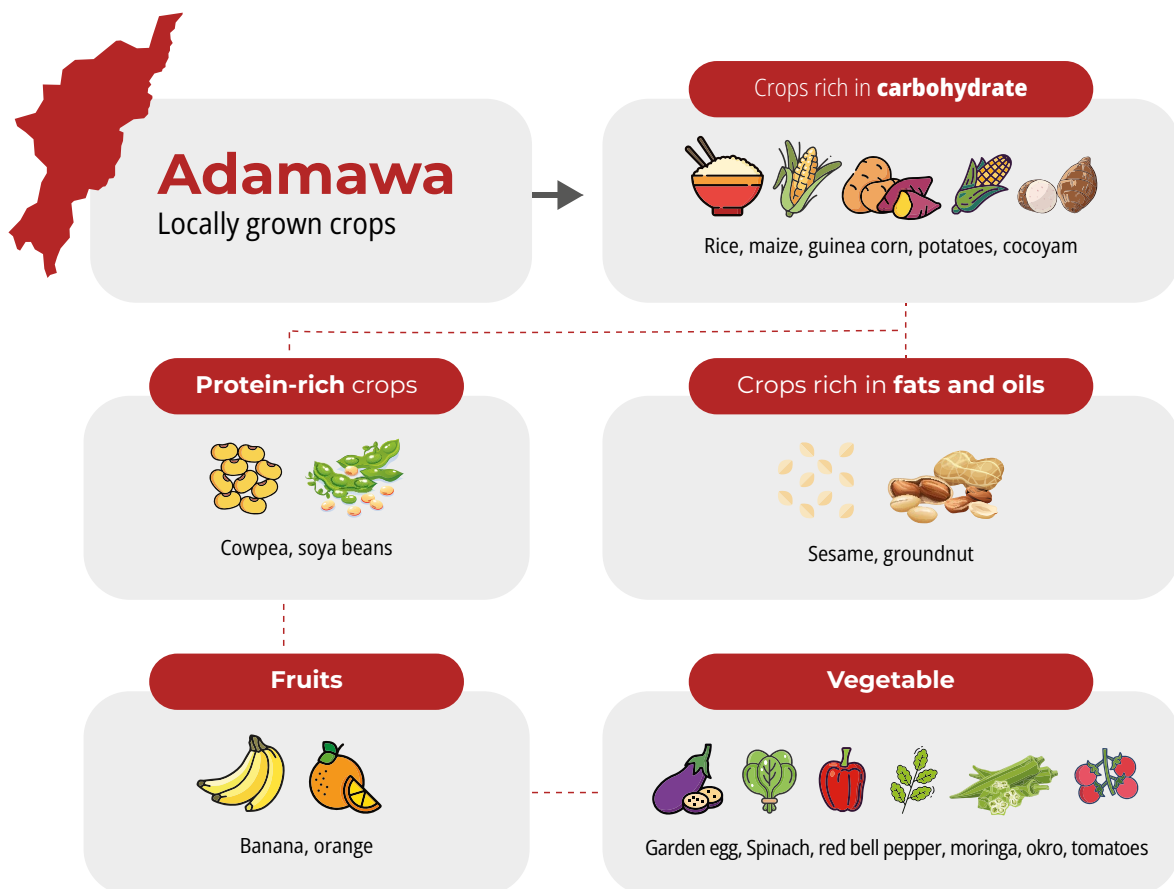


Figure 4: locally grown crops in Adamawa State

Kano

In Kano, the locally grown crops mentioned by the participants include are guinea corn, finger millet (maiwa), millet, beans, soya beans, potatoes, red sorrel (yakuwa), sesame seed, vegetables, pumpkin, groundnuts, wheat, rice, white cowpea, tomatoes, guinea corn, and moringa. Locally grown fruits are pawpaw and watermelon (Figure 5). On the crops grown, a respondent mentioned that:



“What is mostly cultivated in this community is guinea corn, maiwa, millet, cowpea, soya cowpea, potatoes, yakuwa, sesame seed, vegetables as well as pumpkin and watermelon” FGD, Adult Female, Kano

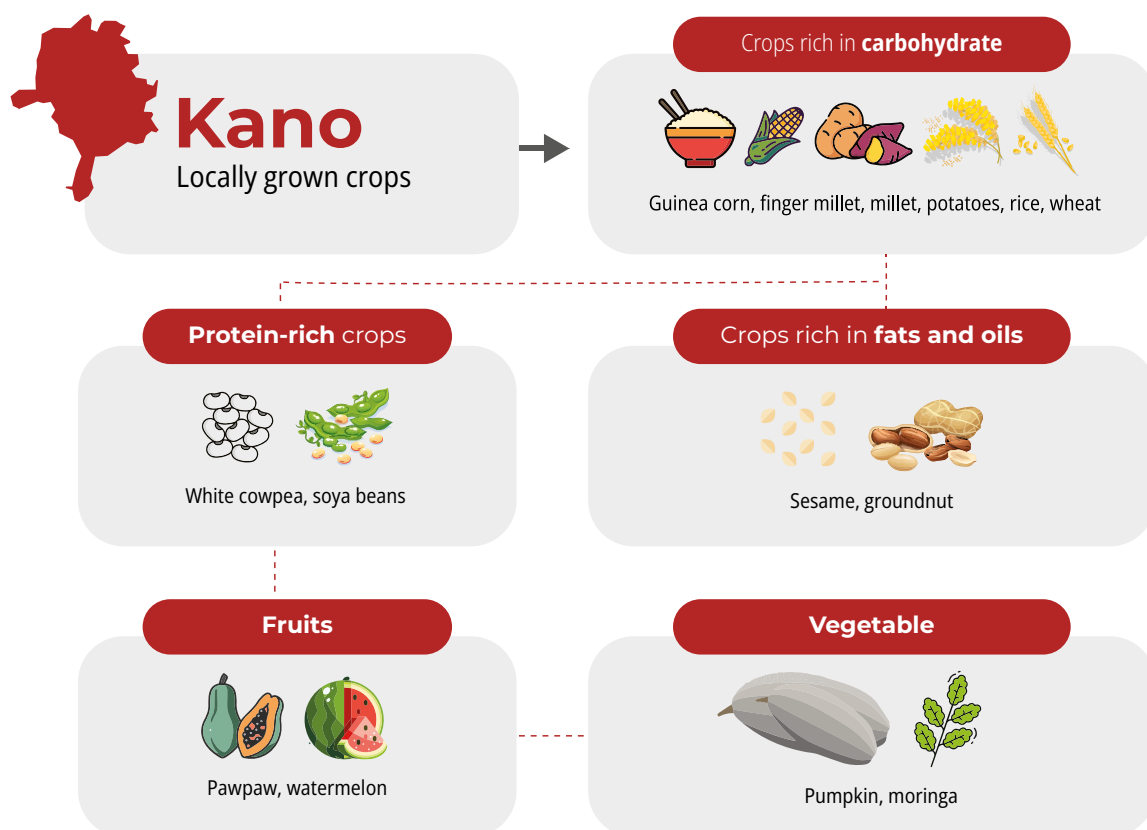


Figure 5: locally grown crops in Kano State

Kwara

From the interviews, smallholder farmers in Kwara state agreed that the popularly grown food crops include Yams, guinea corn (okababa), maize, cowpea, cassava (Ege), rice, millet (jero), melon, tomatoes, soya beans, groundnut, and pepper. Fruits like cashew, mango, orange are common while banana was notably mentioned to be less common (Figure 6). This was further buttressed by one of the respondents:

"We plant cowpea, yam, guinea corn (okababa), corn, soya cowpea, millet, rice, melon, tomato. Our land here is good all we need is help." FGD, Youth Male farmer, Kwara

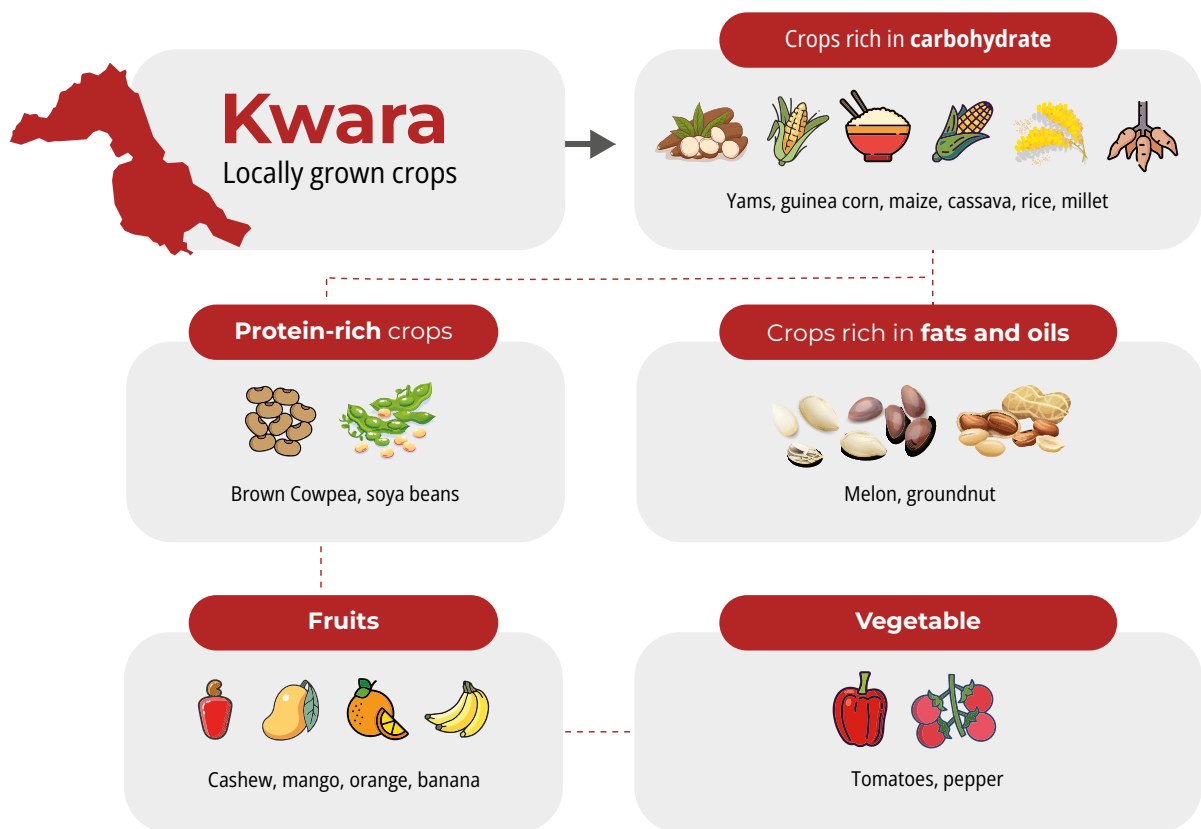


Figure 6: Locally grown crops in Kwara State

Market prices of food items

Smallholder farmers, their HHHs and processors mentioned that prices vary depending on the season of the crops. They further expressed that crops are cheaper when they are in season and expensive when they are out of season. According to some of the farmers and processors, they have challenges in buying crops when they are out of season due to high price., This prevents them from purchasing certain nutritious foods when not in season. In addition, the hyperinflation in Nigeria and high demand due to low agricultural production has negatively affected the food prices in the market (Table 4).

Adamawa State

A bag of soya cowpea goes for 30,000 naira, a bag of rice cost about 22,000 naira while the mudu(a type of measurement used by market sellers to quantify 1.3kg of food) goes for between 1,600 and 1,700 naira. Cowpea is sold as high as 30,000 naira in the market, and it was also mentioned that a bag of maize goes for between 15,000 and 16,000 Naira during raining season but could go as high as 20,000 naira during dry season. The mudu of maize costs 600 naira.

Kano State

According to the respondents, a bag of maize is sold between 12,000 to 20,000 naira and a measure of mudu goes for 700 to 800 naira. Guinea corn is also sold between 20,000-to-21,000-naira, white cowpea is up to 25,000 to 36, 000 naira. Soya cowpea is sold for 31,000 while the mudu is 850.

Kwara State

A mudu of cowpea is 1, 000, while the bag goes for 18,000 naira, a bag of guinea corn is 17,000 naira. A 25 kg bag of rice cost 19,000.

Table 4: cost of frequently purchase food items

Items	Measurement	Price in dollars	Price in naira
Adamawa			
Soya beans	A sac	\$40	N30,000
Rice	A bag (50kg)	\$40-45	N30,000-34,000
	A mudu (1.3kg)	\$2- 2.3	N1,600- 1,700
Maize	A bag	\$20-21	N15,000-16,000 (increases during dry season to 20,000)
	A mudu	\$0.8	
Cowpea	A bag	\$40	N30,000
	A mudu	\$1.6	N1,200
Kano			
Brown cowpea	A mudu (1.3kg)	\$1.3-1.6	N1,000-1,200
White cowpea	A mudu	\$1.86 -2.4	N1,400-1,800
White cowpea	A bag	\$33-48	N25,000-36,000

Items	Measurement	Price in dollars	Price in naira
Maize	A bag	\$16- 27	N12,000- 20,000
	A mudu (1.3kg)	\$0.9- 1.06	N700-800
Guinea corn	A bag	\$27-28	N20,000- 21,000
Soya beans	A bag	\$41.3	N31,000
	A mudu (1.3k g)	\$1.13	N850
Tomato	A basket	\$4-27	N3,000 during season and 20,000 in dry season
Kwara			
Cowpea	A mudu (1.3kg)	\$1.3	N1,000
	A congo (1.5-1.7kg)	\$0.9	N700
	A sac	\$53.3	N40,000
Guinea corn	A congo (1.5-1.7kg)	\$0.3	N250
	A sac	\$30.6	N23,000
Maize	A congo 1.5-1.7kg)	\$1.33	N1,000
	A sac	\$26.6	N20,000
Soya beans	A congo 1.5-1.7kg)	\$0.6	N500
	A bag	\$40	N30,000
Rice	25kg bag	\$25.3	19,000

Expenses on non-food items

The smallholder farmers, their HHs and processors listed various non-food items and how their incomes are expended on them. These items sometimes affect their purchasing power for nutritious foods. The smallholder farmers, their HH and processors listed drugs, clothing, firewood, water, soaps for washing and bathing, transportation, fertilizers, school fees, and children's books as some of the non-food items they spend their income on. Farmers narrated that they sometimes sell their harvested crops to pay their children's school fees and cater for other financial needs. In Adamawa and Kwara States, respondents stated that water is scarce during the dry season and in some places, they have scarcity throughout the year. Thus, they must constantly buy water for daily household use. It was expressed that, the issue with water is caused by the arid nature of northern Nigeria. Similarly, the number of individuals in the household is a huge determinant of how much is spent. Some respondents noted that they typically spend a minimum of 2,000 Naira (\$2.7) in a week, and depending on the situation in the home, the rate of spending increases when a member of the household falls ill. On this, a respondent said that:



"In our house, we have water problems because we are buying at least 3000 litres and 100 litres is costing us not less than 200 naira (\$0.27). At least we are spending not less than 1,500 naira (\$1.34) in a day". - FGD, Youth Male farmers, Adamawa



Knowledge on cowpea farming and storage cultivation

Smallholder farmers in the three states gave detailed explanations of cowpea farming and cultivation. They described the length of time it takes to mature and be harvested, the frequency of fertilizer application and methods of cowpea storage. They mentioned that it takes about 3-4 months for cowpea to be harvested. After the seeds start to germinate, according to them, it is best to start spraying pesticides about 3-4 times before it is ripe for harvest otherwise, maruca will destroy most of the cowpea in the field. In Kwara, the farmers mentioned the pesticide named phostoxin, this pesticide is nicknamed “paracetamol” and is used to store cowpea post-harvesting. Smallholder farmers pick pods when they are full and large to ensure the cowpea is fresh. Also, the farmers mentioned that cowpea fixes nitrogen which is important for soil health. For instance, if cowpea is planted in a space of 2-3 years on the same piece of land, any other seed planted will germinate well. This is supported by a farmer who said:

Frequency of the consumption of some nutritious foods

Across the states, some smallholder farmers stated that although some foods are nutritious, they are not frequently consumed due to the high cost of buying nutritious food and short shelf life of the nutritious food leading to high losses if not sold out. Few farmers reiterated that they sell out some of nutritious foods due to the high prices paid by the buying companies. A good example are the Irish potatoes that companies use for milk, oil or body cream production. They also mentioned that potatoes are perishable, and this makes storing them difficult. According to these farmers, they use the proceeds for the preparation for the next planting season. On this a respondent narrated that:



“We don’t eat potatoes very well. We only cultivate and sell. I heard that some companies use it for milk, but I am not sure if after grinding, they use it for milk. We only eat small number of potatoes, majority is being sold out” – FGD, Youth Male farmers, Kano



“Beans has importance in the soil because its roots and some bacteria that store nitrogen. We know they are legume crops, so, through its roots, it fixes nitrogen in the soil and nitrogen is very important in the soil when farming. And when beans are planted and the leaves fall on the ground, it rots and becomes fertilizer. If you have a farm and you planted beans for two or three years, the following year, if you planted maize, you’ll have a good harvest because of the nitrogen fixed in the soil. So I think beans is a food that is very important”.- FGD, Adult Male farmers, Adamawa

More specifically, in Kano, some respondents mentioned that they cultivate more of white cowpea than brown cowpea because people in the north (Adamawa and Kano) prefer to use the white beans to make beans cake and beans pudding. Also, they prefer the white cowpea because it is “white” and supports their religious beliefs. They also mentioned that the white cowpea cooks faster than the brown cowpea. The farmers in Kwara mentioned that the brown cowpea is more common because they believe it is sweeter than the white cowpea.

The agricultural extension agents in Kano highlighted that there are three types of cowpea, the 499.35 which has a black notch of grain, the 277 which is brown, and the 277.35 which is susceptible to pest. Their relation was more technical and assertive, and this might be because they are professionals in the agricultural field. Although, the knowledge of the technical types of cowpeas mentioned by the extension agents was not known by farmers across the states, some farmers specifically mentioned white cowpea (drum) and brown cowpea (milk). Speaking on the technical varieties of cowpeas, an extension agent said:



“Okay you know 499.35 is black. It has a black notch on the grain. And 277 is green. And curve 499.7 is black. Even the curve, the cover of the cowpea is black. And that 277 is almost yellow or we can say is brown. You see, and 277.35 is very susceptible to different pests”. KII, Agric extension worker, Kano

Perceived benefits of cowpea

The widely shared benefit of cowpea by farmers, farmer households and processors across all the states is that it supplies blood to the body, and it is beneficial for children because it prevents them from falling ill frequently. For male respondents, it is believed that it makes them strong. Cowpea was also said to be beneficial for diabetic patients. It was also highlighted that pregnant women are encouraged to eat cowpea with spinach or egg for healthy growth of their babies. During the FGD sessions, more women reported that they are often encouraged in the hospital to consume cowpea because of their monthly flow. On this, a respondent said that:



‘Cowpea is good for women as it gives blood. Women lose blood monthly and during childbirth. Cowpea helps to replenish the lost blood’- FGD, Adult Women farmers, Kano.

A few respondents mentioned that although cowpea is rich in protein, people perceive that it causes stomach ulcers or heartburn for some people. Furthermore, respondents reported other cowpea uses other than its use for human consumption. They mentioned that cowpea leaves are also used as livestock fodder targeting animals like goats. This reduces the cost of feeding their other livestock.

Across the three states, respondents mentioned the products they consume and process from cowpea. Figure 7 shows a pictorial representation of the forms which cowpea takes after it has been processed.



Figure 7: Processed forms of cowpea is consumed.

Decisions on the utilization of cowpea harvested.

Generally, for most smallholder farmers, a portion of the harvested cowpea is kept for household consumption, another for the next planting season, while the rest is sold to buy other non-food and food items needed at home. A few farmers highlighted that in situations where they did not have direct ownership of the land, they give the landowner some of the harvested cowpea. The roots and leaves are also sold to livestock farmers and the profit accrued is not less than N5,000(\$6.7), as such, cultivating cowpea is a profitable business for most farmers. On the profits made from the cultivation of cowpea, respondents said:



“They bring good profit. Red cowpea are sold for about 1000 to 1200 (\$1.3-\$1.6) naira per mudu (1.3 kg) in the market. White cowpea are sold for about 1400 naira to 1800 naira (\$1.87-\$2.4) per mudu. FGD, Adult Female farmers, Adamawa

Storage and preservation practices for food crops

Various methods are used by the respondents to store and preserve their cowpea. These methods are widely practiced across the states.

Storage practices for cowpea

Smallholder farmers, farmers households and processors mentioned the different ways they store cowpea. Some emphasized that it is always better to store the cowpea in Purdue Improved Crop Storage (PICS) bags to prevent weevils from infesting it, after this, they place tyres or wood on the bag. They also store cowpea in jerrycans, drums and closed containers. This was supported by a respondent who said:



"If you don't want it to spoil, you can get a drum or jerricans and pour the cowpea inside where air cannot enter. The air is what will make the insect enter".
- FGD, Adult Women farmers, Kano.

Preservation practices for cowpea

Most smallholder farmers, farmers households and processors in the states mentioned that they add insecticides or chemicals to the cowpea to preserve it, although for some, the preserved cowpea can be consumed right away while in other situations, you must wait 2 to 3 months before it can be eaten. The chemical methods mentioned are adding phostoxin, insecticides and mixing the cowpea with potassium.

Other non-chemical methods mentioned were preserving the cowpea by adding habanero pepper or neem leaves (known as dogoyaro leaves), exposing it to fire, and sun drying. In addition, farmers from Adamawa noted that an organization educated them on the effect using pesticides to store food. The respondent noted that they were encouraged to avoid using pesticides and resort to less harmful ways to store cowpea. On preservation of cowpea, a respondent said:



"There are also medicines for it, then you put it inside and insects will not enter, the cowpea will stay for a long period of time". - FGD, Adult Women farmers, Kano

Storage and preservation practices of other nutritious crops

According to the smallholder farmers and farmer's household different storage practices apply to different crops. In some households, stores are available for them to keep their food crops, these foods items are partitioned in the store and some crops are kept in sacks to prevent pest infestation.

A female respondent had this opinion as she indicated that:



"We put them in bags and seal them tightly. All harvested crops are put in bags"
- IDI, female member of farm household, Kano

Members of the farmers household expressed that after separating the maize from the cob, the shaft from the separation is added back so that the insects start consuming the dirt before the seeds. For potatoes, they are either peeled and dried for preservation or a hole is dug up and the potatoes are covered inside. For onions, they are stored in a cold dry place. For Bambara nut, it is dried in the sun and placed in a basin with sand. Other crops are simply put in airtight containers, bagged, or sprayed with pesticides.



“For maize, after separating it from the cob and the dirt, the separation is added back into the maize seeds. This is done because if the insects get in it, they start consuming the dirt’s before the seeds. This is how we preserve Maize”. -IDI, Male member of farmer household, Adamawa.

Factors influencing the willingness and ability to cultivate, consume, and sell nutritious foods.

This section focuses on the factors that made it easy for smallholder farmers, their households and processors to cultivate, consume, and process nutritious foods.

Factors influencing the willingness and ability of smallholder farmers to cultivate nutritious crops.

Across the three states farmers highlighted similar factors that made it easy for them to cultivate, consume and sell nutritious crops. The major factors mentioned among others were access to arable farmlands, incentives (seedlings, fertilizers, and pesticides) from their farmers associations and extension agents, and the provision of technical and financial support from NGOs in their respective states.

According to them land plays a pivotal role in shaping their livelihoods, especially smallholder farmers whose livelihoods are partly or entirely dependent on agricultural proceeds. One of the respondents stated that these lands are usually inherited, or they could be leased or purchased. On this the respondent said:



“For us in this community, some of us inherited the lands we farm on. If you did not inherit it, you would either buy or lease it. So, it’s one of two things; you can buy or lease with your money if God has blessed you”. FGD, Adult Male Farmer, Adamawa

Adamawa State

In Adamawa state, smallholder farmers reported that organizations like Mercy Corp provided financial support of 82,000 naira (\$109) per farmer last year and this enabled them to increase the amount of farm related inputs like fertilizers, pesticides, farm tools, on their farms. Speaking to this, a respondent narrated that:



“Organizations like the Mercy Corp have been assisting farmers financially. As of last year, they gave out 82,000 naira (\$109) each to farmers due to the COVID-19, and they also gave us fertilizers and farm tools”. FGD Adult Male Farmer, Adamawa

Kano State

In Kano state, some smallholder farmers confirmed receiving seeds, fertilizers, and pesticides from the farmer's associations they belong to, and this has enabled them use the seedlings for variety of purposes because they can sow the seeds, harvest and consume the produce and sell the excess part of the harvest. Reiterating this a respondent had this to say:

"Some leaders of the farmers' association we belong to, sometimes give us seedlings and fertilizers free of charge. Insecticides also are given to us for free".
FGD, Adult Male Farmer, Kano

Kwara State

In Kwara state, smallholder farmers highlighted that available markets and demand for certain food crops determine what they cultivate. According to them they grow crops that are in demand and change what they cultivate to meet new demands. On this a respondent said:

"Sometimes, this rice my brother is talking about, "Paro" normally matures between 100 days to 120 days. So, during rainy season, when this rice is matured, the price of rice in the market will be high because the female traders must have sold all the rice stocks, making this rice in high demand. It is at this time we will harvest our rice and sell at a high price with plenty of profit". **FGD Adult Male Farmer, Kwara**

Some other factors highlighted by the respondents were the availability of manpower and favourable climatic conditions.

Factors influencing the willingness and ability of farmers' households to consume nutritious crops.

Across the states, farmers' households reiterated that they consume crops cultivated on their farmlands and those readily available and accessible in their communities and local markets. They further highlighted that their knowledge about nutritious food and available funds determine what they eat.

Adamawa

In Adamawa state, the farmer's household members highlighted that the availability of money influences what is being consumed in the home. According to one of the respondents, if there is money they can buy more nutritious food, if not they will eat whatever is available. The respondent said:



"Yes. I also look at the money I have before I eat a particular food. If I have money, I can buy other nutritious foods and I can also buy plenty of meat to cook food for my family also. Where there are no means, I just ask my children to be patient and eat whatever is available". IDI Farmers Household Female, Adamawa

Kano

In Kano state, some household members reported that their knowledge about nutritious crops greatly influenced what they consumed in the house, they further explained that you don't need to be rich in order to consume nutritious foods. They related that with proper food combination you can eat healthily with little or no money. To buttress this point, a respondent said:



"Like me, I cook very nutritious food for my children because I was taught about this when some extension workers came to do food demonstration in our community some time ago. So I learned a lot from them, since then I know how to combine my meals even if I don't have much money" IDI Farmers Household Female, Kano

Kwara

In Kwara state, some of the farmers households' members reported that they consume crops cultivated on their farmlands, and sometime buy foods from the market when there is money. This was because it reduces the stress of getting crops that are outside their locality. On this, a respondent said:



"We usually eat the food we plant on our farms, also when there is money, we can buy other food from the market" IDI farmers household Female, Kwara

Factors influencing the willingness and ability of processors to purchase and sell nutritious crops.

The demand and market value of crops were reported among processors across the states to be the major factors that influence their willingness and ability to purchase and sell nutritious crops. Emphasizing this, a respondent said:



"As for me, if the crop is not in demand in the market I don't even near it. Like here in Kano, we eat maize very well because there are different ways it can be processed. So I sell maize both the grain and I also grind it to powder for those that will want to make swallow from it" IDI Male Processor, Kano.



Also, processors highlighted that they buy products in large quantities when the prices are low and then keep (hoard and refuse to sell in the market) their products in their stores and sell them when the prices of these crops are high to make more profit. Crops like cowpea were stored in Purdue Improved Crop Storage (PICS) bags. The processors are extremely interested in making profits which is why most of their crops are hoarded until the price skyrockets. Talking on this, a processor said:

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"I like to wait for the prices of goods to go up before I sell some of my own. Sometimes, what I do is to keep some in my store and sell some so once the price goes up, my profit will go up too" IDI Male Processor, Kwara

Gender roles, and barriers in the value chain

Across the three states, findings showed that both men and women are involved in farming, although at varying levels. The farming activities embarked on as discussed by the respondents are ploughing, planting, harvesting, processing (Figure 8). This section details the roles men and women assume in the value chain.



Figure 8: pictorial representation of gender involvement in agriculture

Adamawa State

Some of the smallholder farmers from Adamawa narrated that men are involved in the ploughing and planting processes while women harvest the crops. Women are also involved in the business aspect of farming by selling the produce harvested from the farm and they are also involved in processing the farm produce into other forms such as converting groundnut into kulikuli (a snack primarily made from groundnut). Women who earn income through farming activities are able to purchase nutritious foods for their families and this contributes to food security in the household. A member of the farmer's household explained that men are more involved in cultivation than women. On the roles of gender in cultivation, he said:



"Men are more into farming because the women mostly don't come out to lease land for farming. They are mostly involved during harvesting period. But from farm ploughing to planting women are not involved, meaning they are mostly involved during harvest periods" IDI, Male Farmer Household, Adamawa

Kano State

In Kano State, the respondents indicated that both men and women take part in farming. According to them, men do more farming than women because not all women are permitted to leave their homes. Interestingly, some farmers stated that some women are involved in farming because they do not have husbands and so they have to take up the responsibility of providing for their families. On this a female farmer said:



"In our community, a woman who is involved in farming activities does so because she does not have a husband. If she has a husband, she will not do it. Also, a widow and her children participate in farming". FGD, Adult Female, Kano

Most farmers added that not all women in the state are allowed to leave their homes because of religious and cultural practices. This prevents them from directly participating in the cultivation of crops although such women have the option of engaging in other income-generating activities like trading that can be done in their homes. It was further stated that some of these women who are not allowed to leave the house employ farm laborers because they are wealthy and can afford to pay for the services. After harvesting the farm produce, these women send their children or their husband or labourers to sell the products for them. A Female farmer from the youth group had this to say:



"A woman cannot go to the farm, but she can plead with her husband to help her take care of her farm. Some women who have money pay others to work for them". FGD, Youth Male, Kano

According to the smallholder farmer, women are also involved in processing farm products into other forms, and these are sold for money. Some of the forms of the farm produce are turned into are Kulikuli (a snack primarily made from groundnut), bean cake (called Kosei which is derived from cowpea), and soya beans which is processed into soya milk or soya beans cheese (also known as Awara). A female farmer expounded on the level of women's involvement in agriculture in the state. She had this to say:



"Men do cultivation while women assist in the processing and harvesting. Women do the threshing of grains such as millet, corn etc". FGD, Adult Female, Kano

Men in the state are involved in farming activities, and in selling off the farm products. They also engage in the rearing of cattle while women rear the small animals and poultry such as goats, guinea fowl, ducks and chicken. According to one of the female farmers, both men and women are into livestock farming. This is further buttressed below by her:



"The cattle are reared by men. We, the women rear sheep and goats and chickens" FGD, Adult Female, Kano

The farmers expressed that livestock farming could be practiced for commercial purposes or domestic use. Rearing animals for commercial purpose is another channel of generating income to meet basic needs while the rearing of the animals for domestic use will make it easy for the family to consume foods rich in protein. A male farmer had this to say:



"I rear animals like rabbits, chickens, rams, goats and I sell them when they are mature. When I sell these animals, I remove my profits and buy fertilizer". FGD, Male Youth, Kano

Kwara State

Both men and women are involved in farming because some farmers believe there are no jobs in the state. Despite the women's involvement in farming, they still engage male laborers to work on the farm for them because they believe men are stronger and can perform harder tasks on the farm. According to them, more men are involved in planting while the women harvest the crops. Speaking on this, one of the female farmers during the session with the youth said:



"If not that there is no job, the woman should not be farming. We hire labourers because we are not as strong as men" FGD, Youth female, Kwara State]

Perception on role of men and women regarding food consumed and household income.

This section examines how the community members perceive the roles of men and women regarding food consumption and household income. Findings showed that men make more decision in the home because they are seen as the head of the family. Albeit there are instances where women also make decisions especially when they are the head of the family.

Perception on the role of men and women on joint decision-making.

Across the study states, most farmers and members of farmer's households said decisions are made by both partners in the home. However, some mentioned that the men make important decisions (such as how to spend the family income, children's education etc.) because they are seen as the head of the home while the women make decisions on what meal to prepare. However, some respondents mentioned that some men also make decisions on the food to be prepared. The reason men make such decision is because they are the breadwinners of the family. Below is a quote that illustrates it better.



"It is the man that makes decision on what to eat because he brings in the money, so he makes the decision" FGD, Adult Male Farmers, Kano

Role of men and women in managing household income

This varies from household to household; in some households, joint decisions are made on how the income should be spent. A female farmer in the youth group explained in her words that decision can be jointly made by both parties. She said:



"In some houses the man and woman will come together and advice each other how the money will be shared in their house" FGD, Youth female farmer, Kwara State

In most families, the husband makes the decision on how money generated in the household would be spent; this money includes the one made by the woman too. While in some households, a woman can make decision especially if she is financially independent. However, a female respondent believes that men are responsible for making decisions on how money should be spent. In her own words, she expounded on the matter saying:



"If a woman brings home money or the husband brings money home, you don't have to talk about how it is spent. If you as the woman brings money home, you will give it to your husband. Your husband is the one that will go out and do the shopping. He will buy all that you do not have at home. Then the woman will cook the food"
FGD, Adult female, Kano State

Beliefs and practices that can affect men and women participation in farming activities.

Beliefs and practices associated with farming differ from state to state and culture to culture. Kano and Kwara state have specific beliefs and practices on the participation of women in farming activities.

Adamawa State

According to smallholder farmers that were interviewed, there are no cultural practices that prevents men or women from participating in farming activities in Adamawa state but due to social stereotype and society norms, some women might not want to engage in certain jobs as explained by a member of the farmer's household. Reiterating this, he said:



"Here in Ngurore, it's not that the culture forbids anything but because time has changed. The woman on her own may not want to carry out some businesses because of fear of what the society might say, but it's not that she is forbidden by the culture not to do them. For instance, Okada riding (riding a motorcycle) the culture does not stop her from riding it, but she cannot pick up Okada riding as a means of livelihood because of what the society may say or how she will be perceived. So, I don't have anything to say that the woman may want to do, and that culture is against it I don't have any idea about that".

IDI Male Farmer Household, Adamawa

Kano State

In the northern culture especially in Kano State, some northern women are not permitted to go out because of religious beliefs, this makes them to lease farmlands and give it out to either their husband or labourers or their children to farm on. On this, an adult female farmer said:



"In our tradition, women farm although it is their money that does it indirectly. They pay to get it done. She does not go to do it herself whereas, the man does it himself and his children" FGD, Adult female, Kano

Kwara State

There is a belief that certain vocation such as trading is meant for women because they feel farming activities could be strenuous to women. This is buttressed by one of the processors interviewed. He stated that:



"Our perception goes with our culture. Here people believe women are not supposed to go to the farm to cultivate crops. They are expected to go the market, buy store and resell. We believe that the farm labour is only for men." KII, Male Processor Kwara

Smallholder farmers income-generating activities

This part focuses on other income generating activities or occupation smallholder farmers engage in which serves as an addition income to the household. Across the study locations, other activities people engaged in apart from farming are mechanics, mason, motorbike (okada) riding and trading. People also engage in other professions like teaching, fashion designing (tailoring), etc. while others take up government jobs too. Engaging in other income generating activities with farming might give the farmers access to more funds to purchase nutritious foods and meet other basic needs. This point was emphasized by a member of the farmers' household. He said,



"We have artisans, we have tailors, we have mechanic, but majority are farmers. Some women serve as traders" **IDI, Youth Farmer, Kwara**

Barriers preventing the cultivation, sale, and consumption of nutritious foods in the value chain.

Different barriers preventing smallholder farmers, their households, and processors from cultivating, consuming, and selling nutritious foods were discussed at this section as detailed below:

Barriers to the cultivation of cowpea and other nutritious food

Smallholder farmers discussed various barriers they face in the cultivation of nutritious crops. Across the states, most of the farmers complained of difficulty in purchasing necessary farming implements like fertilizer and chemicals due to limited funds. Farmers said pest infestation of nutritious crops discourages them from planting certain crops because it reduces the yield of the product. A female farmer said,



"Our challenges are many. Sometimes, we might have cultivated let's say maize but by the time we get to the farm to check it next week or so, birds would have eaten everything. We will be forced to go to the market, even if the one we have some at home that we have cultivated, we will still need to go to the market, look for money to buy another one and re-cultivate. Sometimes, we apply pesticides, that thing is called commando. It is usually applied on it. So that birds will not go there but sometimes, birds still fly" **FGD Adult female, Kwara**

Some of the farmers complained of herdsmen invasion of farmlands whereby cultivated nutritious crops are eaten by cattle. In addition to this, they also mentioned natural disaster such as drought, erosion, and flooding. According to one of the farmers said:



"Fulani herdsman is the biggest challenges, and sometimes the raining season too affect the farm". **FGD, Adult Female, Adamawa**

Furthermore, poor transportation system was highlighted as a barrier to the sale of farm produce as the cost of transporting these products to the market is high. This was illustrated by a respondent who said:



“If there is no good transportation system it is a problem. Most of the roads here are not good, river has cut across the road. When you take a driver to bring your produce back home, he will say no because the road is not good. So, you see this is a problem but if there are good roads our farmers will make use of these roads in bringing their farm produce to the market. This will be better because they will pay little amount of money on transportation but if the driver charges you a high amount for transport you will definitely add to the selling price because of the high cost paid in transporting it.” **KII, Extension worker Kano**

Barriers to processing of cowpea and other nutritious food.

Getting cowpea to sell could be difficult because at certain times the product becomes scarce due to unavailability. However, the demand for the product is high. Money is also seen as a barrier to the sale or trading of nutritious crops in the community. An individual who is not financially stable might not be able to stock up his/her store with nutritious crops and might not be able to process the crops into other forms, thus posing a limitation to the sale of these crops. This was further explained by one of the processors who said:



“One challenge about corn, guinea corn and red beans is that we have farmlands to farm them, but we do have enough capacity to do so. People come to us to buy but there is not so much to sell. So, we can say the challenge is we do not have the capacity to cultivate, sell and process crops in large quantities. Finance, fertilizers, pesticides and all these are the support we need from farmers’ association”
IDI, Processor Kano

Barriers to farmers’ HH’s consumption of cowpea and other nutritious food.

Barriers to the consumption of nutritious meal as discussed by farmers and members of farmer’s households are insufficient money to purchase nutritious crops, seasonality, unaffordability due to high prices some of nutritious foods and unavailability of food crops in the household. Emphasizing this, a member of farmers’ household said that:



“If you cannot afford it, you will be patient till you can. It is a challenge”
IDI, Member of farmer household Kano

Socio-cultural norms preventing the cultivation, sale and consumption of cowpea and other locally produced nutritious foods.

This section details the social or cultural beliefs that hinder the cultivation, sale and consumption of nutritious foods. Across the state farmers narrated there are no norms associated with cultivation of cowpea and other nutritious crops.

Socio-cultural norms preventing the cultivation of cowpea and other locally produced nutritious foods.

There are no norms hindering the cultivation of cowpea and other nutritious crops acceptable and consumed across the study locations. On this a respondent said:



"There are no beliefs that affect the participation of men and women in farming nutritious foods in this community. I've never heard of it" FGD, Adult male farmer, Adamawa

Socio-cultural norms preventing the sale of cowpea and other locally produced nutritious foods

Processors discussed that there are no norms in the community preventing the sale or processing of crops produced and/ or consumed locally into other forms. A respondent said:



"I do not think there is any custom or tradition that prevents eating or selling nutritious foods" IDI Processor Kano

Socio-cultural norms preventing the consumption of cowpea and other locally produced nutritious foods.

Across the states, certain animals are prohibited for consumption like dogs, donkeys, monkeys, pigs, etc due to religious belief that the animals are unclean. Interestingly few respondents in Kano State cited that in some parts of the state, women are not allowed to eat a kid of a goat, mammary gland of female animals or private part of male animals because eating such has consequences. Speaking on this a respondent said:



"A kid of a goat is consumed only by men. Women are not supposed to eat it. Women are also not allowed to eat the breast of any animal slaughtered so that they will not have their own breast burst" FGD Adult Female Kano



Another respondent said:

“Women do not eat the private part of a slaughtered animal because it results to illness such as cancer. Also, women cannot eat an egg that a hen had sat on even though it is not hatched because it is said to hinder pregnancy” **FGD Adult Female Kano**

Intrahousehold food distribution

Distribution of food varies from household to household. In some households, adult male members are most favoured in terms of the amount of protein (meat and fish) apportioned to them. Men are given more meat than women and children. In addition, men tend to eat more solid foods like tuwo masara (solid food made from corn flour) than women and children. A member of the farmers' household reiterated this by saying:



“In my house, rice is cooked the most and it's consumed mostly by the women folks, but we men eat more solid foods (tuwo masara; a solid food made from corn flour) than the women”. **IDI, Male Farmer's Household, Adamawa**

In another instance a female farmer from one of the FGD sessions explained that men consume more food than woman because they work more. On this, she said;



“Men eat a lot more than women, and this is because the men work a lot”
FGD, Adult Female Farmer, Adamawa

In addition, some households indicated that they put the children's nutrition into consideration when planning their meals. As such, the parents ensure that foods rich in protein and fruits are provided to them. Some farmers and members of farmer's household also indicated that children eat more nutritious foods than adults; because according to them, children need nutritious foods for their growth. Others are of the opinion that boys eat more than other household members. A male farmer explained this by saying:



“The younger ones eat more nutritious food than the older ones, both young men and young women. The older ones are grown and mature, they younger ones are still growing.” **FGD, Adult Male farmer, Kano**



Another respondent said:

“The type of food small children and adult consumes is the same. But we buy eggs, oranges and bananas for small children because of its protein”

FGD, Adult Male farmer, Adamawa

Farmers also mentioned that pregnant women eat certain foods because of their cravings; protein rich foods like cowpea or vegetables were said to be consumed. These foods are nutritious and will help build their bodies and that of their babies. This was explained by one of the male farmers who said:



“This depends on the pregnant woman, some will prefer cowpea, others will prefer salad or cabbage, or anything she wants. They also go for Ante-natal from time to time until she delivers.” **FGD, Adult Male farmer, Kano**

The intrahousehold food distribution for this study are determined by the nature of work done by the individual. This makes men and boys to consume more calorie rich foods than women because they engage in tedious work than them. Other determinants are consideration for the growth of children as they need more nutritious food to grow healthy, and cravings of pregnant women.

Current focus areas and interventions being implemented by other organizations to improve the uptake of nutrition-sensitive agricultural interventions.

Nutritional interventions and focus areas.

This section details the focus areas of government and non-governmental organizations involved in nutrition-sensitive agriculture interventions and the types of interventions that are implemented. Respondents related that government agencies, development organizations, and donor agencies are involved in different agricultural interventions across the study locations, with the goal of improving the uptake of quality diet. These interventions are targeted at farmers, women, children, and households, although responses suggested that in recent times, emphasis and focus have been on improving the quality of nutrition for mothers and their children. Several factors were mentioned to influence the type of interventions that are carried out in state-specific locations.

Adamawa State

The ADP representative noted that amongst its numerous regular interventions, the agency carries out food security assessments, household nutrition and needs assessments, and in recent times the emergency food security and nutrition assessments.

The representative highlighted that the emphasis has been on improving the quality of nutrition for children, especially since the proliferation of insurgency in the state. Insurgency has also been attributed to a variety of agriculture and nutrition-related setbacks in the state, such as loss of crops, loss of farmlands, poverty, and death of male members of family leaving the responsibility of raising the family to the women, who need to be equipped with the necessary knowledge, skill set and tools to improve their nutrition and that of their children.

The respondents mentioned other activities carried out by the agency which includes training of farmers on pesticide application, micro gardening and entrepreneurship, and household income generation activities for women. In addition, the Ministry of health was also reported to have carried out nutrition related interventions. For instance, the “Save One Million Lives” project focused on training women on how to make “Tom Brown” (a nutritious blend of grains) specifically for child nutrition. Organizations like OXFAM was mentioned to provide trainings for women on how to make local salads, and how to purify water using “moringa seeds”. These suggest that organizations are currently involved in interventions targeted at improving the nutrition and dietary practices of women and children who are the most vulnerable groups, as conflicts in the region may limit their access to quality foods.

“Generally, Nutrition is for women and children. Because they are the vulnerable citizen, they suffer the most” KII, ADP representative, Adamawa

Kano state

The representative noted that there is a department within the Kano state Agricultural development project called “women in agriculture” which comprise about 260 female extension agents, whose focus is on food and nutrition. Their tasks include the dissemination of information about food fortification, backyard gardening, dietary diversity, and recipe training through practical demonstrations, group discussions, and meetings with farmers and women at the household level. On this a respondent said:



“We take the packages to the women through our women in agricultural units under this department. I told you we have more than 260 something extension women. We try and give them recipes, utilizations of foods, nutrition so it is through them we go and meet their women groups try and give information in their women groups” KII, KNRDA, representative Kano

Kwara state

The focus has been on farmers, women and children. Trainings are targeted at creating awareness on nutrition and providing necessary food items to improve the quality of the diet of women and children. Other activities carried out to enhance the quality of nutrition for both farmers and women, include the introduction and training of farmers on biofortified crops such as Orange Fleshed Sweet Potato (OFSP), and the distribution of improved seedlings to farmers. On this the ADP representative said:



*“We want them to be eating well, to be eating balance diet, to feed their children especially the children and the pregnant and the lactating mothers. Do you know that is where the problem starts? When you are pregnant and you are not eating very well, it will affect the child. We want them to feed very well so that ...you know, if you are not healthy, agricultural activities and your duty job cannot be done. So, what we are looking forward to is that they should feed well and that is our motto. **“KII, ADP representative, Kwara**”*

At the household level, women are trained on how to make milk from soya beans, improve backyard gardening for vegetables such as Ugwu (Pumpkin), and animals such Chicken (layers) goats, and cows were distributed for rearing to improve their protein intake. The ADP representative further referred to a recent program for farmers called, Small Holder Horticulture Empowerment Program (SHEP), targeted at training farmers on how to make nutritious foods and emphasise the importance of eating nutritious foods. According to the ADP representative, farmers cultivate crops but do not know what to eat, and that farmers in the state prefer to sell off their crops than consume them. The respondent buttressed this by saying:



“When I was the director of women in Agric, fund is normally made available for us in nutrition. What we do is that we use that money to do home garden and the school garden. In the home garden, we have foods that are rich in vitamin A, we give them pumpkin seedling that is “ugwu” so that when they plant it at the backyard, they can have access to iron-rich foods. Then we normally made available small ruminant like goats and we even give them layers. We give them some of these animals so that it will serve as a source of protein for them”
KII, ADP representative, Kwara

Organizations working on nutrition interventions.

This section focuses on the different organizations carrying out nutrition-sensitive agricultural interventions and the type of interventions they are involved in. According to the state government agricultural agency representatives, different nutrition interventions are carried out by organizations across their respective states. These interventions include, facilitating nutrition assessments, capacity building for state government field staff, training of farmers on best farming practices, training of women on backyard gardening, provision of improved seedlings and livestock to farmers

and women, training on recipes for mothers, and distribution of farming equipment, fertilizers and pesticides to farmers. The dynamics to the type of interventions provided by some organizations may have been influenced by state and context specific situations experienced in these locations.

Adamawa state

Organizations like UNICEF (United Nations Children Fund), Society for Women Development & Empowerment of Nigeria (SWODEN), Sasakawa Africa Association (SAA) IITA, Icrisat, Links, Harvest plus, GAIN project, and Dangote group were mentioned by the ADP representative as organizations who collaborate with government institutions like the ministry of Agriculture, Ministry of Health and other affiliated government institutions. The activities of these organizations cut across state, local government and community level. These supports include technical nutrition assessments, funding and training to government agencies. Other organizations mentioned who implement nutrition related interventions include the British council, UNDP, Mercy Corps, Victim support, International Institute of Tropical Agriculture (IITA), Rice farmers Association Nigeria (RIFAN), Oxfam, NURU International, CRS, and GIZ.

Furthermore, government institutions mentioned by the representative who carry out nutrition interventions in Adamawa the state include the Adamawa State Ministry of Agriculture, Adamawa state Agricultural Development project (AADP), and Adamawa State Ministry of health.

Kano state

Specifically in Kano state, Harvest Plus an NGO, was mentioned by the KNARDA representative to be at the forefront of providing improved varieties of seeds and biofortified crops like maize, and Orange Fleshed Sweet Potato (OFSP) to farmers. Also, agencies like Islamic Development Bank, African Development Bank, and World Bank were reported to provide funding to the National Agricultural and Rural Development Authority (NARDA) to facilitate discussions and resolve issues of conflicts between herders and farmers in Kano state. On this the respondent said:



*“What we did in the state was done through UNICEF and the nutrition desk officers in the state. Every six months, UNICEF carries out a survey to understand the intake of food apart from the health sector, what is the deficit, do they have malnourished people, malnourished children? what are the prevalent diseases? Is it due to malnutrition or deficiency of some element? They bring the result to us they now say so please we need to mount a campaign for yellow maize because they have night blindness, they lack vitamin A we will say no problem we now mount that campaign or we call on Harvest Plus or supporters” **KII, KNRDA representative, Kano***

Government agencies mentioned to facilitate nutrition interventions in Kano state include the Kano State Ministry of Agriculture (KSMA), and the Kano State Agriculture Development Project (KSADP).

Kwara state

It was mentioned by the ADP representative that Kwara plays host to several non-governmental organizations, who reach both farmers and households with a variety of interventions. These organizations include USAID, RIFAN, Nigeria Olamtech, and Viti rice.

UNICEF is said to be instrumental in collaborating with state agriculture agencies in facilitating nutrition assessments and promoting different areas of nutrition including dietary diversity, animal and food protein, food fortification, and backyard gardening for women.

The government institutions mentioned by the ADP representative who carry out nutrition related interventions are the Kwara State Agricultural Development Project and Kwara State Ministry of Agriculture.

Barriers and facilitators of uptake of nutrition interventions.

This section focuses on the barriers to implementing nutrition sensitive interventions from the perspectives of state government agricultural agency representatives. It also, details their perspectives on the barriers to the uptake of nutrition interventions by farmers, women and households.

Barriers to the implementation of nutrition interventions

Adamawa State

The ADP representative from Adamawa state noted that, although the role of agricultural government agencies in the state is pivotal to improving the nutrition and dietary practices of the community, they are faced with several implementation challenges. Inadequate funding, conflicts in the state, clashes between herders and farmers, deforestation, migration of community members, and climate change were mentioned as barriers to implementing nutrition interventions in the state. This region is one of those in the country where conflict has led to loss of lives and massive displacement of people, such issues could hinder the implementation of interventions especially in regions directly impacted. The ADP representative responding to this said:



“Funds, Resources and Logistics. Globally we need money There are so many things to be done but we have financial constraints because of these” KII, ADP representative, Adamawa

Kano State

Responses from the Kano state government agricultural agency representative, although similar to that of his counterpart in Adamawa, religious and cultural norms were reported as barriers that prevent men from entering houses for sensitization activities, although, female extension workers are permitted to enter houses and engage with women freely in the state. Worthy to mention is that he noted that fear of consuming or cultivating new varieties of crops may hinder the adoption of intervention. This may be possible, especially in scenarios where false information about genetically modified crops are common in communities.



“You know when you introduce a new innovation – when you come with a new idea or new technology or variety, it is either they adopt or reject. There will be trial. From that trial they will identify so and so issue. From that trial is one of the factors that facilitate the uptake and they will adopt the new variety” **KII Agric extension Agent, Kano**

Kwara State

The ADP representative noted that challenges experienced by the agency in implementing these interventions are inadequate means of transportation for extension agents who are the primary persons responsible for taking these interventions to the communities, inadequate staff (extension agents), inadequate involvement of female extension agents, and limited funds to drive some of the activities. On this the representative said:



“You know, but if you want to implement these programs, you have to make use of the extension agents and most of our extension agents are not mobile. Mobility have been the problem on the part of the extension agents because I can’t move here and start going to the field. The extension agent is here but mobility and sometimes, lack of staff, lack of women in extension. You know in disseminating this program, we need women. Men cannot go there because what we are normally do, we do practical things when we want to visit a local government, we tell the extension agent, they will group all the farmers around that area, the women in the area. We sit down there to teach them how to cook because we cannot say they are much, we have to teach them how do you prepare this but scarcity of fund, then lack of female extension workers.” **KII, ADP representative, Kwara**

Barriers to the uptake of nutrition sensitive agriculture interventions

Farmers, HH and processors across the states did not give clear-cut reasons why nutrition-sensitive agriculture interventions provided by organizations was not be accepted by the recipients, they however mentioned generic challenges believed to affect their participation in such interventions. These challenges include poverty, drought, the high cost of pesticides and insecticides, limited access to loans, and poor sustainability. It is unclear how these issues mentioned could make farmers, women, and households in these low-income communities, unwilling to accept or adopt interventions targeted at benefiting them. This is further buttressed by the ADP representative who said:



“Basically, it has to do with funds. For people to adopt they need kits, they need the materials for them to use. When you train people, they’re willing but the kits are also needed. That’s the funds and the other is our mindset” **KII, ADP representative, Adamawa**



Talking on sustainability, an extension agent from Kano also said that:

“Sustainability can play an important role there, yes. When a certain program is taking place in a certain community, and many people enter such a program. But once the program comes to an end, some farmers may not be able to sustain such kind of technology or some that intervention” **KII, Agric extension Agent, Kano**



Reiterating on the lack of access to loans, an extension agent said:

“Also, banks have no interest in investing in agriculture because they can see that it is very risky on their own part, the major reason is climate change and cattle invasion” **KII, Agric extension Agent, Kwara**

These reasons may suggest why farmers and their households in these communities are prone to experiencing poor feeding practices, and limited cultivation of crops but do not indicate a clear hindrance to why they may not adopt nutrition sensitive agriculture interventions.

Facilitators to the uptake of nutrition sensitive agriculture interventions

Although they were no distinctive facilitators mentioned by participants of this study that could motivate the adoption of interventions provided by organizations, the government agency representatives across the states believe that the intervention was a facilitator for adoption. However, common facilitators believed could lead to the uptake of nutrition-sensitive agriculture interventions include the distribution of seeds, grants, livestock, food items, access to loans, demonstration plots, and training for farmers and households on nutrition which are usually received without hesitation. These different activities have been noted to arouse the interest of target audience, especially in communities of low income. Also, advocacy visits to community leaders, introducing the intervention, and how it would be beneficial to the community were also mentioned to facilitate the uptake of interventions, as approval from these leaders are critical.

Adamawa State

Similarly, the extension agent in the state noted that the facilitators for the adoption of interventions by farmers and community members, include loans given to farmers to facilitate their farming activities, providing physical evidence of improved varieties of seeds for planting to farmers, conducting demonstration plots for farmers to see, distribution of grants, manure, and other farm inputs to smallholder farmers.



"We trained them on the demo plot on Rice farming using our method, so that they can compare it with their own. According to them, from one acre of land they get up to 20 bags of Rice and some 7 bags. After we have done our method, they realized that our output from the demo plot has doubled their own method. The reason is that the seed, they should use fertilizer after two weeks, then they should plant Urea after 20 days and they found out our method to be more effective, so they adopted it" **KII, Agric Extension Agent, Adamawa**



Another extension agent said:

"There are many including assistance from the Government, Loans, especially loan, you know there are less privileged that wants to farm but don't have the means to, second improve varieties which they are expected to get, third Fertilizer, these will encourage them to improve on their farming as is it required and also rain too" **KII, Agric Extension Agent, Adamawa**

Kano State

In addition, for Kano state, the KNRDA representative noted that conducting advocacy visits to the relevant stakeholders like community heads and religious leaders enhances the acceptance of interventions in the community. Also, the testimonies of farmers who have benefited from previous interventions can motivate others, and trust in extension agents or government agencies by smallholder farmers also facilitate the uptake of interventions.



"I am looking at the nutritional uptake as a whole, we do a wholistic approach we don't look at the community or villages. We advocate the local leaders of the people in the village, or they will not allow you to express your issues or grievances to the populace in that village in the community. So, advocacy is very important to the local leaders and the religious leaders to allow you" **KII, KNRDA, Kano**

Effective communication platforms used to reach the target audience across the states.

Communicating with smallholder farmers is critically important to agriculture and society at large. Farmers need updated information to take advantage of new seeds and other improved technologies. Through communication, they receive information, while researchers and policymakers receive feedback about farmers' successes and problems in using the new seeds and improved technologies. This section highlights the most effective communication platforms across the states to reach farmers, farmers households and processors.

Smallholder farmers, farmers' households, and processors across the states highlighted that the major platforms they received information about nutrition, current market prices of crops, and the latest agricultural innovations were radio, market/marketers, farmers' associations, agricultural extension agents, and NGOs.

Radio as a means of communication for smallholder farmers, their households, and processors.

Smallholder farmers, their households, and processors across the states mentioned radio as a major platform where they receive the latest information on nutrition, and current agricultural practices and innovations. Some of the farmers highlighted that programs were aired on the radio where agricultural extension agents, were invited to educate the masses, especially farmers. Information on the latest agricultural innovation and technology, and how to access incentives (seedlings, fertilizers, and pesticides) were discussed on this platform. On radio as a valid means of communication to farmers, a farmer said:



"Through the radio, Agricultural experts are invited to discuss what, when and how a certain crop should be planted and on cultivation periods too". FGD, Adult Male farmers, Adamawa

According to the farmers, doctors were also mentioned as part of the experts that speak on radio to sensitize people on nutrition and healthy behaviours. Furthermore, farmers and processors received current prices of crops in the market through radio spots. Reiterating this, a farmer said:



"Sometimes the radio stations they bring doctors to talk about nutrition, balanced diet and health matters" FGD, Adult Male farmers, Adamawa.

The radio stations mentioned across the states include Radio Nigeria Kano, Pyramid F.M., Ray power FM, Express FM, Arewa radio, Radio house Kano, Rahama radio, Radio Kwara, Freedom Radio, Sobi FM, Sunna FM, NAS FM, FM Gotel Yola, Kaduna Radio and Katsina Radio.

Extension agents as a means of communication for smallholder farmers, their households, and processors

Smallholder farmers across the states narrated the important role extension agents play in bringing the current information on agricultural practices, and providing technical support through trainings, sensitization, and demonstrations. Some farmers expressed satisfaction with the progress they have made after attending trainings conducted by extension agents in their states. On the trainings conducted by extension agents in the states, a farmer said:



"I attended a training under agriculture extension services almost three years ago and we learned so many things about food nutrition which we were able to acquire a lot of knowledge on nutrition then". FGD, Adult male Farmers, Kano

In Kwara state, for instance some farmers mentioned that the extension agents were their closest link to the latest information on farming. This was amplified by the fact that some of these extension agents know the required techniques and some of them are also farmers and understand how to easily communicate the information needed. On this, an extension agent said:



"Most of our farmers, some of them do not have television or radio, some of them do not have interest in listening to the radio they believe in an extension agent. They called extension agent by language MOLATI (master of the farm). That when they come, they will tell us all the things and we will do it that is what we believe on. You know Agric is practical they give us some technical knowledge that works, so mostly they believe in this extension agent more than any other person". KII, Agricultural extension Agent, Kwara.

The extension agents in Adamawa mentioned that they conduct trainings mostly through farmers' associations. They further reiterated that they were the major link between the farmers and other organizations who intend to carry out any agricultural interventions in the state.



"Wherever I want to pass information to farmers, I do it mostly through the farmers associations by conducting a demonstration, or training, or sensitization. I make the lead farmers to step down the training to other farmers that didn't participate in the training that took place." KII, Agricultural extension agent, Adamawa.

Market/Marketers as a means of communication for smallholder farmers, their households, and processors

According to respondents (smallholder farmers, farmers households and processors) across states, the market serves as the meeting point of the farmers and the buyers while the marketers were referred to as the middlemen between the farmers and buyers. When getting updates on the current crop prices, the marketers were mentioned to play a key role in informing farmers on price changes in the market. Narrating the importance of marketers, a processor said:



"We mostly get information through the market, when women go to market on market days to sell, if the demand is high, they will increase the market price. When they return from the market, they will give you an update on the new price".

KII, Male processor, Kwara

In Kwara state, some processors cited they have middlemen whom they call "dilali". these middlemen serve as links between the processors and the buyers. They help the processors sell their products at profitable prices while they get commissions after sales. On this, a processor said:



"We call them dilali. The buyers will tell them what they want to buy, and the number of bags of the item they want. After speaking with the buyer, the dilali will come to us asking if he can get the number of bags the buyer is interested in and the price, we are willing to sell. for instance, if we sell it \$22, we will give him discount so the extra profit on it will be his own" IDI Male processors Kwara

Farmers Associations as a means of communication for smallholder farmers, their households, and processors

Smallholder farmers in Adamawa reiterated that one of the most effective ways to get information across to them was through the farmers' association because most of them belong to this association. The farmers mentioned that almost all the crops have related association. Some of the farmers' associations mentioned were Rice farmers association, Beans farmers association, and Yam farmers association. On this a farmer said:



"The most effective way is through farmers association. That's how you will meet real farmers". FGD, Male farmers, Adamawa

Some smallholder farmers in Kwara state highlighted that all the farmer's associations like the (maize, rice, and beans) farmers association in the state come under the umbrella of the All-Farmers Association of Nigeria. On this a farmer said that:



"We have mentioned that before. We have a lot of them like maize farm association, rice farm association even all the crops have their associations. But we all belong to the Umbrella body for farmers, that is the All-Farmers Association of Nigeria". **FGD Male Youth Kwara**

Some smallholder farmers across the states further mentioned they were taught about storing cowpea in PICS bags by their farmer's association. In comparison to the radio, some farmers said the farmers' association was the most effective information dissemination platform because the knowledge they got from their farmers associations were more practical in nature. Reiterating this, a farmer said:



"Yes, although radio information cannot be compared to the lesson, we learn from these leaders of the farmers' association who sometimes follow us to the farm and show us how it should be done. And they do a follow-up as well until harvest." **FGD, Male farmers, Kano.**

Non-Governmental Organizations as a means of communication for smallholder farmers, their households, and processors

Smallholder farmers interviewed across the state mentioned that NGOs such as OXFAM, FADAMA, IITA, SAA, UNDP, UNICEF, SWODEN, Ecrisat, Links, Harvest Plus, GAIN Project, and the World Bank have played significant roles in impacting knowledge, mentorship, and technical support to the farmers across the states. Specifically speaking on an NGO which impacted him, a farmer said:



"Oxfam, when they came to educate us, they recruited some farmers among us, and went to mentor them on how to farm and helped us with farming and so on. We used what they said, and the result was outstanding". **FGD, Male Adult farmers, Adamawa**

Other communication platforms mentioned by most respondents across the states include phone calls/SMS, social media (WhatsApp), newspapers, hospitals, town criers, and religious/traditional leaders.

State-specific communication platforms as a means of communication for farmers, their households, and processors

Although farmers, farmers' households, and processors have similar communication platforms across the state, however, some respondents from each state were able to identify communication platforms that were specific to their state. These communication platforms are highlighted below.

Adamawa State Communication Platforms

Radio Stations:

- NAS FM Yola
- Sunna Radio
- FM Gotel Yola.

Farmers associations:

- Rice Farmers Association of Nigeria
- Beans Farmers Association
- Maize Farmers Association.

NGOs:

- Sasakawa Africa Association
- Mercy Corps
- Agro-Ecological Sustainable Technology Initiative

Extension Agents:

- Adamawa Agricultural Development Project (AADP).

Kano State Communication Platforms

Radio Stations:

- Radio Nigeria Kano
- Pyramid F.M
- Express FM
- Arewa radio
- Radio house Kano
- Rahama radio
- Freedom FM

Farmers associations:

- Rice Farmers Association of Nigeria
- Beans Farmers Association
- Maize Farmers Association.

NGOs:

- Sasakawa Africa Association
- Kano Women Farmers Advancement Network (WOFAN)
- SWODEN.

Extension Agents:

- Kano State Agricultural and Rural Development Authority (KNARDA)
- Kano State Agricultural Development Project

Kwara State Communication Platforms

Radio Stations:

- Sobi FM
- Radio Kwara
- Ray power FM Kwara.

Farmers associations:

- Soco Gege Farmers
- Sokwasu Farmers Association
- New Farmers Associations
- Bawosoko Farmers Association
- Rice Farmers Association of Nigeria
- Beans Farmers Association
- Yam Farmers Association
- Maize farmers Association

NGOs:

- Viti rice
- Nigeria Olamatch.

Extension Agents:

- Kwara Agricultural Development Project (KWADP).

Gender-specific platforms for communication

This refers to the communication platforms where information on nutrition, and the latest agricultural innovations are passed specifically to either men or women groups in the.7. Farmers across the states reported that most of the farmer groups are for both men and women. However, there are some gender-specific groups that are just for women. An extension agent from Adamawa speaking to this said:



*"This one I am talking about in "Gombi", they are all Women's union but when it comes to Farmers' associations, they are both Men and Women". **KII Agric extension agent Adamawa***

An extension agent in Kano state highlighted that when they get training and information from the extension agents, they are usually separated into two groups: the men and the women group. On this, the extension agent said:



*"There is a class for men and women the men follow the male extension agent to teach them and anything that concerns men they tell them. The women also have their own classes too". **KII, Agric extension agent, Kano***

Smallholder farmers also identified other specific platforms where female farmers get their information on nutrition and agriculture. These platforms include women's groups, the Women Farmers Association of Nigeria (WFAN), and Hospitals during antenatal. On platforms where women got nutritional information, an extension agents said:



*"At Agricultural Development project (ADP) most times they usually organize this meeting they call it monthly review meeting. So, they organize some of the women and they educate them about the nutritional importance of the crops and foods they consume". **KII, Agric extension agent, Kwara***

Some extension agents highlighted that if more women are directly involved as extension agents it will encourage more women to participate in agriculture. On this, an extension agent in Kwara said:



*"If women see women among the extension agent, it will even encourage them. People like me are even doing this now, so they will be able to have the motivation and encouragement in doing any activity they want to do" **KII, Agric extension agent, Kwara***

Challenges experienced in receiving Information by farmers, their households and processors.

A farmer from Adamawa during the FGD stated that some organizations that use to be very effective in training, sensitizing, and providing support to farmers are no longer functional as some of the farmers no longer get any information from these organizations again. On this a farmer said:



“There are organizations, but most of them don't work, now we have RIFAN (Rice Farmers Association), we have BFA (Cowpea Farmers Association), and almost all the commodities you know have their association, but with all the associations, information seems to be very hard in reaching us”. FGD, Adult Male. Adamawa

Despite the benefits smallholder farmers get from NGOs and extension workers, some farmers expressed dissatisfaction with their experience with some of the organizations. In Kano for instance respondents complained that seeds gotten from an organization did not yield produce. Furthermore, some respondents reported that they needed more technical support and sensitization from experts on the latest agricultural innovations and technologies. Speaking on this, a respondent said:



“We get information quite all right but our problem is, the information we get is not the correct one. I will give an example, me and my neighbour planted a bean together, he got his own seeds from IITA in Abuja and I planted the one I've been using which is a red seed from Banjiram, I harvested my own while his own IITA from Abuja didn't yield anything, this is what discourages farmers to pay attention to farm specialist about quality seeds, sometimes a certified seed is only the name on the bag but what's inside is a local seed, when opened, you'll see a red, white variety of rice, stones, and cowpea inside the bag. So, we became discouraged, and we don't even anticipate the government seeds, this is what I have to say”. FGD, Adult Male farmers, Kano

Discussion

The study sought to understand the nutritional knowledge of cowpea smallholder farmers, their households, and processors. The findings showed that these target audience knew about foods that are considered nutritious to the body, and how to combine them to make them more nutritious. The findings also revealed that cultivation and sale of cowpea improved household dietary diversity and household income. The findings like Manda et al., (2020) indicated that an increase in agricultural production leads to marketable surplus which inevitably increases income for farmers and consequently increase ability to buy varieties of food from the market. Cost and their expense on non- food items can pose a barrier on the frequency they buy and consume these nutritious foods. As previously discovered by Jayathilake et al., (2018), there are many benefits to the consumption of cowpea. Some of these benefits are anti-inflammatory, anti-hypertensive, anti-cancer and prevention of chronic diseases. The respondents from our study mentioned some benefits, these were mostly around the general saying that cowpea is beneficial to the body, however, they couldn't clearly state these benefits.

Furthermore, farmers still use pesticides to preserve cowpea and even though most are aware of the harmful side effects of using pesticides. It is evident that they are unaware of the issues that could surface from the use of these pesticides. Adomi et al (2023) discussed about eliminating the use of pesticides and switching to a method like the Purdue Improved Crop Storage (PICS) bag for farmers. This could be a cost-effective means when infused with communications to create awareness (Otitoju & Lewis, 2021).

The major factors that facilitated the willingness and ability to purchase or consume nutritious foods were knowledge of nutritious foods, access to arable farmlands, access of trainings from agricultural NGOs on nutritious foods and current agricultural innovations, seedlings, fertilizers, and pesticides from their farmers associations and extension agents, and the access to technical and financial support from NGOs. This finding corroborates with the report from Anthony et al., (2021) who noted that the major factors that enabled farmers to cultivate nutritious crops in Nigeria were access to farmlands, access to funds and credits, market information on expected price of output, educational level and the quality of seeds and fertilizers. Reiterating this, Abubakar et al., (2021) reported similar factors such as access to lands, educational level, available markets, and profits from sales of these crops as factors that enabled farmers, their households and processors to cultivate, consume and sell nutritious crops in Nigeria. Focusing on these factors would benefit smallholder farmers consumption and purchase of nutritious food greatly and aid the easy execution of farming activities.

Men and women engage in several activities especially when it relates to the cultivation and consumption of nutritious food. This was in line with a study conducted in Jos, Plateau State, Nigeria by Onuwa (2021), who buttressed that both sexes participate in all forms of farming activities. Although, our study found that men are perceived to be more involved in cultivation and ploughing activities than women because they are believed to be stronger, it was discovered that women take the lead in the harvesting and processing of the farm products into other forms because these activities are considered less tedious. Onuwa, (2021) further reiterated that men engage more in clearing the land, making ridges and other tedious activities while women are involved in planting, harvesting, and processing. Our results suggested that participating in income-generating



activities would make it easier to prepare nutritious foods for their households and the responsibility of providing nutritious meals for the household lies on women while the overall decision-making is on the men. Decision making is a major aspect of planning. In this study, household decisions are mostly made by men because they are believed to be the head of the family, and this could be due to the patriarchal nature of the society. Men are also seen as major decision makers regarding food consumed in the home. Likewise, around spending available income in the home, men tend to determine how this is expended except in some few instances where women take up the role. This finding is consistent with literature that suggests that men are perceived as decision makers in the family (Feed the Future, 2020). A literature review by Quanti et al. (2022) also affirmed that joint decision could be made by both partners, but a woman's contribution is relatively small.

On the barriers faced by smallholder farmers in the cultivation of nutritious crops, our findings revealed that farmers are faced with barriers ranging from herdsmen invasion, financial limitation to acquire farm inputs, natural disasters, pest infestation and poor transportation system (from the farms and to the market). This follows

a similar study conducted on vegetable farmers which cited lack of resources, climatic condition as barriers

local farmers faced in the agricultural sector (Fadairo et al. 2020). Non-governmental organization have in recent times concentrated on reducing the effects of these barriers through targeted interventions.

According to a study conducted by Yaradua et al., (2018) in Nigeria, the quality and coverage of nutrition programs will be low if implemented by the government alone, however, when non-governmental organizations and United Nations intergovernmental agencies facilitate such programs, performance is improved. This aligns with our findings, as several non-governmental organizations and donor agencies were identified who are currently involved in nutrition-sensitive agriculture interventions in the study locations. Most of whom collaborate with existing government agencies and structures within the state, local governments, and community levels to reach their focus audience who are farmers, women, children, and the households. Participants of the study further, acknowledged the role of these non-governmental organizations across the states in contributing to the successes recorded in implementing these nutrition related interventions.

As indicated by Fudjumdjum et al., (2019) in their study in north-eastern Nigeria, amongst others, funding for agriculture has declined, this was identified as a cross-cutting challenge by participants in this study, it was noted that government agencies involved in nutrition and agricultural

interventions do not have adequate funding to implement several activities. Ifeanyi-Obi et al., (2022) further identified issues such as insufficient extension agents to cater for farmers' needs and insufficient funding by the government in intervention planning and implementation as existing barriers impeding agricultural development. Thus, providing the necessary support to facilitate their effective participation in the implementation of nutrition-sensitive agriculture can go a long way in facilitating the uptake of these interventions.

The most effective platforms to reach farmers, farmers households and processors on information about nutrition, market prices, and the latest agricultural innovations were radio, market/marketers, farmers' associations, agricultural extension agents, and NGOs. This finding agrees with the study in Nigeria by Sennuga et al (2020) who reported that effective sources of information dissemination among farmers in Nigeria included radio stations, and mobile phones. A study by Malekani & Mubofu, (2020) corroborated with our by highlighting researchers, extension officers, knowledgeable farmers, research institutions, mass media, commercial and government agencies as important channels for disseminating agricultural research findings to farmers in Nigeria.



Conclusion

The importance of consuming and preserving nutritious foods cannot be overemphasized especially for farmers who are the direct growers of crops used for making nutritious foods. Cowpea farmers, their households and processors are willing to consume nutritious foods. If these farmers are reached via their existing platforms to encourage them to consume nutritious foods, then their diet, nutrition and preservation practices can be improved.

There are clear gender roles as regards farming activities, as more tedious tasks are carried out by men while women participate more in harvesting, processing, and marketing of end products of agricultural crops. There are women who assume the perceived roles of men especially in female-headed households and this makes them conduct all farming activities from clearing through to marketing because the responsibility to provide for their families rely on them.

Household decision making is dominated mostly by men. However, decisions are also made through agreement between partners and sparingly



by women alone. Decision on foods consumption and how the income generated in the home should be expended are mostly made by men because of the patriarchal nature of the society. Financially independent women tend to be more active in decision making as regards household and farming activities because women of this status are respected in the community.

Smallholder farmers and other value chain actors play significant role in reducing poverty and increasing food supply. Majority of the farmers households consume what they cultivate in their farmlands. Nutritional benefits, nourishment and availability are factors that enabled them to consume nutritious foods. The factors that influence the cultivation of nutritious crops are access to arable farmlands and incentives (seedlings, fertilizers, and pesticides), demand, market value, financial support, information and training on current agricultural innovations and technology. While for the sale of nutritious crops, the influencing factors are demand, profit and market value.

The dissemination of information to smallholder farmers in the 21st century is crucial since information is the bedrock for effective operation of any occupation. Smallholder Farmers, their households and processors get information on nutrition, latest agricultural innovation and technologies, and current market prices from the radio, extension agents, their farmers associations, and NGOs in their states. Mobile phones, WhatsApp, traditional/religious leaders are also important platforms deployed to relate information. Furthermore, women specific communication platform for information dissemination across the research states exist. These platforms are women's groups, the Women Farmers Association of Nigeria (WFAN), and hospitals during antenatal. Farmers associations and extension agents also conduct demonstration, trainings, and sensitization sessions that were solely directed to women.



Recommendation

1

Messages should be developed to reinforce the benefits of consuming nutritious foods. Social and Behaviour Change (SBC) approach should be used promote state-specific recipes to improve nutritional practices.

2

The storage practices used by most smallholder farmers and their households involve the use of pesticides/chemicals to preserve some of their food crops. Training on the right use of storage and preservation practices such as use of Prudue Improved Crop Storage should be advised. This training should also elaborate on measures used to maintain the nutritional value of cowpea during preservation/storage.

3

An enabling environment should be created where smallholder farmers have access to arable lands, incentives (seedlings, fertilizers and pesticides), information and trainings, and very importantly access to financial support and credits.

4

Farmers generally (Cowpea farmers and non-cowpea farmers) should be encouraged to increase cowpea production to meet the demand of consumers and consequently reduce the price of cowpea.

5

Encourage the processing of cowpea and other nutritious crops into different forms and promote their consumption in respective states

6

Gender sensitive programmes should be designed to educate the community on the importance of women's participation in agriculture. The programmes should further empower them to participate in all farming activities and decision making.

7

Empower men and women farmers through improved farming practices which will enable them to overcome challenges affecting productions. This will ultimately increase yields and family income.

8

Leverage on specific existing nutrition interventions that are in place in the study locations to further educate smallholder farmers and their households on how to innovatively grow nutritious crops and practise home gardening to enable access to fresh nutritious crops.

9

Partner with identified organizations implementing similar interventions. Leveraging on these partnerships can provide easy access to the communities, and ride on existing structures and systems in the states.

10

Collaborate with Agricultural extension agents in providing targeted interventions to smallholder farmers in the states as they are trusted by farmers.

11

Harvesting and communicating context-specific testimonies and success stories of smallholder farmers who have benefited from programs will go a long way to motivate others to adopt interventions directed at improving cultivation and consumption of nutritious food.

12

Practical sessions such as demonstration plots should be explored when providing new varieties of crops to smallholder farmers especially in the introduction of nutrients-enriched crops.

13

Based on the identified communication platforms, farmers and their households should be reached with messages on nutrition through their network of marketers and their farmers associations.

14

Most farmers have access to radio and see it as a major means of information. Agricultural extension agents and associations can be engaged to co-create radio dramas and live interactives (call-in shows) to pass vital information relating to farming and nutrition. This should be done by leveraging on existing state-specific radio stations.

15

For respondents that might not have access to radio, content can be uploaded to the digital platform where individuals can easily access information through non-internet enabled phones.

16

Leverage on existing state-specific structures like the, AADP, and KWADP to continue to train, link smallholder farmers up with potential buyers, improved variety of seedling and connect to loan agencies etc.

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Annex

Annex 1: FGD guide for farmers (Male and Female, (Adult/youth))

Questions

- 1. Can you name some nutritious foods you know? why do you consider them nutritious?**
 - Probe for what kinds of foods/ingredients constitutes a nutritious food
 - Have you received any information/education on nutrition? where did you receive it
 - Are you able and willing to purchase some of these foods from the market
 - How can these nutritious foods be made more affordable?
 - Are these foods readily available in the market
- 2. What are some of the locally grown nutritious food crops in your community?**
- 3. Can you tell me which foods/ food crops are considered most nutritious in this community and why?**
 - Probe for the ability (time/money) to purchase nutritious foods
 - Probe for affordability and how available is it?
- 4. What are some of the foods that are considered nutritious but are not often consumed and why?**
- 5. Can you tell me about your family's regular diet? list the foods contained in the meal you eat daily.**
 - Probe for what constitutes their regular feeding as breakfast/lunch/dinner and why? (Preferences, availability, taste, affordability etc)
 - How do you combine the different foods eaten daily
- 6. What are the things you consider before choosing a meal for yourself or your household?**
 - Probe for taste, price, household members want it, nutrition, easy to obtain, etc
 - What role do men play in respect to what the household consumes?
- 7. How do individual diets vary within households and who or what determines that?**
 - Are there any taboos that prevent the consumption of certain foods?
 - How do you combine your meals to make them nutritious?
 - Probe for accessibility and affordability
- 8. Is there a difference in the type of foods that men/boys and women/girls eat? What are those foods?**
 - Probe: If yes, Is it type of foods or just quantity of the food? (e.g., do women still eat that food but just in lower quantity).
 - Probe: What is the reason for the difference in type/quantity of food that men/boys and women/girls eat?
- 9. How much do you typically spend on non-food items related to nutrition (e.g. medical expenses, water, hygiene related items)?**

Questions

10. What do you do with the Cowpea you harvest?

- Probe what forms cowpea is processed
- Probe the benefits of consuming cowpea (nutritional, health and economic) in relation to Men, women and children
- Do you sell the surplus cowpea? How do you spend the income from the sales of cowpea?
- How do you store the harvested cowpea?
- What storage and preservation practices are currently used and/or available for home produced crops?
- Are you involved in any other income generating activities? How do you allocate the income from these activities? How much of your crops do you sell? How much do you keep for household consumption?

11. Can you tell me about the challenges associated with cultivating cowpea and other nutritious foods?

- Probe for challenges around demand, accessibility, affordability, ease of cooking, taste, etc.
- What are some of the challenges you encounter in accessing these nutritious foods?
- Other than food crops do you also keep small animals and birds for meat?
- What are some of the practices employed to prolong shelf life of cowpeas and other nutritious foods

12. What will make it easy for you to cultivate, eat, and sell cowpea and nutritious foods? (probe for other factors if only cost is mentioned)

- Probe for knowledge, and availability, accessibility, land ownership, occupation, household size, religion
- Probe for access to inputs and finances to cultivate nutritious food crops

13. What will make it difficult for you to cultivate, eat, and sell cowpea and nutritious foods? (probe for other factors if only cost is mentioned)

- Probe for knowledge, and availability, accessibility, storage facilities, transportation etc

14. Can you talk about the norms and beliefs that prevent you from cultivating/eating/processing/selling nutritious foods, including cowpea?

- Are there any foods that are taboo/forbidden in the community?
- Are there any foods forbidden for men/women/children?
- Why are these foods taboo/forbidden?

15. How is the Intrahousehold food distribution done?

- Probe if anyone consumes more protein or carbohydrate in the household and why
- Probe if anyone in the household eat more food than others
- Probe if anyone in the household is served food first and/or last.
- Probe who is given more nutritious between men/boys and women/girls, if yes, probe for reasons

Questions

16. What crops are commonly planted and prioritized in your community?

- Probe for local names
- Probe if there are specific crops only grown in their community.
- Give reasons

17. What types of foods are commonly eaten in your community?

- Give reasons

18. What types of foods are commonly sold in your local markets?

19. Are these foods seasonal or available throughout the year?

- Probe if they sell to other neighboring communities

20. What measures would make nutritious foods more available, accessible and affordable?

21. How do you cope with food shortage, what measures do you take?

22. What are typical market prices of nutritious foods and how are these affected by season?

23. What is the community's perception on the role of men and women who are involved agricultural activities and other income-generating activities?

- Probe for the kind of activities men and women are involved in, in the community and why?
- Probe for who is more involved in cultivation of cowpea.
- Probe if men and women have equal access to land in the community? why?
- Probe for who is more involved in the cultivation of crops, is it the men or women? Why?
 - Probe for these steps land clearing, making ridges, sowing, adding manure, irrigation and harvesting
- Probe for reasons why men or women carry out certain agricultural activities if such exist.

24. What is the role of men and women with respect to managing household income?

- Probe for who decides how to spend the household income earned by either the husband or both husband and wife.

25. What is the role of men and women with respect to what is consumed in the household?

- Probe for who decides what is eaten and why?
- What do you think needs to be done to improve women and men participation in deciding what the households consumes?
- What factor influences joint decision making in the household?

26. What are the beliefs and practices that can affect the participation of men and women in farming activities in this community?

- Probe for cultivation, processing (agriculture), consumption
- What are other barriers that prevent women in this community from engaging in small businesses?

Questions

27. Can you tell me how you currently receive information about crop varieties to cultivate?

- Probe: how they get information on the price of your farm products
- Probe: how they get reliable information on the best seed variety for cultivation.
- Probe for any existing associations, and platforms used.

28. How do you communicate with your buyer about the availability of your produce and market prices?

29. What are some of the challenges you experience in receiving nutrition information?

30. If we want to reach you with messages, what platforms can we use to get messages across to you? And why?

- Probe for existing opportunities and approaches used in reaching male farmers and female farmers respectively in the state?

31. Which other organization has worked with you on nutrition?

- What interventions have they recommended?
- Are you implementing the interventions recommended?

Annex 2: IDI guide for Farmers household

Questions

1. Can you name some nutritious foods you know? why do you consider this a nutritious food?

- Probe for what kinds of foods/ingredients constitutes a nutritious food
- Have you received any information/education on nutrition? where did you receive it
- Are you able and willing to purchase from the market some of these foods
- How can these nutritious foods be made more affordable?
- Are these foods readily available in the market

2. What are some of the locally grown nutritious food crops in your community?

3. Can you tell me which foods/ food crops are considered most nutritious in this community and why?

- Probe for the ability (time/money) to purchase nutritious foods
- Probe for affordability and how available is it?
- What are some of the foods that are considered nutritious but are not often consumed and why?

Questions

- 4. Can you tell me about your family's regular diet? list the foods contained in the meal you eat daily.**
 - Probe for what constitutes their regular feeding as breakfast/lunch/dinner and why? (Preferences, availability, taste, affordability etc)
 - How do you combine the different foods eaten daily
- 5. What are the things you consider before choosing a meal for yourself or your household?**
- 6. How do individual diets vary within households and who or what determines that?**
 - Are there any taboos that prevent the consumption of certain foods
 - How do you combine your meals to make them nutritious
 - in which Probe for accessibility and affordability
- 7. How much do you typically spend on non-food items related to nutrition (e.g. medical expenses, water, hygiene related items)?**
- 8. Do you currently consume cowpea in your household?**
 - Probe what forms cowpea is processed
 - Probe the benefits of consuming cowpea,(nutritional, health and economic) in relation to Men, women and children
 - What storage and preservation practices are currently used and/or available for home produced crops?
 - Are you involved in any other income generating activities? How do you allocate the income from these activities? How much of your crops do you sell? How much do you keep for household consumption?
- 9. Can you tell me about the challenges associated with consuming cowpea and other nutritious foods?**
 - Probe for challenges around demand, accessibility, affordability, ease of cooking, taste, etc.
 - What are some of the challenges you encounter in accessing these nutritious foods?
 - Other than food crops do you also keep small animals and birds for meat?
 - What are some of the practices employed to prolong shelf life of these nutritious foods
- 10. What will make it easy for you to eat, and sell nutritious foods? (probe for other factors if only cost is mentioned)**
 - Probe for knowledge, and availability, accessibility, occupation, household size, religion
 - Probe for access to inputs and finances to cultivate nutritious food crops
- 11. What will make it difficult for you to eat, and sell nutritious foods? (probe for other factors if only cost is mentioned)**
 - Probe for knowledge, and availability, accessibility, storage facilities, transportation etc
- 12. Can you talk about the norms and beliefs that prevent you from eating/selling nutritious foods, including cowpea?**
 - Are there any foods that are taboo/forbidden in the community?
 - Are there any foods forbidden for men/women/children?
 - Why are these foods taboo/forbidden?
- 13. How is the Intrahousehold food distribution done?**
 - Probe if anyone consumes more protein or carbohydrate in the household and why.
 - Probe if anyone in the household eat more food than others
 - Probe who is given more nutritious between men/boys and women/girls if yes, probe for reasons

Questions

14. What crops are commonly planted and prioritized in your community?

- Probe for local names
- Probe if there are specific crops only grown in their community.
- Give reasons

15. What types of foods are commonly eaten in your community?

- Give reasons

16. What types of foods are commonly sold in your local markets?

17. Are these foods seasonal or available throughout the year?

- Probe if they sell to other neighboring communities

18. What measures would make nutritious foods more available, accessible and affordable?

19. How do you cope with food shortage, what measures do you take?

20. What are typical market prices of nutritious foods and how are these affected by season?

21. What is the community's perception on the role of men and women who are involved agricultural activities and other in income-generating activities

- Probe for what kind of activities men and women are involved with, in the community and why?
- Probe for who is more involved in cultivation of cowpea
- Probe if men and women have equal access to land in the community? why?
- Probe for who is more involved in the cultivation of crops, is it the men or women? Why?
 - Probe for these steps land clearing, making ridges, sowing, adding manure, irrigation and harvesting
- Probe for reasons why men or women carry out certain agricultural activities, if such exist

22. What is the role of men and women with respect to managing household income?

- Probe for who decides how to spend the household income earned by either the husband or both husband and wife

23. What is the role of men and women with respect to what is consumed in the household?

- Probe for who decides what is eaten and why?
- What do you think needs to be done to improve women and men participation in deciding what the households consumes?
- What factor influences joint decision making in the household?

24. What are the beliefs and practices that can affect the participation of men and women in farming activities in this community?

- Probe for cultivation, processing (agriculture), consumption
- What are other barriers that prevent women in this community from engaging in small businesses?

Questions

- 25. Can you tell me how you currently receive information about crop varieties in the market?**
 - Probe: how they get information on the price of your farm products
 - Probe for any existing associations, and platforms used
- 26. How do you communicate with your buyer about the availability of your produce and market prices?**
- 27. What are some of the challenges you experience in receiving nutrition information?**
- 28. If we want to reach you with messages, what platforms can we use to get messages across to you? And why?**
 - Probe for existing opportunities and approaches used in reaching male farmers and that used in reaching female farmers in the state?

Annex 3: IDI guide for Processors

Questions

- 1. Can you name some nutritious foods you know? why do you consider this a nutritious food?**
 - Probe for what kinds of foods/ingredients constitutes a nutritious food
 - Have you received any information/education on nutrition? where did you receive it
 - Are you able and willing to purchase from the market some of these foods
 - How can these nutritious foods be made more affordable?
 - Are these foods readily available in the market
- 2. What are some of the locally grown nutritious food crops in your community?**
- 3. Can you tell me which foods/ food crops are considered most nutritious in this community and why?**
 - Probe for the ability (time/money) to purchase nutritious foods
 - Probe for affordability and how available is it?
 - What are some of the foods that are considered nutritious but are not often consumed and why?
- 4. Can you tell me about your family's regular diet? list the foods contained in the meal you eat daily.**
 - Probe for what constitutes your regular feeding as breakfast/lunch/dinner?
 - Probe for how they combine the different foods eaten daily
 - What are the most common foods you eat regularly? And why? (Preferences, availability, taste, affordability etc)
- 5. What are the things you consider before choosing a meal for yourself or your household?**
 - Probe for any taboos that prevent the consumption of certain food
 - Probe how they combine their meals to make them nutritious

Questions

- 6. Can you tell me the kinds of nutritious foods your currently process?**
 - What processing practices do you do and to what foods?
 - What storage and preservation practices currently being used and/or available for home produced crops?
 - What proportion of food is lost or damaged in storage and during processing?
 - What is the feasible processing/storage intervention options to improve the nutritional content of food?
 - Probe if they sell to people from other states
- 7. Can you tell me what you know about cowpea?**
 - Probe how they process cowpea
 - Probe for health, nutritional and economic benefits
 - Probe for how respondents sell cowpea (in bulk or not)
 - Probe what forms cowpea is sold or can be sold
 - Probe if there is market demand for cowpea, the major buyers and suppliers
 - Probe how they create demand for cowpea processed products
- 8. Can you tell me about the challenges with buying, selling and processing cowpea including other nutritious foods?**
 - Probe for challenges around demand, accessibility, affordability, ease of cooking, taste, etc.
 - Probe if they sell to individuals, industries etc and quantity sold
- 9. Where and from whom do you source the nutritious food including cowpea you process**
- 10. In your opinion how does processing affect the nutrition quality of food**
- 11. How is the processed food stored/ preserved to increase the shelf life**
- 12. What will make it easy for you to eat, buy, process, and sell nutritious foods? (probe for other factors if only cost is mentioned)**
 - Probe for knowledge, technology, and availability, accessibility
- 13. What will make it difficult for you to eat, buy, process, and sell nutritious foods? (probe for other factors if only cost is mentioned)**
 - Probe for knowledge, and availability, accessibility
- 14. Can you talk about the norms and beliefs that prevent you from buying/selling/processing nutritious foods, including cowpea?**
 - Probe for foods that are taboos in the community or food forbidden for men/women/children?
- 15. How is the Intrahousehold food distribution done?**
 - Probe if anyone consumes more protein or carbohydrate in the household and why.
 - Probe if anyone in the household eat more food than others
 - Probe who is given more nutritious between men/boys and women/girls if yes, probe for reasons

Questions

16. What crops are commonly planted and prioritized in your community?

- Probe for local names
- Probe if there are specific crops only grown in their community, give reasons
- Probe for food commonly eaten in the community, give reasons
- Probe for foods commonly sold in the community, and if sold to other communities

17. What are typical market prices of food and how are these affected by season?

18. What training/information have you received on proper storage/processing/packaging? From whom did you receive this training?

19. What is the community's perception on the role of men and women who are involved agricultural activities and other in income-generating activities

- Probe for what kind of activities men and women are involved with, in the community and why?
- Probe for who is more involved in processing of nutritious foods
- Probe for reasons why men or women carry out certain agricultural activities, if such exist

20. What is the role of men and women with respect to managing household income?

- Probe for who decides how to spend the household income earned by either the husband or both husband and wife

21. What is the role of men and women with respect to what is consumed in the household?

- Probe for who decides what is eaten and why?
- What do you think needs to be done to improve women and men participation in deciding what the households consumes?
- What factor influences joint decision making in the household?

22. What are the beliefs and practices that can affect the participation of men and women in farming activities in this community?

- Probe for cultivation, processing (agriculture), consumption
- What are other barriers that prevent women in this community from engaging in small businesses?

23. Can you tell me how you currently receive information about staples to process?

- Probe: how they get information on the price of your farm products
- Probe for any existing associations

24. How do you communicate with your buyer about the availability of your products?

25. If we want to reach you with messages, what platforms can we use to get messages across to you? And why?

- Probe for existing opportunities and approaches used in reaching male farmers and that used in reaching female farmers in the state?

Questions

- 1. Can you tell me what you know about cowpea?**
 - Probe if there are varieties of cowpea, if yes, respondents should mention them
 - Probe for forms cowpea can be processed or turned into
 - Probe for benefits (nutritional benefits, health benefits for different category of people, economic benefits)
 - Probe if the other parts (leaves, roots etc.) of the cowpea are useful
- 2. Can you discuss those things (factors) that influence willingness and ability of farmers to cultivate cowpea and other nutritious foods?**
 - Probe for land ownership, climate, soil fertility etc
 - Probe if there are factors that influence the willingness of men to cultivate cowpea
 - Probe if there are factors that influence the willingness of women to cultivate cowpea
 - Probe for demand of cowpea in the community
- 3. Can you tell me key gendered barriers that prevents the adoption of improved nutrition (from agric production, to improve income and consumption) in this area?**
 - Probe for barriers (social norms, cultural beliefs) that prevent men from practicing nutrition behaviours
 - Probe for barriers (social norms, cultural beliefs) that prevent women from practicing nutrition behaviours
- 4. Can you discuss how these barriers were/will be addressed to increase availability (access, and affordability of cowpea products and other nutritious food etc.)?**
- 5. Can you talk about various nutrition-sensitive interventions your organization has introduced to farmers in this state?**
 - Probe if the nutritional interventions were targeted at both genders or if there are specific interventions targeted at each gender
- 6. What other innovative nutrition approaches/interventions do you think can be introduced to the farmers?**
 - Give reasons for your response
- 7. Can you mention other organizations you are aware of that implement nutrition sensitive Agriculture interventions in this state?**
 - Probe for the types of interventions provided by these organizations
 - Probe if there are public or private institutions incorporating nutrition polices?
- 8. What are those things that hinder the adoption of these interventions?**
 - Probe if there were gender specific hinderance to the adoption of these interventions
- 9. Can you mention those things that facilitated the uptake of these interventions?**
 - Probe if there were gender specific facilitators to the uptake of these interventions
- 10. Kindly discuss how important information are passed across to the farmers in this state?**
 - Probe for existing platforms (farmers' association, producers' event etc) used to reach producers/processors in the state
 - Probe if there are specific structures used in reaching men producers/female producers
- 11. Can you mention other communication channels that can be used to reach farmers in the state?**
 - Probe for specific structures that can be used in reaching male/female farmers
- 12. What are some of the nutrition sensitive interventions put in place?**
- 13. What are some of the challenges faced in adoption and implementation of these interventions?**
- 14. What target behaviors are you looking at changing for farmers and households?**

Questions

1. **Can you please tell me a bit of background about your work, and how long you have been addressing nutrition issues through agriculture?**
2. **What do you think are the underlying challenges of nutrition in the state?**
 - Do these challenges differ from men and women?
3. **Can you discuss the current policy and legislative responses to tackle nutritional challenges in the state?**
 - Do you think the current responses are adequate? If yes, in what ways? If no, why?
 - How are these policies influencing the nutritional uptake in the state?
 - How are these policies causing a barrier to nutritional uptake in the state?
 - Are there specific policies directed at men and women regarding nutritional uptake?
4. **What interventions are available to help households consume nutritious meals?**
5. **Can you explain how the government is implementing these policies?**
 - Who are the public and private sector players incorporating nutrition policies in this state?
6. **From your perspective, what would you consider as key challenges towards implementing these policies?**
 - How can these challenges be addressed?
7. **What are some of the nutrition sensitive interventions put in place?**
8. **What are some of the challenges faced in adoption and implementation of these interventions?**
9. **What kind of behaviors are you looking at changing for farmers and households in general?**

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SIGNATURE/THUMB PRINT & DATE

(Address)

In the presence of:

Name _____

Address _____

Phone No _____ Signature _____

Date _____

