Local food plants for nutrition

IMPROVING DIETS AND REDUCING FOOD SCARCITY WITH THE HELP OF LOCAL FOOD PLANTS IN NORTHERN AND EASTERN REGIONS OF UGANDA

SD=HS Sowing Diversity = Harvesting Security

OXFAM Novib

Sweden Sverige

ESAFF

PELUM ASSOCIATION

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This work is part of the Sowing Diversity = Harvesting Security program (www.sdhsprogram.org) Phase II (2019-2023). Funding for the program is provided by the Swedish International Development Cooperation Agency (Sida).

Citation: Oxfam Novib. 2023. Improving diets and reducing food scarcity with the help of local food plants in Northern and Eastern regions of Uganda. The Hague: Oxfam Novib.

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Cover design by Daniel Anyang (2023).

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Acronyms

ASOCUCH	Asociación de Organizaciones de los Cuchumatanes
CTDT	Community Technology Development Trust
CSI	Cognitive Salience Index
DSR	Dietary Species Richness
ESAFF	Eastern and Southern Africa Small Scale Farmers' Forum
FFS	Farmer Field School
FOVIDA	Fomento de la Vida
FVS	Food Variety Score
HDDS	Household Dietary Diversity Score
HFIAS	Household Food Insecurity Access Scale
HHS	Household Hunger Scale
Li Bird	Local Initiatives for Biodiversity, Research and Development
MAHFP	Months of Adequate Household Food Provisioning
MsHDDS	Micronutrient Sensitive Household Dietary Diversity Score
NAFRI	National Agricultural and Forestry Research Institute
NUS	Neglected and Underutilized Species
PELUM	Participatory Ecological Land Use Management
SD=HS	Sowing Diversity = Harvesting Security
ZAAB	Zambia Alliance for Agroecology and Biodiversity

Foreword

This document presents the main household-level findings of the baseline survey conducted between 2019-2021, during the second phase of the *Sowing Diversity = Harvesting Security (SD=HS)* programme (2019-2023). The results of the baseline are complemented with the main findings of the diagnostic exercises conducted by SD=HS' Farmer Field Schools (FFS). Both activities are part of SD=HS' work on Local Food Plants for Nutrition. SD=HS is a global program, and our work on local food plants is currently implemented by Oxfam Country Offices and partner organizations in seven countries. These partners are the *National Agricultural and Forestry Research Institute (NAFRI)* and the *Agricultural Research Center (ARC)* in Laos, the *Local Initiatives for Biodiversity, Research and Development* (Li Bird) in Nepal, the *Asociación de Organizaciones de los Cuchumatanes (ASOCUCH)* in Guatemala, the *Participatory Ecological Land Use Management (PELUM)* and the *Eastern and Southern Africa Small Scale Farmers' Forum (ESAFF)* in Uganda, the *Zambia Alliance for Agroecology and Biodiversity (ZAAB)* in Zambia, the *Community Technology Development Trust (CTDT)* in Zambia and Zimbabwe, and the *Fomento de la Vida (FOVIDA)* in Peru. SD=HS is coordinated by Oxfam Novib.

The use of the baseline data and FFS diagnosis conducted by farmers allowed us to establish the local and regional nutritional and agroecological conditions in the communities where the Farmer Field Schools (FFS) on Nutrition and Local Food Plants were implemented. The baseline data served to advise and guide the development of a country-specific FFS curriculum and the implementation of FFS activities, by informing FFS participants, collaborators, and other stakeholders about the potential role of local food plants in improving local diets and reducing the food scarcity period.

This Briefing Note is part of a series of briefing notes summarizing the program's findings on nutrition. The comparison of the baseline and FFS diagnosis results across the seven program countries will be consolidated in global SD=HS publications.

We are grateful for the funding support from the Swedish International Development Cooperation Agency (Sida).

We hope this document, which provides new and detailed data, contributes to increased attention on the role of local food plants for healthy and affordable diets, and improved nutrition of indigenous peoples and smallholder farmers.

1 Introduction

1.1 Malnutrition

Malnutrition remains one of the greatest global health challenges, and women and children are its most visible and vulnerable victims. People are malnourished when: (a) their diet does not provide adequate calories or nutrients for their body growth and normal function, (b) they are unable to fully utilize the food they eat due to illness, or (c) they take in too much energy, saturated or trans-fat, salt, and sugar (overnutrition). In all cases, malnutrition is closely linked to disease as it affects the function and recovery of every organ system. Poverty exacerbates the likelihood and effects of malnutrition. Furthermore, malnutrition contributes to higher healthcare expenses, decreased productivity, and hindered economic growth, fostering an ongoing cycle of poverty and ill-health[1].

There has been minimal advancement in alleviating poverty in Uganda throughout much of the decade leading up to 2019/20. According to a recently launched report in Kampala, approximately 30% of the Ugandan population lived in poverty in 2019/20, a figure only slightly lower than the 31% recorded in 2012/13[2]. In addition, the report underscores unforeseen events have disproportionately impacted impoverished and rural residents in Uganda, revealing that 40% of rural and 30% of urban households have encountered at least one livelihood shock since 2013. An alarming 90% of farmers reported a deterioration in climate conditions for agriculture over the past decade. Expressing concern about the limited social assistance available in Uganda and the fragility of households, Mukami Kariuki, the World Bank's Country Manager in Uganda, stated: "The economically disadvantaged were more prone to adopting detrimental coping strategies, such as reducing food consumption, with potentially negative repercussions for their long-term human capital." Furthermore, a minimum of 50% of Ugandans are susceptible to the risk of reverting to poverty in the next two years[2].

At the same time, the threat of malnutrition looms large over a generation of children in Uganda, where over one-third of all young children (2.4 million) face stunting. The irreversible consequences of stunting persist despite recent declines in stunting and anemia rates. Regardless of economic status, children in Uganda face malnutrition for similar underlying reasons. Factors such as early pregnancies and the subsequent birth of low-weight babies contribute to a predisposition to malnutrition. Additionally, recurrent childhood infections like diarrhoea and low rates of breastfeeding contribute to wasting and stunting. Many families, whether due to financial constraints or lack of knowledge, struggle to provide their children with a nutritious diet[3].

Apart from the consequences on public health, malnutrition further extends poverty. Uganda experiences an annual loss of productivity amounting to US$310 million due to elevated levels of stunting, iodine deficiency disorders, iron deficiency, and low birth weight. The impact of malnutrition extends further, causing a reduction of approximately 4.1% in the gross domestic product each year. The treatment of malnutrition also incurs significant expenses as addressing severe acute malnutrition costs more than US$120 per child[4].

1.2 Food scarcity

For many people, the availability of food is driven by seasonal cycles, and the availability of food is least in the pre-harvest months. During food scarcity periods, household food stocks from the last harvest have dwindled. This may coincide with food shortages in the local market, meaning that food that is still available is sold at inflated prices. In this period of the year, the nutrition security of the family is most at stake. Rural households may be forced to resort to various

coping strategies to deal with food scarcity, such as reducing the diversity and quantity of their meals, which has an effect on macro and micronutrient deficiencies of household members. Other strategies to which farmers resort when food scarcity really hits them, such as mortgaging or selling the land, livestock, and other household assets, may result in further spiralling into poverty. The challenges experienced during the scarcity period can be increasingly aggravated by the consequences of climate change. The psychological effects of food scarcity challenges are profound, and all family members may experience high levels of anxiety and stress during this period. Women are especially affected, as their responsibilities often comprise food production, income-generating activities, and care for other household members (including food preparation). The effects of food scarcity periods tend to be overlooked by policymakers, or may only get attention when these result from natural or human-made calamities.

In Uganda, the northern and eastern regions, notably Karamoja, face challenges due to rain scarcity, intensifying food insecurity. Families in these areas often resort to selling assets, withdrawing children from school, or adopting environmentally harmful practices to secure food. Nearly half of all Ugandans, on average, consume fewer calories than required daily, and one in three school children lacks food during the school day. These insufficient diets contribute to persistent nutritional problems, adversely affecting the health, growth, and development of Ugandan children[5].

While there has been an increase in average monthly rainfall over the past 35 years in the region, the rainy season, extending from March to May and from September to December, has become more unpredictable in terms of volume. This unpredictability undermines agricultural production and poses a threat to food security in Karamoja. Rising temperatures further jeopardize the region's food production by potentially increasing the frequency, intensity, and duration of heat waves, reducing water availability for crops and animals. Despite these changes, a majority of people in Karamoja, especially women, are unaware of the climate shifts occurring over decades. Even among those who perceive these changes, a lack of knowledge on adaptation measures hinders their ability to take effective action[6]. In particular, smallholder farmers, especially those in the north and east, encounter challenges such as a lack of farming skills, handling techniques, and limited access to essential services like credit and insurance[5].

1.3 Objectives

The objective of SD=HS work on Local Food Plants for Nutrition is twofold: 1. To enhance dietary diversity[a] and food security; 2. To reduce the duration and severity of climate-related food scarcity seasons. This is achieved through promoting access to and consumption of diverse and nutritious local food plants while safeguarding local biodiversity and optimizing the management of these crucial plant resources. By achieving these goals, the initiative aims to improve overall nutrition security and resilience to climate challenges.

In order to improve the nutrition status of smallholder farmers and indigenous peoples, the following questions were addressed:

- What are, according to farmers, the local causes and consequences of malnutrition?

[a] Diverse diets include a variety of foods from different food groups, including cereals; white roots and tubers; vitamin A-rich vegetables and tubers; dark green leafy vegetables; other vegetables; vitamin A-rich fruits; other fruits; organ meat; flesh meat; eggs; fish and seafood; legumes, nuts and seeds; milk and milk products; oils and fats; sweets; spices, herbs, and beverages. A diverse diet is important to ensure the intake of a wide variety of nutrients, which is needed for a healthy life.

- What characterizes the food scarcity period and which strategies do farmers implement to cope with it?
- What is the role of local food plants in improving the diversity of the diet during the food scarcity and sufficiency periods?
- What is the role of the agroecosystems and local environments in the provision of local food plants?
- Are households that consume more local food plants less prone to suffer from food insecurity, food scarcity, and lower dietary diversity and quality?
- How can we best measure this? What are the implications of local food plant consumption for the most vulnerable households?
- What are the local food plants on which knowledge is shared by men and/or women in the communities?
- Which are the local food plants that are consumed during the food scarcity period?
- Who are the most powerful household members in terms of access to food?
- What are the roles of women and men in the acquisition of local food plants?
- Does gender affect the knowledge of local food plants?

This Briefing Note is an attempt to answer these questions, by comparing the consumption of local food plants in food scarcity and sufficiency periods, and its effects on achieving dietary diversity and quality throughout the year. It further addresses the role of local food plants in strengthening communities' coping strategies, in view of their demographic and socio-economic profiles. It also reflects the intention to raise awareness, stimulate discussions, and trigger feedback from a wider audience of stakeholders on the role that local food plants may play in improving nutrition and ensuring healthy and affordable diets. Finally, it provides information to support policies and legislation that promote diverse and healthy diets through the improved and sustainable use of biodiversity available in the environment.

2 Methodology

2.1 Household survey

The household survey took place from 2019 to 2021 at two different periods (scarcity season and sufficiency season) by ESAFF and PELUM [Table 1]. Data was collected by local enumerators who speak the local language. They were trained by the two organizations and pilot-tested the questionnaire before collecting the data. The household survey was conducted in a representative sample of communities, representing each agroecosystem and ethnic group in the project region. In each selected community, a random household sampling equivalent to 30% of all households living in the community took place to ensure statistical representativeness. For villages with 30 to 100 households, a sample of 30 households was used; for villages with 30 or fewer households, all households were interviewed. Households that had been living for less than one year in the community or households that had not been engaged in farming were excluded from the sample. All informants participated freely and with prior informed consent.

Table 1. *Data collection periods during scarcity and sufficiency seasons by ESAFF and PELUM*

Local organizations	Sufficiency season (round 1)	Scarcity season (round 2)
ESAFF	July – November 2019	May 2021
PELUM	January – February 2021	April – May 2021

This Briefing Note presents the results of the following survey modules: (1) demographic and socio-economic characteristics, (2) severity of food insecurity, (3) dietary diversity, (4) local food plant acquisition, (5) free-listings of local food plants, (6) features of the food scarcity

season, and (7) sources of information modules of the household survey[b]. The demographic and socio-economic module includes collected data that allowed the calculation of variables related to gender and household vulnerability, and that gave a general indication of the main productive activities of the household, among others. All interviews (except for the demographic and socio-economic module) were conducted in both food scarcity and sufficiency periods.

Food insecurity was measured using the Household Food Insecurity Access Scale (HFIAS) and the Household Hunger Scale (HHS)[7] [Table 2]. According to the HFIAS indicator guide[8], a food secure household experiences no food insecurity conditions, or it might rarely experience concerns on sufficient access to food. A mildly food insecure household often worries about not having enough food, it might be unable to eat preferred foods and have a more monotonous diet than desired, or it can even consume some foods considered undesirable. A moderately food insecure household often sacrifices quality more frequently, by eating a monotonous diet or undesirable foods and can start to cut back on quantity by reducing the size of meals or number of meals. Finally, a severely food insecure household has resorted to cutting back on meal size or number of meals and its members can still run out of food, go to bed hungry, or go a whole day without eating[8].

Table 2. *Food insecurity indicators and their definitions*

Food Insecurity Indicators	Abbreviation	Definition
Household Food Insecurity Access Scale	HFIAS	It measures the severity of household food insecurity during the past four weeks (30 days). It ranges from 0 to 27, indicating the degree of insecure food access. Households are categorized as food secure, mildly food insecure, moderately food insecure, or severely food insecure[7].
Household Hunger Scale	HHS	It is derived directly from the HFIAS and it includes only three hunger-related aspects of insecure food access: "little to no hunger in the household", "moderate hunger in the household", or "severe hunger in the household"[7].

A 24-hour dietary recall-based interview was also conducted to capture detailed information about all foods and beverages consumed by the respondent in the past 24 hours[9]. Based on the results of the 24-hour recall, the Household Dietary Diversity Score (HDDS), Micronutrient Sensitive HDDS (MsHDDS), the Food Variety Score (FVS) and Dietary Species Richness (DSR), were all calculated [Table 3].

[b] The detailed explanation of each module, including the survey questionnaire, is accessible in the Baseline Tool document (http://bit.ly/2WSHfTf). The tool was revised and agreed upon with all partner organizations.

Table 3. *Dietary diversity indicators calculated based on the 24-hour recalls, and their definitions*

Dietary Diversity Indicators	Abbreviation	Definition
Household Dietary Diversity Score	HDDS	It assesses a household's economic access to food (i.e. its ability to produce, purchase or otherwise secure food for consumption by all household members). The potential score range is 0-12[10].
Micronutrient Sensitive HDDS	MsHDDS	It disaggregates and reorganizes the HDDS food groups into 16 micronutrient-based groups[11].
Food Variety Score	FVS	It measures the number of different food items consumed from all possible items eaten (individual foods, food mixtures, food categories, or a combination of these)[12].
Dietary Species Richness	DSR	It measures the number of different species consumed per day, assessing both nutritional adequacy and food biodiversity[13].

Local food plant acquisition events, based on a recall period of seven days, also captured the multiple environments from which local food plants were acquired, and gender roles related to their harvesting or gathering. A detailed explanation of how each index was calculated, alongside the rationale of each survey module, and the survey questionnaire itself are accessible upon request. The tools were revised and agreed upon by all partner organizations. Each partner could adapt, test the tools, and include specific sections relevant to their own context.

The free listings of the food plants aim to provide an overview of local knowledge and were used for the development of a list of species based on the knowledge that is shared by community members. Given that knowledge is intrinsically related to gender, free listings were requested from the head of household and his/her spouse separately. The results of the free listings were analysed by using the cognitive salience index (CSI). The CSI combines frequency and order of mention across men's and women's lists for each plant species and reflects the knowledge of a specific plant (the higher the CSI, the higher the knowledge of that specific plant14. In addition, the species that are more widely used among households during the food scarcity season were identified using the traffic light exercise[15]. For that, the enumerator asked men and women to give a colour to each plant species in relation to the period when it is consumed, as follows:

- Green light: local food plant species is consumed during the sufficiency period, or when food may not be plentiful but generally available to the community in adequate quantities and qualities.
- Amber light: local food plant species is consumed during a period in which food reserves are alarmingly low.
- Red light: local food plant species is consumed during a situation in which the food supply is depleted, which condition requires emergency measures.

The food scarcity module not only assessed the months in which households have reduced access to food[16] but also captured the variety of local food plants consumed in times of food scarcity. The sources of information module captured the current and preferred sources of information for the community households on health, sanitation, and nutrition issues, to help design strategies to communicate with farmers by using preferred channels.

The data was analysed with descriptive and non-parametric statistics. Spearman rank correlations were calculated between ordinal or continuous variables. Kruskal-Wallis ranked tests estimated correlations between one nominal variable that has two or more categories and a continuous variable. Mann-Whitney tests estimated correlations between one nominal

variable that has two categories and a continuous variable. Finally, Chi-Square tests were calculated between two nominal variables.

2.2 FFS diagnostic exercises

The FFS diagnosis took place in 2021 for 23 FFS established during that year in the Northern and Eastern regions of Uganda. Data was collected by FFS facilitators who speak the local language. They were trained on the FFS approach for the work on nutrition and local food plants, including the conduction of diagnostic exercises and FFS activities by ESAFF and PELUM, as part of the training of trainers. All FFS members participated freely and with prior informed consent.

This Briefing Note presents the results of the malnutrition problem tree, decision-making with respect to intra-household food distribution, and timeline analysis of local food plants and nutrition exercises from 23 FFS for which we had complete and good-quality data. The analysis of the data was mainly a descriptive exercise, showing patterns, frequencies, and means, where applicable. The FFS diagnostic exercises are detailed in the illustrated module 'Diagnostic Phase' of the FFS Field Guide, which also includes the forms by which results were reported. More information on the FFS work on Nutrition and Local Food Plants is provided on the SD=HS website and is summarized in the Online Course, accessible through the SD=HS website.

2.3 Household and FFS locations

In total, data were collected from 644 households for the baseline survey and 23 FFS for the Diagnostic exercise. Table 4 presents the distribution of the households and FFS surveyed across the Northern and Eastern regions of Uganda. The FFS in the Northern region were run by ESAFF, while the FFS in the Eastern region were run by PELUM.

Table 4. *Distribution of sampled households and FFS across the two regions, involved in the activities indicated*

	FFS diagnostic exercise		Baseline survey	
Regions	Number of FFS	Percentage of total number of FFS	Number of households	Percentage of total number of households
Northern	12	52%	458	71%
Eastern	11	48%	186	29%
Total	**23**	**100%**	**644**	**100%**

Figures 1 below shows the location of the households and FFS surveyed by both our partners (ESAFF and PELUM) within Uganda. The map figures were prepared by Matteo Petitti.

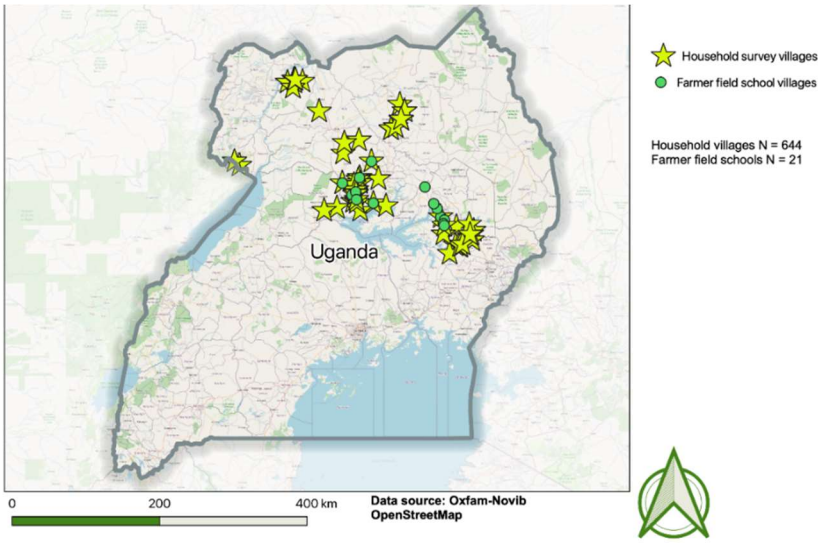

Figure 1. *Locations of households and FFS surveyed by both ESAFF and PELUM in Uganda.*

3 Results

3.1 Indigenous peoples and smallholder farmers in Uganda

Agroecological conditions determine largely which crops can be successfully grown and which farming conditions need to be fulfilled, e.g. irrigation, maximum time to maturity, and dependence on fertilizers. Recently, climate change has caused the agroecosystems to become drier and rainfall patterns to become more irregular. Such changes bear heavily on crop production and food security.

Indigenous peoples and smallholder farmers surveyed in Uganda live in agroecological zones 1 (West Nile Farmlands), 2 (Northwestern Farmlands-Wooded-Savanna), 3 (Northern Moist Farmlands), 4 (Northeastern Central Grass-Bush Farmlands), and 8 (Southern and Eastern Lake Kyoga Plains)[17]. In these zones, the mean average temperature is between 23 and 25 °C, while the mean annual precipitation is 850 in zone 8, and between 1100 and 1300 in zones 1, 2, 3 and 4[17]. According to the Holdridge Life Zone classification [18,19], 72% of the communities involved are situated in the subtropical moist forests zone, while the location of the remaining 28% of the areas classified are either in the tropical dry forests zone (15%) or in the subtropical dry forest zone (13%). Köppen Climate classification[20] indicates that 100% of the implementing areas have a climate of equatorial winter dry. The surveyed communities mostly rely on cassava farming, maize, groundnut and beans to sustain their livelihoods. More than 90% of these crops are cultivated for household consumption.

Table 5 presents the socio-demographic characteristics of the participating communities. The majority of the households investigated had an average size of almost seven household members and belonged to the ethnic group Luo (30%). Male household heads were present in almost 80% of the households interviewed, indicating the gender disparity in household dynamics. The educational level and literacy rates of the surveyed households showed that 73% of household heads have at least completed primary education, while 22% do not know how to read or write. Almost 30% of the household heads have never attended formal education, while a surprising 15% have completed the highest education. The results point out a strong divergence in literacy and formal education levels within and between these communities.

Table 5. *Results from socio-demographic module of baseline survey*

Socio-demographic variables	Scarcity season interviews (R1)			
	N	%	Mean	St. D.
Ethnic Groups	644	100%		
Madi	96	15%		
Luo	192	30%		
Lugb	1	0%		
Kakw	1	0%		
Ites	187	29%		
Arin	1	0%		
Alur	85	13%		
Acho	81	13%		
Household size			6.8	2.9
Sex of household head				
Man	457	79%		
Woman	123	21%		
Main occupation of household head				
On farm	408	70%		
Outside farm	26	5%		
Both	142	25%		
Age of household head			46.3	13.5
Literacy of household head				
Only read	27	5%		
Only write	14	3%		
Both	348	70%		
None	110	22%		
Education of household head				
Never attended formal education	142	27%		
Primary	237	45%		
Secondary	67	13%		
Highest education	76	15%		
Number of migrants per household			0.9	1.8
Number of children (incl. orphans) per household			3.7	2.2
Number of chronically ill people per household			0.5	0.8
Number of women in child-bearing age per household			1.6	1.1
Total land area (ha) per household			4.2	11.8
Main productive activities per household				
Agriculture	579	61%		
Livestock farming	300	32%		
Fishing	8	1%		
Hunting	2	0%		
Gathering	12	1%		
Other	43	5%		
Farm ownership				
Owned	511	72%		
Rented	134	19%		
Borrowed from family or friends	21	3%		
Communal land	32	5%		
Other	11	2%		
Number of crops grown in the past 12 months, and for what use			6.9	2.9
Sales			4.4	3.3
Consumption in the household			6.2	3.0
Barter			0.2	0.9
Market orientation (proportion of harvest for sale)			0.6	0.3
Presence of income from non-agricultural activities	244	43%		
Presence of home garden	487	85%		

** The results are based on the baseline household survey, in which 644 households participated. Ethnic groups: N=644 (missing values=0); Household size: N=568 (missing value=76) ; Sex of household head: N=580 (missing value=64); Main occupation of household head: N=580 (missing values=64); Age of household head: N=570 (missing values=74); Literacy of household head: N=499 (missing values=145); Education of household head: N=522 (missing values=122); Number of migrants: N=579 (missing values=65); Number of children: N=568 (missing values=76); Number of chronically ill people: N=578 (missing values=66); Number of women in child-bearing age: N=580 (missing values=64); Total land area: N=580 (missing values=64); Main productive activities: N=581 (missing value=63); Farm ownership: N=580 (missing values=64); Number of crops grown on the past 12 months: N=581 (missing value=63); Market orientation: N=581 (missing value=63); Presence of income from non-agricultural activities: N=573 (missing*

values=71); Presence of home garden: N=571 (missing values=73). The percentages are calculated over the valid number of responses for each variable, excluding missing values.

In terms of their productive activities, more than 60% of the households interviewed work in agriculture, more than 30% of them in livestock farming and more than 70% also own a farm. An average total of seven crops were grown by the households in the past 12 months and the average sale proportion from their harvest is 60%, while the rest was mostly consumed in the household. Interestingly, more than 40% of the households have an income from non-farming activities and 85% of them operate a home garden.

3.2 Local causes and consequences of malnutrition

The diagnostic exercises addressed the causes and consequences of malnutrition using the Malnutrition Tree as a tool. The most important causes of malnutrition mentioned 16 times by the FFS participants were food scarcity during the scarcity season and poverty, which was linked with low income or unemployment [Table 6]. The lack of knowledge on nutrition and local food plants was also reported as an important cause of malnutrition 13 times within the 23 FFS. The lack of dietary diversity and imbalanced diet was mentioned 12 times by the FFS participants, showing that despite the previously mentioned lack of knowledge in nutrition, some knowledge on the benefits of a diverse diet is present. Social problems and environmental challenges are only mentioned 6 times within the 23 FFS, indicating a gap in understanding the linkages between overpopulation, climate change and food scarcity. Responses like lack of access to food, cropping system limitations, cultural stigma around certain foods, hygiene and poor access to land, were mentioned by less than 5% of the total responses. In conclusion, the scarcity periods, low income and lack of knowledge regarding local food plants and nutrition are the major arguments listed.

Table 6. *Causes of malnutrition as reported by FFS participants*

Malnutrition cause	Number of answers	Percentage of answers	Details and examples
Food scarcity	16	20%	Inadequate food intake (fewer meals in scarcity season); poor feeding; not eating in time
Poverty	16	20%	Low income, unemployment
Knowledge gap	13	16%	Lack of knowledge on nutrition, on the value of local plants, and general
Imbalanced diet	12	15%	Limited dietary diversity; limited consumption of fruit and vegetables
Social problems	6	8%	Overpopulation, alcoholism, laziness, separation of parents leaving children helpless
Environmental challenges	6	8%	Floods, climate change
Lack of access to food	4	5%	E.g. because of poor transport facilities
Cropping system limitations	3	4%	Poor quality seed
Cultural attitude/stigma	2	3%	People refuse to eat certain foods
Hygiene	1	1%	Poor hygiene in food storage or preparation
Poor access to land	1	1%	-
Total	**80**	**100%**	

**The details and examples are taken directly from the FFS diagnostic reports. The way the question was asked allowed FFS to give more than one open responses. During data analysis, the responses were then grouped into categories. The percentages are calculated over the total number of answers (N=80) collected from the 23 FFS.*

The most important consequence of malnutrition, reported 19 times by the 23 surveyed FFS, was the changes in skin and eye appearance as rough or yellow skin and yellow eyes [Table 7]. Overall weakness, lethargy and poor productivity were reported 18 times, while illnesses and

poor life expectancy were reported 17 times by the FFs participants. In addition, stunted growth and related clinical conditions were reported 12 times and weight loss was reported 12 times. All these answers indicate that the most important malnutrition consequences are related to physical health. Only two malnutrition consequences were reported relating to social and household-level challenges. Obesity was also only reported once within the 23 FFS.

Table 7. *Consequences of malnutrition as reported by FFS participants.*

Malnutrition consequence	Number of answers	Percentage of answers	Details and examples
Changes in skin/eyes appearance	19	19%	Sores on body, rough skin, yellow skin, yellow eyes
Overall weakness, lethargy and poor productivity	18	18%	Reduced labour, low productivity and development in the community
Illnesses	17	17%	Scurvy, night blindness, anaemia, weakened immunity, constipation, rickets
Poor life expectancy or death	17	17%	Getting old faster, early death for both mothers and children
Stunted growth and related conditions	14	14%	Including kwashiorkor and marasmus
Weight loss	12	12%	-
Social and household challenges	2	2%	High levels of stress; increased poverty
Obesity	1	1%	-
Total	**100**	**100%**	

**The details and examples are taken directly from the FFS diagnostic reports. The way the question was asked allowed FFS to give more than one open responses. During data analysis, the responses were then grouped into categories. The percentages are calculated over the total number of answers (N=100) collected from the 23 FFS.*

All FFS (100%) reported that their nutrition status had worsened in their village in the last 30 years [Table 8]. The overall results may be related to an increased share of staple crops in a less diverse diet and decreased access to additional minor crops, including local food plants.

Table 8. *Nutrition changes in the village in the last 30 years*

Changes in nutrition	Number of FFS	Percentage of FFS
Worsened	23	100%

**The details and examples are taken directly from the FFS diagnostic reports. The question asked was "Has the nutrition in the village changed in the last 30 years?". Percentages are calculated over the total number of the 23 FFS that participated.*

Poverty and access to land or food (35%) as well as the lack of knowledge on local food plants (18%) were the main factors that affected the nutritional status of the household [Table 9]. The lack of local food plants from the diets was a major influencing factor, mentioned 10 times within the 23 FFS, while globalization and Westernized eating habits were reported 7 times by the FFS participants. Climate change and environmental degradation (9%) and the lack of local food plant production (6%) were also reported as important influencing factors of the nutritional status by the FFS participants. The appearance of new crops or cash crops and the lack of knowledge on the preparation of local food plants were reported by less than 3% of the total answers. These causal factors are likely interrelated, as already pointed out above.

Table 9. *Major factors that affected the nutritional status of the households*

Factors influencing the change	Number of answers	Percentage of answers	Details and examples
Poverty and access to land/food	23	35%	Poverty, wars, food scarcity, no money, poor transport, people could not afford adequate food, Inadequate income of households to acquire food, low incomes
Lack of knowledge/education/policy support	12	18%	Knowledge on NUS, Knowledge gap on better understanding of nutrition, Limited access and skills of cooking the local food plants and they needs a lot of ingredients, lack of sensitization of communities on the importance of local food plants, ignorance of balanced diet, limited knowledge on agroecology
Loss of local foods in diet	10	15%	Low consumption of local foods and reduced number of meals, limited food variety consumed, people eat one meal and not with balanced food values
Globalization and change in habits	7	11%	Laziness, development of new technology, long/difficult preparation or bad taste of local foods
Climate change and environmental degradation	6	9%	Declining fertility, use of chemicals, deforestation due to overpopulation, wildfires
Lack of local crops/seeds	4	6%	Disappearance of local food plants, low yields
New/cash crops	2	3%	Change from production of food crops to cash crops, poor yield of local crops, infestation of crops by pests and diseases, growing new food plants at HH levels
Long/difficult preparation of local foods	1	2%	Local food plant preparations need lots of ingredients
Total	**65**	**100%**	

**The details and examples are taken directly from the FFS diagnostic reports. The way the question was asked ("What were the major factors that affected the nutritional status of the households?") allowed FFS to give more than one open responses. During data analysis, the responses were then grouped into categories. The percentages are calculated over the total number of answers (N=65) collected from the 23 FFS.*

3.3 Understanding local diets

The baseline survey showed that household dietary diversity (HDDS) and micronutrient-sensitive dietary diversity (MsHDDS) were higher during the sufficiency season compared to the scarcity season [Table 10]. It is important to note that both the HDDS and MsHDDS indicators simply group food plants in categories such as cereals, tubers, vegetables, fruits, and legumes and measure to what extent the household diet contains crops from these groups. That means that unfortunately these indicators cannot capture the diversity of food plants consumed within each food group, e.g. diversity of vegetables, fruits, etc. The indicators FVS, which measures the variety of different food items, and DSR, which measures the diversity in species consumption[12,13], scored slightly higher during the food scarcity season, in contrast to the household dietary diversity indicators (HDDS and MsHDDS). This indicates that during the food scarcity season, households consume a greater variety of foods and plant species that belong to the same food group category of the HDDS and MsHDDS indicators. For example, they might consume a greater variety of different vegetables which all belong to the vegetable food group. The greater variety of foods (FVS) or plant species (DSR) consumption during the scarcity season

when food is less available, could be a substitute of the decreased availability and consumption of main staples.

Table 10. *Dietary diversity (HDDS, MsHDDS, FVS and DSR) differences between scarcity and sufficiency seasons*

Dietary diversity	Sufficiency season (mean ± sd)	Scarcity season (mean ± sd)
HDDS (0-12)	6.0 ± 2.8	5.4 ± 2.2
MsHDDS (0-16)	6.7 ± 3.9	5.9 ± 2.6
FVS (>0)	5.6 ± 2.1	6.1 ± 2.5
DSR (>0)	4.4 ± 1.6	4.8 ± 1.7

** The results come out the baseline household survey, in which 644 households participated. During the first survey round (sufficiency season) 82 values were missing for HDDS (N=562), 103 values were missing for MsHDDS (N=103), and 303 values were missing for FVS and DSR (N=341). During the second survey round (scarcity season), 241 values were missing for HDDS and MsHDDS (N=403), and 388 values were missing for FVS and DSR (N=256).*

Regarding the dietary diversity in relation to the specific food groups, we noted that cereals, tubers and roots, vegetables and legumes are almost equally the most consumed food groups during both the scarcity and sufficiency seasons [Table 11]. Fruits are consumed slightly more frequently during the scarcity season. Whereas available food quantities might be less during the scarcity periods, the dietary diversity appeared not statistically different between these two seasons, suggesting that improving the role of local food plants in local diets might be important throughout the year and regardless of the nature of the season.

Table 11. *Main food groups consumed during the scarcity and sufficiency seasons*

Food Group	Sufficiency season		Scarcity season	
	N	% HHS	N	% HHS
Cereals	472	14%	306	14%
White tubers and roots	482	14%	305	14%
Vegetables	456	13%	306	14%
Fruits	287	8%	268	12%
Meat	172	5%	60	3%
Eggs	106	3%	36	2%
Fish and other seafood	219	6%	131	6%
Legumes, nuts, and seeds	475	14%	324	15%
Milk and milk products	111	3%	84	4%
Oils and fats	192	6%	132	6%
Sweets	160	5%	60	3%
Spices, condiments and beverages	314	9%	196	9%
Total	**3446**	**100%**	**2208**	**100%**

** The results are deduced from the baseline household survey, in which 644 households participated. During the first survey round (sufficiency season) 63 households were missing (N=579), while during the second survey round (scarcity season), 237 households were missing (N=407). The percentages are calculated over the total number of answers per season.*

3.4 Local food plants diversifying the diet

Table 12 presents the food groups in which some important local food plants from the Northern and Eastern regions of Uganda are categorized. These plants have been selected for their importance in food scarcity season and/or due to their high nutritional value. However, many of the crops listed are not considered local food crops or NUS but really represent major crops grown across countries and regions. In fact, the table shows how less than half of the species can be considered to represent local food plants, whereas we do not know how large their share in the local diet really is.

Table 12. *Important local food plants and food groups*

Scientific name	English name	Local name	Food group
Manihot esculenta	cassava		tubers and roots
Phaseolus vulgaris	beans, white peas	imare	legumes
Sorghum bicolor	sorghum		cereals
Eleusine coracana	finger millet		cereals
Cajanus cajan	pigeon pea		legumes
Sesamum indicum	sesame	simsim	nuts and seeds
Vigna unguiculata	cowpea	eboo	legumes, tubers and roots
Glycine max	soybean	soya bean	legumes
Hibiscus sabdariffa	hibiscus	malakwang	vegetables
Pisum sativum	green peas/green grams	coroko	legumes
Abelmoschus esculentus	okra		vegetables
Crotalaria retusa	wedge leaf rattlepod, devil bean	alayu	vegetables
Cleome gynandra	African cabbage	akeyo, orobi	vegetables
Dioscorea villosa	wild yam		tubers and roots
Cucurbita maxima	pumpkin		fruits
Amaranthus dubius	spleen amaranth	dodo	vegetables
Corchorus olitorius	jute mallow	othigo, etigo	vegetables
Senna obtusifolia	sickle pod	oyedo	vegetables
Solanum lycopersicum	cherry tomato	enyanya	vegetables
Tamarindus indica	tamarind		fruits

It should be noted that out of the 194 local food plants identified in the 23 FFS, 77 of them (44%) were mentioned because of their nutritional value [Table 13]. Quite a few of these 194 plants were also mentioned because of their medicinal (25%) and agronomic value (14%). Furthermore, 21 plants were reported because of their specific role during the food scarcity periods, and 11 plants were mentioned because of their generally wide availability. Only very few local food plants were mentioned because of their flavour (3%), their easy ways of preservation (2%), and their role in rituals (1%).

Table 13. *Perceived importance of local food plants used in times of food scarcity*

Perceived importance	Number of plants	Percentage of plants
Nutritional value	77	40%
Medicinal value	48	25%
Agronomic value	27	14%
Important for food security (incl. in times of scarcity)	21	11%
Easily available	11	6%
Has good flavour/taste	5	3%
Can be preserved	4	2%
Ritual importance	1	1%

**The results come out the FFS diagnostic exercise, for which data was collected out of 23 FFS. In total, 194 local food plants were identified. Percentages reflect the number of plants divided by the total number of plants identified in this exercise (N=194). For some plants, no perceived importance was assigned.*

3.5 Measuring the severity of food insecurity

The baseline survey showed that household food insecurity was significantly higher during the scarcity season compared to the sufficiency season [Table 14]. As expected, this demonstrates the crucial negative impact that lean periods have on household food security.

Table 14. *Food insecurity (HFIAS, HHS) differences between scarcity and sufficiency seasons*

Food Insecurity	Sufficiency season (mean ± sd)	Scarcity season (mean ± sd)
HFIAS (0-27)	9.6 ± 7.6	13.2 ± 6.9
HHS (0-6)	1.3 ± 1.5	1.7 ± 1.9

** The results come out the baseline household survey, in which 644 household participated. During the first survey round (sufficiency season) 63 values were missing (N=581), while during the second survey round (scarcity season) 236 values were missing (N=408).*

The HHS index, which measures hunger, is derived directly from the HFIAS, but it only assesses the most severe experiences of food insecurity. Table 15 shows that during the scarcity season, almost 50% of the interviewed households were experiencing moderate or severe hunger. Moreover, an important 38% of households also experienced moderate or severe hunger during the sufficiency season, which demonstrates that food insecurity is a crucial problem in the investigated regions throughout the year.

Table 15. *Percentage of households that suffer from food scarcity throughout the year*

Household Hunger Scale (HHS)	Sufficiency season		Scarcity season	
	N	% Hhs	N	% Hhs
Little to no hunger (% total Hhs)	361	62%	216	53%
Moderate hunger (% total Hhs)	177	31%	131	32%
Severe hunger (% total Hhs)	43	7%	61	15%

** The results are calculated based on the data from the baseline household survey, in which 644 households participated. During the first survey round (sufficiency season) 63 values were missing (N=581), while during the second survey round (scarcity season) 236 values were missing (N=408). The percentages are calculated over the valid number of households, excluding missing values.*

3.6 The food scarcity period

Given the major links between food scarcity and food insecurity, it was important to look into the current length of the scarcity period within the investigated areas in Uganda. Table 16 presents the percentage of households surveyed by ESAFF that suffer from food scarcity throughout the year. Similar data from the households investigated by PELUM were not collected. May, June and July are the months with the largest shortages, with more than 49% of households experiencing food scarcity. Food shortages are however mentioned from March (22%) to August (18%).

Table 16. *Percentage of households that suffer from food scarcity indicated per calendar month*

Months	Percentage of households
January	13%
February	16%
March	22%
April	29%
May	52%
June	78%
July	49%
August	18%
September	7%
October	6%
November	4%
December	4%

**The results come out the first-round baseline household survey conducted by ESAFF, in which 341 household participated and 1 value (Hhs) were missing (N=340). No such data are available from PELUM. The percentages are calculated over the valid number of households (N=340), excluding missing values.*

The most important characteristic of the food scarcity season, mentioned 21 times out of the 61 responses of the FFS participants, was poor access to food as a result of poverty [Table 17]. As

a consequence, reduced food intake was reported 13 times as an important characteristic of the food scarcity season, while hunger and illness were reported 12 times by the FFS participants. Climate change impact was only mentioned by 10% of the total number of responses. Answers referring to casual labour, migration, relying on others for food, and consumption of local food plants were only mentioned twice within the 23 FFS. This demonstrates the lack of knowledge and attention to local food plants and their potential to improve food security.

Table 17. *Characteristics and definition of the scarcity season as mentioned by the FFS participants*

Characteristics of the scarcity season	Number of answers	Percentage of answers	Details and examples
Poverty/poor access to food	21	34%	Inadequate cash in circulation; high price of food items in the market; low incomes and insufficient access to quality food
Reduced food intake/limited dietary diversity	13	21%	People eating once a day and some even sleep hungry; reduction on the number of meals; reduction in the amount of food; people eat one meal a day and mainly mangoes; limited food variety
Hunger and illness	12	20%	Sickness and loss of body weight; children and elderly are sickly
Climate challenges/crop failures	6	10%	Drought; diseases
No harvests or priority to cash crops	3	5%	Most of the food crops are still growing; it is planting season; extinction of major local food plants due to dry spells
Casual labour, migration or (over)spending for food	2	3%	-
Relying on neighbours and family for food/money	2	3%	No food in the granaries of some homes; borrowing or working for food
Consumption of local/wild plants (sometimes stigmatised)	1	2%	-
Consumption of stored food	1	2%	-
Total	**61**	**100%**	

**The details and examples are taken directly from the FFS diagnostic reports. The way the question was asked allowed FFS to give more than one open responses. During data analysis, the responses were then grouped into categories. The percentages are calculated over the total number of answers (N=61) collected from the 23 FFS.*

3.7 Food plants during the food scarcity season

The average number of food plant species used in times of food scarcity per household was 3.8 (± 1.7). Table 18 presents the most frequently used food plants in times of scarcity. Cowpea, cassava, bean, maize and sorghum seem to be the plants mentioned with the highest frequencies (<20% of the households). Although all of these crops may be considered to be staple food, rather than local food plants, they seem to play an important role during food scarcity, perhaps in reduced volumes.

Table 18. *Key food plant species used during food scarcity period*

Food plants used in food scarcity	Number of households	Percentage of households
cowpea	241	42%
cassava	229	40%
bean	225	39%
maize	117	20%
sorghum	116	20%
hibiscus	100	17%
okra	74	13%
amaranth	61	11%
pumpkin	60	10%
sweet potato	59	10%
African cabbage	56	10%
eggplant	51	9%

**The results come out the baseline household survey, in which 644 households participated. In total, 70 values were missing (N=574).*

3.8 Multiple environments can support diverse diets: Local food plant acquisition

Sourcing of local food plants

In the scarcity period, a significant number of households (43%) are reported to have harvested at least one of the local food plants they mentioned. Slightly fewer households (38%) also said they purchased the local food plants they mentioned, while only 13% reposted gathering food plants from public spaces or the wild. Interestingly, during the sufficiency season, fewer households (34%) reported that they harvested at least one of the plants they mentioned, while most said they purchased (43%) them. This indicates the crucial role of food scarcity in determining households sourcing methods and confirms the minor role that local food plants currently fulfil in household diets in the communities interviewed.

A smaller variety of different species was reported to be harvested in the scarcity season (105) compared to the sufficiency season (127), possibly due to lack of water and the resulting lower yields. Similarly, a slightly bigger variety of species was reported to be gathered (83) in the sufficiency season compared to the scarcity season (75), probably due to the greater availability of food during the sufficiency season. No significant differences were found in the number of different species purchased between the two seasons.

Sites where the local food plants originate from

The majority of the local food plants listed (>60%) are collected from the home gardens during both scarcity and sufficiency periods [Table 19]. During the food scarcity season, a greater variety of local food plants is sourced from the forests, while during the sufficiency season, more local food plants are collected from the agricultural field. Many local food plants are also being brought from the market during both seasons, with a slightly higher number of species being acquired during the food scarcity season. This demonstrates the effect of food scarcity season on the places where families tend to acquire their food. It also highlights the important role of home gardens during the entire year and the contribution of forests as a sourcing site during the food scarcity season.

Table 19. *Number of plant species and sites where they originate from*

Place of origin	Sufficiency season		Scarcity season	
	Number of species	Percentage of species	Number of species	Percentage of species
Agricultural field	93	54%	62	39%
Home garden	107	62%	94	60%
Forest	52	30%	64	41%
Public spaces	33	19%	23	15%
Roadside	18	10%	15	10%
Lake	4	2%	1	1%
Riverside	11	6%	7	4%
Market	83	48%	85	54%
Other	49	28%	43	27%

** The results come out the baseline household survey, in which 644 households participated. In total, 111 households were missing in the scarcity period (N=533), and 237 during the sufficiency period (N=407). During the first survey round (sufficiency season) 173 different plant species were mentioned, while during the second survey round (scarcity season), 158 different species were mentioned. Percentages reflect the number of species brought from each different place, divided by the total number of different species mentioned. **Public spaces are a grouped category and consist of the combination of roadsides, lakes and riversides.*

3.9 Women's and men's roles: Local food plant acquisition

Household members that acquire local food plants for the household

Baseline survey data showed that women bring home the majority of species during both the scarcity (85%) and sufficiency (74%) seasons, compared to other family members [Table 20]. Men also bring quite a variety of local food plants to their households, without important variations during the two seasons. Whereas the species provided by women and men show considerable overlap, the total number provided by women is substantially larger. This demonstrates the important role women have in sourcing local food plants and nourishing the family. Children also appeared to bring some variety of local food plants to their households, mainly during the sufficiency season, when food is more available.

Table 20. *Number of plant species that are acquired by various family members*

Family member	Sufficiency season		Scarcity season	
	Number of species	Percentage of species	Number of species	Percentage of species
Man	78	45%	72	46%
Woman	128	74%	135	85%
Both genders	61	35%	33	21%
Children	77	45%	29	18%
Others	1	1%	13	8%

**The results are based on the baseline household surveys, in which 644 households participated. In total, 111 households were missing in the scarcity period (N=533), and 237 during the sufficiency period (N=407). Percentages reflect the number of species brought from each different place, divided by the total number of different species mentioned per season. During the first survey round (sufficiency season) 173 different plant species were mentioned, while during the second survey round (scarcity season), 158 different species were mentioned.*

3.10 Women's and men's knowledge on local food plants (Free listings)

Individual men (7.0 ± 2.6) listed a slightly lower number of plants than individual women (7.7 ± 2.3), indicating that women have slightly bigger knowledge of local food plants. However, as a group men reported a similar number of different plant species per person (181 different species/ 364 men), compared to women (208 different species /410 women). Almost all plant species were listed by the two genders with similar frequencies. Annex 1 presents the full list of plants and the frequencies in which they were mentioned by men and women.

3.11 Relationships with dietary diversity and food insecurity indicators

A significantly negative relationship was found between the number of crops grown in the past 12 months for consumption and the household food insecurity indicator HFIAS ($p<0.001$) during the food scarcity season. No significant correlation was found for this relationship during the sufficiency season. This suggests that during the scarcity season when food security is threatened, the more food-insecure households grow a significantly smaller number of crops for household consumption, despite the fact that they suffer from larger food insecurity. Such a pattern does not appear during the food sufficiency season.

Similarly, a significantly negative relationship was found between the number of local food plants that were acquired and the HFIAS indicator ($p<0.01$), again only during the food scarcity season. This might again suggest that during the scarcity season, when food is less available, the more food-insecure households consume a significantly smaller number of local food plant species.

A significantly positive relationship was found between the number of crops grown in the past 12 months for consumption and dietary diversity, during the sufficiency period ($p<0.001$). No significant correlation was found for this relationship during the scarcity season. This indicates that when food is more abundantly available, households grow a larger number of crops for consumption and hence have higher dietary diversity.

Likewise, during food sufficiency season, a significantly positive relationship was found between the number of local food plants that were brought home and dietary diversity ($p<0.001$). This indicates that when food is more abundantly available, households that acquire more local food plants also have more diverse diets.

3.12 Intra-household decision making

Worldwide, women play a key role in safeguarding the nutrition of their families through their wide knowledge of local food plants, which allows diversification of diets and higher nutrient intake. Empowering them can contribute to improving their own food and nutrition security and that of their families[21]. However, in many cultures, there are major gender inequalities in relation to the access and control of resources, including food, with major consequences for the nutrition of women and children. Land is traditionally passed on to male family members as they reach adulthood, as according to local culture female family members will not need it after their marriage. In addition, men are usually in charge of the staple crops that are produced for both consumption and sale, such as maize. Women, on the other hand, tend to take responsibility for smaller crops like legumes that are mostly grown for household consumption (e.g. cowpea and Bambara nut). Women are also the ones who usually attend the home gardens and decide what to cook as they will know better what is available in the household.

Indeed, 81% of the answers withing the 23 FFS indicated that mothers are the ones who decide what to eat in the household, while fathers were reported only by the FFS participants [Table 21]. Children were only reported to make such decisions once within the 23 FFS.

Table 21. *Decision making member regarding what to eat in the household*

Decision making member	Number of answers	Percentage of answers
Mother	13	81%
Father	2	13%
Children	1	6%
Total	**16**	**100%**

** The details and examples are taken directly from the FFS diagnostic reports. The way the question was asked ("Who decides what to eat in the household?") allowed FFS to give more than one response: 1= Father, 2= Mother, 3= Children, 99= Other, please specify [multiple options allowed]. During data analysis, the responses were then grouped into categories. The percentages are calculated over the total number of responses (N=16) collected from the 23 participating FFS.*

Mothers and fathers were equally reported as the most powerful household members in providing access to food at large, including from other sources than the owned farm [Table 22]. Children were again only reported once by the FFS participants to be equally as powerful household members in terms of access to food.

Table 22. *Most powerful household members in terms of access to food*

Most powerful member	Number of answers	Percentage of answers
Mother	20	49%
Father	20	49%
Children	1	2%
Total	**41**	**100%**

** The details and examples are taken directly from the FFS diagnostic reports. The way the question was asked ("Who are the most powerful household members in terms of access to food?") allowed FFS to give more than one response: 1= Father, 2= Mother, 3= Children, 99= Other, please specify [multiple options allowed]. During data analysis, the responses were then grouped into categories. The percentages are calculated over the total number of responses (N=41) collected from the 23 participating FFS.*

Overall, Tables 21 and 22 indicate that although women are most important in the intra-household food distribution, that is they decide what to do with the food that is already available, they have equal power with men in accessing food from any source and providing it to their household.

The baseline analysis further suggests a relationship between the gender of the household member that decides the income from the main farming activities and the number of plants listed by each of the genders in the household. More specifically, the length of the women's list of plants was significantly higher (more plants mentioned) in the households where women decided what to do with the income from the farming activities ($p<0.1$). This indicates that women's decision-making is well linked with local knowledge and that if women have more decision-making power, their knowledge of local food plants will be more extensive (and vice versa).

3.13 Evaluation of coping strategies and possible solutions

The main coping strategy to fight food insecurity mentioned was the consumption of local food plants, as it was reported 22 times within the 23 FFS [Table 23]. However, in reality, local food plants played a very minor role, so this response may show that interviewees were aware of the potential of local food plants but were hardly applying this coping strategy. Hunting and fishing were mentioned next (18 times), while changes in household management were reported 16 times by the FFS participants. Casual labour and migration, together with a reliance on neighbours and family for food were mentioned equally 14 times within the 23 FFS. Consumption of stored and processed foods was reported 12 times by the FFS participants, while renting or selling assets (7%), and gardening or improving farming methods (3%) are answers mentioned by less than 10% of the total number of answers. It should also be noted that most of these coping strategies are not of an agricultural nature. This might be an artefact of the way the question was asked to the FFS participants.

Table 23. *Main strategies mentioned to cope with the scarcity season and their severity as reported by the FFS participants*

Coping strategies	Number of answers	Percentage of total answers	Details and examples
Consumption of local/wild plants	22	21%	Going to look for fruits in the bush, gather wild food, feeding on wild fruits and greens, eating NUS,
Hunting/fishing	18	17%	
Changes in household management/relations	16	15%	Sending away relatives, giving girls to rich men, sending children to relatives
Casual labour or migration for work	14	13%	Working in other farmers gardens or homes in exchange for food or some money
Relying on neighbours and family for food/money	14	13%	Borrowing food or money from neighbours
Consumption of stored or processed food	12	11%	In HH or silos and granaries, sometimes seed which should be for planting is eaten
Renting or selling farm and HH assets	7	7%	Land, livestock, home properties
Gardening or improving farming methods	3	3%	Getting involved in horticulture, planting of fast maturing local vegetable food plants, irrigation
Total	**106**	**100%**	

** The details and examples are taken directly from the FFS diagnostic reports. The way the question was asked allowed FFS to give more than one open responses. During data analysis, the responses were then grouped into categories. The percentages are calculated over the total number of responses (N=106) collected from the 23 participating FFS.*

Malnutrition is often associated with food scarcity and focuses on the particular consequences of the latter. The most popular counter strategies to combat malnutrition according to FFS participants were the sowing of local food plants (21%) and their promotion in seed and food fairs (21%) [Table 24]. Food preparation and cooking demonstrations were reported as possible solutions 36 times by the FFS participants. Seed storage and seed germination were also reported as possible coping strategies 23 and 22 times respectively within the 23 FFS. Food preservation, harvesting of local food plants, school gardens and other activities were mentioned by less than 10% of the total number of responses. In light of the limited share of local food plants in the local diets, many of these responses may have provided options rather than existing practices.

Table 24. *Possible solutions to malnutrition by farmers*

Solutions	Number of answers	Percentage of answers	Related research objective
Sowing local food plants	42	21%	Restore, preserve and store the seeds of the local food plants both wild and domesticated; sow and store local food plants for future use during scarcity; seed multiplication
Seed fairs and food fairs	41	21%	To interest the current generation on utilisation of local food plants; promote experience sharing with elderly people on preparation and preservation methods
Food preparation and cooking demonstrations	36	18%	To learn, know and promote consumption of local food plants at household level; to explore other preparation (cooking) alternatives to improve consumption and use of local food plants
Seed storage	23	12%	To explore seed storage methods
Seed germination and breaking seed dormancy	22	11%	To explore germination rates after different seed treatments
Food preservation	11	6%	To explore other preservation methods for local food plants to improve its availability during scarcity or dry spell
Harvesting wild food plants	10	5%	
Creating school gardens	7	4%	
Other activities	5	3%	Domestication and improving taste; propagation practice
Total	**197**	**100%**	

** The details and examples are taken directly from the FFS diagnostic reports. The way the question was asked allowed FFS to give more than one open responses. During data analysis, the responses were then grouped into categories. The percentages are calculated over the total number of responses (N=197) collected from the 23 participating FFS. Other activities category includes answers like the creation of home gardens, selling and storing local food plants.*

3.14 Preferred ways to promote the use of local food plants by local communities

Radio is the channel by which most households obtain information (25%), and these are also most preferred (29%) [Table 25]. Health facilities and community health services are the next sources of information that are being used and acknowledged by the responding households. It is important to notice that no reference is made to extension services and that agriculture-related information sources are only preferred by 10% of the interviewed households. This suggests that support to cope with food scarcity and dietary needs is better received when obtained from radio or health providers than from other sources.

Table 25. *Current and preferred sources of information*

Sources of information	Current sources		Preferred sources	
	N	% Hhs	N	% Hhs
Neighbour	103	7%	84	7%
Health facilities	253	17%	231	18%
Community health	271	18%	264	21%
Support group, farmer group, FFS	165	11%	126	10%
NGOs	120	8%	58	5%
Radio	376	25%	364	29%
School children	37	3%	30	2%
TV	9	1%	6	1%
Pamphlet	15	1%	6	1%
Cell phone	41	3%	38	3%
Other	95	6%	66	5%

* The results come out the first round of baseline household survey, in which 644 household participated and 68 values were missing from *Current sources* (N=576) and 67 values were missing from *Preferred sources* (N=577). The questions were asked in a way that allowed households to provide multiple responses. Percentages reflect the number of households that mentioned the source of information, divided by the valid number of households that responded the question, excluding missing values.

4 Conclusions

The study sheds light on the intricate dynamics of households in the surveyed area, revealing a multifaceted picture of agricultural practices, economic activities, and nutritional challenges. A notable majority of households are actively engaged in both crop cultivation (over 60%) and livestock ownership (more than 30%), demonstrating a diversified approach to agriculture. This is further underscored by the fact that over 70% of these households own the land they cultivate, indicating a level of stability and commitment to farming.

The prevalence of home gardening among 85% of households underscores a commitment to supplementing their food sources. The cultivation of an average of seven different crops per year reflects a rich agricultural landscape. Despite this diversity, the study highlights that on average 60% of the household harvest is sold, indicating a significant market orientation among the surveyed households.

However, amidst these agricultural achievements, nutritional challenges persist. Factors such as poverty, limited access to land and food, and a lack of knowledge about local food plants emerge as critical determinants affecting the nutritional status of households. Moreover, the influence of globalization and Westernized eating habits is shaping dietary choices in the community.

An intriguing finding is that, despite the presence of knowledge regarding local food plants, their contribution to combating food and nutrition insecurity appears limited. Less than half of the species grown can be classified as local food plants, raising questions about their actual impact on the local diet, particularly during scarcity periods.

Gender-wise, the study reveals similarities in knowledge about local food plants, indicating a shared understanding within the community. Additionally, the seasonal variability in the harvest, with fewer species reported during scarcity seasons, suggests the influence of climatic factors on agricultural yields.

In conclusion, while the surveyed households exhibit commendable agricultural diversity and economic adaptability, it is imperative to underscore the pivotal role that local food plants can play in enhancing nutrition security, especially during scarcity seasons. Despite facing challenges such as poverty and changing dietary habits, a strategic emphasis on promoting and incorporating local food plants into agricultural practices could be a key factor in addressing nutritional gaps. A comprehensive approach that integrates economic development, nutritional education, and sustainable farming practices, with a specific focus on maximizing the impact of local food plants, is crucial for ensuring the well-being and resilience of the community in the face of nutritional challenges.

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6 ANNEX 1. KNOWLEDGE OF LOCAL FOOD PLANTS

			Freelistings						Food Scarcity					
Food plant	English name	Scientific name	Total number (men + women)		Number of men		Number of women		% of men that indicated traffic light:			% of women that indicated traffic light:			% of hh that indicated traffic light:	
						green	amber	red	green	amber	red	green	amber	red
ababanga			2	1	1	0%	0%	100%	100%	0%	0%			
abakeke			1	0	1	0%	0%	0%	100%	0%	0%			
abamia			1	1	0	100%	0%	0%	0%	0%	0%			
aboga	Spleen Amarantha	Amaranthus odubius										17%	83%	0%
abololo												0%	100%	0%
abura			1	0	1	0%	0%	0%	0%	0%	100%			
acawoi			16	5	11	40%	40%	20%	91%	0%	9%	0%	0%	100%
acoga			22	13	9	23%	38%	23%	67%	22%	0%			
acululu			2	1	1	0%	0%	100%	100%	0%	0%			
acwe wang gweno			8	5	3	0%	20%	80%	0%	0%	100%	0%	0%	100%
adibakong			1	1	0	0%	0%	0%	0%	0%	0%			
aduka			1	1	0	0%	0%	100%	0%	0%	0%			
aedo												50%	0%	50%
afuku			1	0	1	0%	0%	0%	0%	0%	100%			
aimuria			1	1	0	0%	100%	0%	0%	0%	0%			
ajur												0%	50%	50%
akeyo	Spider plant	Cleome gynandra,	81	31	50	42%	42%	10%	68%	24%	0%	24%	35%	6%
akima			2	0	2	0%	0%	0%	0%	100%	0%			
akingo adiga												0%	0%	100%
akit emiria			7	1	6	0%	0%	0%	0%	50%	17%			
akobokob	Canary melon	cucurbitceae	11	3	8	0%	33%	67%	0%	63%	38%	17%	67%	17%
akokwa			1	0	1	0%	0%	0%	0%	100%	0%			
akolili	Canary melon	cucurbitceae	4	3	1	33%	67%	0%	100%	0%	0%			
akongo amor			1	1	0	0%	0%	100%	0%	0%	0%	0%	0%	100%

			Freelistings						Food Scarcity					
Food plant	English name	Scientific name	Total number (men + women)		Number of men		Number of women		% of men that indicated traffic light:			% of women that indicated traffic light:			% of hh that indicated traffic light:	
						green	amber	red	green	amber	red	green	amber	red
akuka			1	0	1	0%	0%	0%	0%	0%	100%			
akungur			1	0	1	0%	0%	0%	0%	100%	0%			
akwalakwala			1	0	1	0%	0%	0%	0%	0%	100%			
akwar												0%	0%	100%
alamai	False sandalwood	olacaceae	1	1	0	0%	100%	0%	0%	0%	0%			
alayu			28	11	17	27%	45%	27%	41%	29%	29%	10%	30%	60%
alilot												0%	20%	80%
aliyoli			1	1	0	0%	100%	0%	0%	0%	0%			
alodi			4	2	2	0%	0%	100%	0%	0%	100%			
alungu			1	1	0	0%	100%	0%	0%	0%	0%			
alwaro			32	11	21	91%	0%	0%	81%	10%	0%	40%	40%	20%
amado munu			3	0	3	0%	0%	0%	33%	67%	0%			
ambalaka			1	0	1	0%	0%	0%	0%	0%	100%			
aminataka			1	0	1	0%	0%	0%	0%	0%	100%			
amola			20	12	8	0%	8%	92%	25%	38%	38%	0%	0%	100%
amul			6	2	4	50%	50%	0%	25%	75%	0%			
angurunya			3	1	2	100%	0%	0%	100%	0%	0%	100%	0%	0%
anvara			1	0	1	0%	0%	0%	0%	0%	100%			
apple	apple		3	1	2	100%	0%	0%	50%	50%	0%			
apuiku			1	1	0	0%	0%	0%	0%	0%	0%			
apurukur			4	1	3	0%	0%	100%	0%	67%	33%	0%	0%	100%
arum			1	0	1	0%	0%	0%	0%	0%	100%			
arwarwa			1	1	0	100%	0%	0%	0%	0%	0%			
asululu			1	1	0	100%	0%	0%	0%	0%	0%			
asuza			1	0	1	0%	0%	0%	100%	0%	0%			
atap												100%	0%	0%
atapa												0%	50%	50%
atigo												100%	0%	0%

			Freelistings						Food Scarcity					
Food plant	English name	Scientific name	Total number (men + women)		Number of men		Number of women		% of men that indicated traffic light:		% of women that indicated traffic light:		% of hh that indicated traffic light:	
						green	amber	red	green	amber	red	green	amber	red
avocado	avocado		34	21	13	33%	10%	0%	92%	8%	0%	50%	50%	0%
awa			1	0	1	0%	0%	0%	0%	100%	0%			
ayuu			6	4	2	25%	0%	75%	0%	50%	50%	25%	0%	75%
ayuyu			3	1	2	0%	0%	100%	0%	0%	100%	0%	100%	0%
bambara nut	bambara nut		39	27	12	37%	56%	7%	92%	8%	0%			
banana	banana		104	53	51	64%	30%	2%	69%	22%	10%	35%	53%	12%
bean	bean		282	140	142	87%	9%	4%	85%	11%	4%	55%	35%	10%
binjara			2	0	2	0%	0%	0%	100%	0%	0%			
black berries	black berries		1	0	1	0%	0%	0%	0%	0%	100%			
blackjack	blackjack		1	0	1	0%	0%	0%	0%	100%	0%			
brother heart			23	11	12	55%	27%	9%	83%	8%	8%	100%	0%	0%
cabbage	cabbage		83	37	46	51%	46%	3%	59%	28%	11%	59%	32%	9%
cala			1	0	1	0%	0%	0%	0%	0%	100%			
carrot	carrot		6	4	2	50%	50%	0%	0%	50%	50%	0%	100%	0%
cashew nut	cashew nut		1	0	1	0%	0%	0%	0%	0%	100%			
cassava	cassava		349	170	179	86%	10%	4%	81%	9%	8%	56%	34%	10%
cele												0%	0%	100%
chombe			2	1	1	0%	0%	100%	100%	0%	0%			
coconut	coconut		3	0	3	0%	0%	0%	100%	0%	0%			
coroko	Green gram/ Mungbean	Vagna radiata	48	2	46	0%	50%	50%	30%	57%	11%	57%	38%	5%
cowpea	cowpea		266	108	158	71%	17%	12%	66%	18%	11%	35%	34%	30%
cui cui			4	0	4	0%	0%	0%	100%	0%	0%			
dakamuro												0%	0%	100%
dodo	Amaranth	Amaranthus spp	90	33	57	52%	33%	9%	77%	12%	4%	49%	21%	28%
ebale			9	9	0	11%	78%	11%	0%	0%	0%			
ebelekuma			7	7	0	86%	0%	14%	0%	0%	0%			
ebisali			10	0	10	0%	0%	0%	0%	0%	100%			
eboga			16	6	10	50%	33%	0%	60%	30%	0%	0%	100%	0%

			Freelistings						Food Scarcity					
Food plant	English name	Scientific name	Total number (men + women)		Number of men		Number of women		% of men that indicated traffic light:			% of women that indicated traffic light:			% of hh that indicated traffic light:	
						green	amber	red	green	amber	red	green	amber	red
ecadoi	African spider plant	Cleome gynandra,	86	48	38	46%	27%	15%	45%	42%	11%	19%	45%	35%
ecataula												100%	0%	0%
ecodokokor			12	9	3	0%	33%	0%	33%	33%	33%	0%	0%	100%
ecok kulu												0%	0%	100%
ecomai	Desert date	Balanitacia	7	1	6	100%	0%	0%	17%	83%	0%	40%	20%	40%
ecoroko	Green gram peas		13	6	7	50%	50%	0%	71%	29%	0%	40%	50%	10%
ecototo			9	3	6	67%	33%	0%	0%	100%	0%			
edek												100%	0%	0%
ediol			1	0	1	0%	0%	0%	0%	0%	100%			
edioli												0%	0%	100%
eduro			1	0	1	0%	0%	0%	0%	0%	100%			
eedo			11	3	8	0%	33%	33%	0%	75%	13%	50%	0%	50%
eggplant	eggplant		117	55	62	58%	31%	9%	50%	40%	6%	20%	51%	29%
egwanyira			35	22	13	55%	5%	14%	38%	46%	8%	0%	50%	0%
eitu												100%	0%	0%
ekoropot			4	1	3	0%	0%	100%	0%	33%	33%	0%	0%	100%
emagira			13	1	12	0%	100%	0%	17%	0%	83%	14%	29%	57%
emaido			4	1	3	100%	0%	0%	33%	67%	0%			
emalakula			1	1	0	0%	100%	0%	0%	0%	0%			
emapera												100%	0%	0%
ematuda												100%	0%	0%
emena												100%	0%	0%
emolodok												0%	50%	50%
emoros	Bush grap	Cissus Adenocaulis(cypho stemma-Adenocaulis	27	6	21	33%	17%	33%	38%	38%	14%	29%	29%	43%
emulukuju												0%	0%	83%
endre			5	3	2	100%	0%	0%	100%	0%	0%			

			Freelistings						Food Scarcity					
Food plant	English name	Scientific name	Total number (men + women)		Number of men		Number of women		% of men that indicated traffic light:		% of women that indicated traffic light:		% of hh that indicated traffic light:	
						green	amber	red	green	amber	red	green	amber	red
engwanyira												100%	0%	0%
entula			22	9	13	89%	11%	0%	23%	38%	31%	0%	40%	60%
enuga			3	0	3	0%	0%	0%	0%	0%	100%			
enyanya	Tomato	Solanum lycopersicum	31	15	16	27%	60%	13%	75%	6%	0%	75%	0%	0%
epalakolong												0%	100%	0%
epena			10	0	10	0%	0%	0%	0%	0%	100%			
eputon			1	0	1	0%	0%	0%	0%	0%	100%	0%	0%	100%
erinyot			5	1	4	0%	0%	100%	0%	25%	50%	0%	13%	87%
esalameje			1	0	1	0%	0%	0%	100%	0%	0%			
esimato												0%	0%	100%
esukuma wiki			19	10	9	80%	10%	0%	89%	11%	0%			
esuswa												0%	0%	100%
etaget												0%	100%	0%
etigo	Jute Mallow, Okra local	Corchorus olitorius	32	19	13	53%	21%	0%	77%	8%	0%	47%	37%	13%
ewayo			3	2	1	100%	0%	0%	100%	0%	0%			
ewelu	Black plum	Vitex doniana	2	2	0	50%	0%	50%	0%	0%	0%			
fig tree eggs			3	2	1	100%	0%	0%	100%	0%	0%			
finger millet	finger millet		72	27	45	26%	59%	15%	38%	38%	22%	25%	50%	25%
formo			4	3	1	33%	67%	0%	0%	0%	100%			
giri			4	0	4	0%	0%	0%	100%	0%	0%	100%	0%	0%
goi			16	6	10	83%	0%	17%	60%	20%	20%	50%	0%	0%
green gram	green gram		26	10	16	0%	80%	20%	31%	0%	69%	0%	50%	50%
green vegetables	green vegetables		7	0	7	0%	0%	0%	71%	29%	0%	70%	20%	10%
greens	greens											71%	21%	7%
groundnut	groundnut		173	83	90	80%	19%	1%	89%	11%	0%	62%	31%	8%
guava	guava		35	20	15	65%	30%	5%	67%	33%	0%			
guli			4	0	4	0%	0%	0%	25%	50%	25%			

			Freelistings						Food Scarcity					
Food plant	English name	Scientific name	Total number (men + women)		Number of men		Number of women		% of men that indicated traffic light:		% of women that indicated traffic light:		% of hh that indicated traffic light:	
						green	amber	red	green	amber	red	green	amber	red
gwanya			24	9	15	33%	11%	22%	20%	60%	13%	6%	47%	41%
ikanyum			1	1	0	100%	0%	0%	0%	0%	0%			
ikorom												0%	0%	100%
imare	Cow peas	Vagnum unguiculata	59	34	25	38%	32%	15%	32%	32%	32%	33%	50%	17%
imumwa												33%	67%	0%
isuku			3	0	3	0%	0%	0%	100%	0%	0%			
jackfruit			50	27	23	56%	33%	7%	39%	52%	4%	100%	0%	0%
jobyo			1	1	0	100%	0%	0%	0%	0%	0%			
kahali			8	8	0	13%	13%	75%	0%	0%	0%			
kalabi			8	1	7	100%	0%	0%	43%	29%	29%	0%	100%	0%
kamula												0%	100%	0%
keruja			1	1	0	100%	0%	0%	0%	0%	0%			
kilimikuka			24	10	14	40%	40%	20%	29%	43%	29%	0%	100%	0%
kobokobo												0%	100%	0%
koda												0%	100%	0%
kulanga mundu			1	0	1	0%	0%	0%	0%	0%	100%			
kuruja			1	0	1	0%	0%	0%	0%	0%	100%			
laduru			2	0	2	0%	0%	0%	0%	0%	100%			
lagwec												0%	0%	100%
lakilikili			1	0	1	0%	0%	0%	0%	0%	100%			
lala			46	20	26	35%	30%	20%	23%	27%	31%	23%	23%	8%
lalar												0%	0%	100%
lapena			9	5	4	0%	60%	40%	0%	75%	25%	0%	0%	100%
lawacawaca			1	0	1	0%	0%	0%	0%	0%	100%			
lawija			13	8	5	13%	13%	50%	20%	40%	40%	0%	22%	78%
ledu			4	1	3	0%	0%	100%	33%	33%	33%			
lemon	lemon		8	6	2	67%	33%	0%	100%	0%	0%	100%	0%	0%
lemon grass	lemon grass		1	0	1	0%	0%	0%	100%	0%	0%			

			Freelistings						Food Scarcity					
Food plant	English name	Scientific name	Total number (men + women)		Number of men		Number of women		% of men that indicated traffic light:			% of women that indicated traffic light:			% of hh that indicated traffic light:	
						green	amber	red	green	amber	red	green	amber	red
lojoko												0%	0%	100%
lugba			1	0	1	0%	0%	0%	0%	0%	100%			
lugwiri			1	0	1	0%	0%	0%	0%	100%	0%			
lura			1	0	1	0%	0%	0%	0%	0%	100%			
magala												0%	0%	100%
maize	maize		233	121	112	79%	17%	3%	74%	13%	13%	57%	34%	9%
malakwang	Hibiscus	Hibiscus sabdariffa or malvaceae	189	73	116	45%	32%	15%	51%	24%	13%	27%	28%	39%
malugu			7	3	4	0%	67%	0%	75%	0%	25%	33%	33%	33%
mamuna			1	1	0	100%	0%	0%	0%	0%	0%			
mango	mango		56	30	26	67%	30%	3%	77%	19%	0%	70%	10%	20%
maole			6	2	4	100%	0%	0%	25%	50%	25%			
mathegunda			4	2	2	50%	0%	0%	100%	0%	0%			
matooke												60%	40%	20%
mayo			1	0	1	0%	0%	0%	0%	0%	100%			
mbgambga			1	1	0	100%	0%	0%	0%	0%	0%			
millet	millet		147	71	76	59%	30%	11%	57%	30%	12%	24%	55%	21%
moringa			1	0	1	0%	0%	0%	0%	0%	100%	0%	0%	100%
muchicha			2	1	1	100%	0%	0%	100%	0%	0%	100%	0%	0%
murundu			1	1	0	0%	0%	100%	0%	0%	0%			
nakati			9	3	6	67%	33%	0%	67%	17%	0%	0%	0%	50%
narya			3	0	3	0%	0%	0%	100%	0%	0%			
ndera			6	2	4	0%	100%	0%	25%	75%	0%			
nefle			1	1	0	100%	0%	0%	0%	0%	0%			
neyel			2	0	2	0%	0%	0%	100%	0%	0%			
ngor			3	0	3	0%	0%	0%	33%	67%	0%			
nugei			1	1	0	0%	0%	100%	0%	0%	0%			
nunga			1	1	0	100%	0%	0%	0%	0%	0%			
nyalang			1	1	0	100%	0%	0%	0%	0%	0%			

			Freelistings						Food Scarcity					
Food plant	English name	Scientific name	Total number (men + women)		Number of men		Number of women		% of men that indicated traffic light:			% of women that indicated traffic light:			% of hh that indicated traffic light:	
						green	amber	red	green	amber	red	green	amber	red
obito lum												100%	0%	0%
obogye			3	3	0	0%	0%	100%	0%	0%	0%			
obokokwee			23	10	13	40%	0%	60%	46%	15%	15%	0%	33%	33%
obololo			16	8	8	25%	50%	0%	13%	50%	38%			
obougje												0%	0%	100%
obuga	Amaranth	Amaranthus spp	30	12	18	83%	8%	8%	89%	11%	0%	40%	0%	60%
obwewingo			1	1	0	0%	0%	100%	0%	0%	0%			
ocao			1	1	0	0%	0%	100%	0%	0%	0%			
oceyo			17	12	5	42%	25%	33%	0%	80%	20%	0%	100%	0%
ochoboro			1	0	1	0%	0%	0%	0%	0%	100%	0%	0%	100%
oci			1	0	1	0%	0%	0%	0%	0%	100%			
ocuga	Black night plant	Solanum nigram	28	12	16	17%	42%	42%	6%	56%	38%	0%	0%	100%
ocwiji			1	0	1	0%	0%	0%	0%	100%	0%			
odeyo			1	0	1	0%	0%	0%	100%	0%	0%			
odipaikong			5	3	2	0%	0%	100%	0%	0%	100%	0%	20%	80%
odwe												0%	0%	90%
odwonga			1	0	1	0%	0%	0%	0%	100%	0%			
okoda			2	1	1	0%	0%	100%	0%	0%	100%	0%	0%	100%
okra	okra		46	12	34	33%	42%	25%	50%	35%	12%	20%	27%	50%
okra bush												0%	0%	100%
okuku			2	0	2	0%	0%	0%	0%	50%	50%			
okwe			2	1	1	0%	0%	100%	0%	0%	100%	0%	50%	50%
okwoko			2	1	1	0%	0%	100%	0%	0%	100%			
olam			3	3	0	33%	33%	33%	0%	0%	0%			
olemo			25	17	8	35%	35%	12%	38%	50%	13%	0%	100%	0%
olilimo			1	0	1	0%	0%	0%	0%	0%	100%			
olok			2	0	2	0%	0%	0%	50%	0%	50%	0%	100%	0%
ombira			1	1	0	0%	0%	100%	0%	0%	0%			

			Freelistings						Food Scarcity					
Food plant	English name	Scientific name	Total number (men + women)		Number of men		Number of women		% of men that indicated traffic light:		% of women that indicated traffic light:		% of hh that indicated traffic light:	
						green	amber	red	green	amber	red	green	amber	red
omolodok												0%	0%	100%
onguk			5	2	3	50%	0%	50%	33%	33%	0%	0%	0%	100%
onion	onion		30	17	13	82%	12%	6%	100%	0%	0%			
ooko			4	1	3	0%	0%	100%	0%	67%	33%			
opele			1	0	1	0%	0%	0%	100%	0%	0%			
opelo			10	5	5	20%	40%	40%	40%	20%	40%	0%	33%	67%
opopo			2	2	0	0%	0%	50%	0%	0%	0%			
opuka			9	3	6	33%	0%	0%	17%	0%	0%	0%	11%	11%
orange	orange		46	24	22	67%	21%	13%	86%	9%	5%	100%	0%	0%
orobi			25	13	12	69%	23%	8%	100%	0%	0%	79%	11%	13%
oruju			4	0	4	0%	0%	0%	25%	50%	25%			
oruru			18	11	7	36%	64%	0%	43%	43%	14%	0%	100%	0%
orwecho			1	0	1	0%	0%	0%	0%	0%	100%			
osiga			26	6	20	100%	0%	0%	85%	10%	0%	50%	0%	50%
osoi			21	10	11	20%	40%	10%	64%	18%	18%			
osondi			1	1	0	100%	0%	0%	0%	0%	0%			
osungina			7	2	5	100%	0%	0%	60%	20%	0%			
othigo	Jute Mallow	Corchorus olitorius	40	8	32	75%	0%	13%	72%	9%	3%	36%	18%	9%
ovacado			9	4	5	50%	0%	50%	60%	20%	20%			
owello black			4	4	0	0%	50%	0%	0%	0%	0%			
oweto			1	0	1	0%	0%	0%	0%	0%	100%			
oyado												0%	0%	94%
oyedo	Perennial peanut	Arachis glabrata.	38	11	27	0%	73%	0%	19%	44%	15%	20%	50%	20%
oyellu	Black plum	Vitex doniana	36	25	11	32%	32%	20%	64%	27%	9%	0%	100%	0%
oyera			1	1	0	0%	100%	0%	0%	0%	0%			
palm tree			4	2	2	50%	0%	50%	50%	0%	50%			
pandi			9	5	4	20%	40%	20%	0%	75%	25%			
passion fruit	passion fruit		28	18	10	56%	44%	0%	30%	60%	10%			

			Freelistings						Food Scarcity					
Food plant	English name	Scientific name	Total number (men + women)		Number of men		Number of women		% of men that indicated traffic light:			% of women that indicated traffic light:			% of hh that indicated traffic light:	
						green	amber	red	green	amber	red	green	amber	red
pawpaw	papaya		51	21	30	57%	38%	5%	70%	13%	17%	38%	8%	54%
pedo wi akuli												0%	0%	100%
pepper green	pepper green		5	3	2	33%	67%	0%	50%	50%	0%			
pepper red	pepper red		14	4	10	75%	0%	25%	0%	30%	30%	22%	0%	67%
pigeon pea	pigeon pea		135	65	70	60%	38%	2%	54%	43%	3%	32%	50%	18%
pineapple	pineapple		21	5	16	80%	0%	20%	6%	81%	6%			
pomu			1	0	1	0%	0%	0%	0%	0%	100%			
posho												0%	100%	0%
potalira			1	0	1	0%	0%	0%	0%	100%	0%			
potato	potato		27	15	12	73%	13%	13%	58%	25%	17%	19%	13%	69%
pule-muno			4	2	2	100%	0%	0%	100%	0%	0%			
pumpkin			124	47	77	55%	30%	11%	57%	23%	14%	50%	18%	28%
ratang			1	1	0	0%	100%	0%	0%	0%	0%			
rice	rice		80	45	35	42%	47%	11%	63%	26%	11%	30%	60%	10%
shear nut	Shea tree	Vitellaria paradoxa/ sapotaceae	39	16	23	19%	19%	63%	13%	30%	52%	0%	33%	0%
siga			1	0	1	0%	0%	0%	0%	0%	0%			
simsim			175	82	93	63%	30%	4%	61%	25%	12%	44%	56%	0%
skumawiki			17	4	13	50%	50%	0%	69%	23%	8%	50%	17%	33%
sorghum	sorghum		238	121	117	50%	34%	17%	57%	20%	21%	24%	44%	32%
sorogo	Green gram/ Mungbean	Vagna radiata	44	42	2	52%	40%	7%	100%	0%	0%	100%	0%	0%
soyabean	soyabean		85	49	36	55%	35%	10%	42%	36%	22%	50%	0%	50%
sugar cane	sugar cane		3	2	1	100%	0%	0%	100%	0%	0%			
sugarcane	sugarcane		3	2	1	50%	50%	0%	100%	0%	0%	0%	100%	0%
sukumawiki			5	3	2	67%	33%	0%	100%	0%	0%	0%	0%	0%
sunflower	sunflower		26	12	14	50%	17%	25%	64%	21%	14%			
sungu			2	1	1	0%	100%	0%	100%	0%	0%			

			Freelistings						Food Scarcity					
Food plant	English name	Scientific name	Total number (men + women)		Number of men		Number of women		% of men that indicated traffic light:			% of women that indicated traffic light:			% of hh that indicated traffic light:	
						green	amber	red	green	amber	red	green	amber	red
sweet potato	sweet potato		249	110	139	77%	15%	6%	76%	18%	4%	41%	39%	19%
tamarind	tamarind		22	7	15	57%	29%	14%	7%	7%	80%			
tamarine			1	0	1	0%	0%	0%	0%	100%	0%			
thambulungwal			7	4	3	25%	75%	0%	33%	33%	33%	0%	100%	0%
thundah			1	1	0	100%	0%	0%	0%	0%	0%			
tingili			3	1	2	100%	0%	0%	0%	50%	50%			
toki			3	0	3	0%	0%	0%	33%	0%	33%			
tomato	tomato		53	28	25	86%	7%	7%	96%	4%	0%	47%	21%	32%
torgi												0%	0%	50%
tula			9	5	4	60%	40%	0%	100%	0%	0%	33%	56%	0%
uba			1	0	1	0%	0%	0%	0%	0%	100%			
udu			1	0	1	0%	0%	0%	0%	0%	100%			
ukuju			2	1	1	0%	100%	0%	0%	100%	0%			
uleku												50%	50%	0%
vegetables	vegetables		3	0	3	0%	0%	0%	67%	33%	0%	100%	0%	0%
watermelon	watermelon		18	10	8	50%	50%	0%	50%	25%	25%			
wheat	wheat		1	1	0	0%	0%	100%	0%	0%	0%			
yam	Cocoyam	Xanthosoma sagittifolium	117	55	62	47%	36%	15%	37%	35%	26%	21%	55%	24%
yao			2	2	0	50%	0%	50%	0%	0%	0%			
zambarou			1	1	0	100%	0%	0%	0%	0%	0%			

**The table presents the results of the 'free listing' module, and the 'plants in food scarcity' module of the baseline analysis; In total, 364 men and 410 women out of 644 participating households, responded to the 'free listing' module and listed 181 (men) and 208 (women) species; Regarding the 'plants in food scarcity' module, out of the 644 households, 70 were missing and 574 did actually participate and listed a total of 155 species; Colour visualization: Green= used in affluent period, Amber= used in moderate food scarcity period, Red= used during severe food scarcity period.*