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Participatory Impact Assessment of World Vision Emergency Seed Intervention in Adjumani District, Northern Uganda

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Activity Title:	Feed the Future Global Supporting Seed Systems for Development activity
Activity start date and end date:	Aug 24, 2018 – Aug 23, 2023
Cooperative agreement number:	7200AA18LE00004
Document title:	Participatory Impact Assessment of World Vision Emergency Seed Intervention in Adjumani District, Northern Uganda
Publication date:	March 2023
Citation:	Longley, C., Suji, O., Tindiwensi, C., Adriko, J. and Walters, E., (2023). Participatory Impact Assessment of World Vision Emergency Seed Intervention in Adjumani District, Northern Uganda. A Feed the Future Global Supporting Seed Systems for Development activity (S34D) report.
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Activity Goal:	Improved functioning of the high-impact integrated seed systems
Language of document:	English
Submitted on behalf of:	Catholic Relief Services
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Cover page photo credit: Kate Longley, CRS

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This report was made possible by the generous support from the American people through the U.S. Government's Feed the Future Initiative and the United States Agency for International Development through Cooperative Agreement 7200AA18LE00004. The contents are the responsibility of Catholic Relief Services and do not necessarily reflect the views of USAID or the United States Government.

Feed the Future Consortium Partners in the Feed the Future Global Supporting Seed Systems for Development activity:

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Acknowledgements

We would like to thank World Vision (WV) Uganda for their partnership in this assessment. Special appreciation goes to Noel Anzo Alabi for his excellent coordination throughout the process, and to Richard Mulandi for initially expressing an interest in the assessment. We are particularly grateful to Jesca Alanyo and Kizitous Apangu and their colleagues who helped to plan the fieldwork and provided invaluable support to the data collection process. Thanks to Paul Mwirichia and Tony Ojok for their insights into World Vision's broader experiences and challenges, and to Richard Anjeliko, Innocent Otim, Noel and Kizitous for their feedback on the preliminary findings. We also thank Noel and Sibonginkosi Mungosi for their insightful comments on the draft report. We wish to thank our Fieldwork Assistants, Jesus Anyovi, Stephen Kirabo, Nadia Manzubo and Lilian Mazira, who worked diligently and energetically throughout. For logistical and administrative support, we are grateful to the CRS Kampala office, particularly our drivers, Issa Byamukama and Aggrey Ibanda. The team thanks the many people who patiently shared their knowledge, experience and insights with us, most especially the farmers and community leaders, traders, agro-dealers, District and sub-county officers, and OPM staff throughout Adjumani District. Any unintentional errors or misrepresentations remain the responsibility of the report authors.

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Acronyms

CRS	Catholic Relief Services
DAO	District Agricultural Office
DFA	District Farmers Association
DRC	Democratic Republic of Congo
FAO	Food and Agriculture Organization of the United Nations
FFS	Farmer Field School
FGD	Focus Group Discussion
FSNA	Food Security and Nutrition Assessment
FSP	Farmer Seed Producer
ISSD	Integrated Seed and Sector Development (Uganda)
KII	Key Informant Interview
LSB	Local Seed Business
LWF	Lutheran World Federation
MBA	Masters of Business Administration
MoH	Ministry of Health
NAADS	National Agricultural Advisory Services
NARO	National Agricultural Research Organization
NGO	Non-governmental Organization
NURI	Northern Uganda Resilience Initiative
OPM	Office of the Prime Minister
OWC	Operation Wealth Creation
PIA	Participatory Impact Assessment
PRELNOR	Project for the Restoration of Livelihoods in the Northern Region
PRM	Bureau of Population, Refugees, and Migration (USAID)
QDS	Quality Declared Seed
RWC	Refugee Welfare Council
RQ	Research Question
S34D	Feed the Future Global Supporting Seed Systems for Development activity
UNDP	United Nations Development Program
UNHCR	United Nations High Commission for Refugees
USAID	United States Agency for International Development
VSLA	Village Saving and Loan Association
WV	World Vision

Executive Summary

Introduction

This report presents the findings of a participatory impact assessment (PIA) of emergency seed interventions implemented by World Vision (WV) in Adjumani District, northern Uganda. The assessment was designed and carried out by the Feed the Future Global Supporting Seed Systems for Development (S34D) activity, led by CRS. S34D is funded by the Feed the Future Initiative through the Bureau for Resilience and Food Security (RFS) and by USAID through the Bureau for Humanitarian Assistance (BHA). The aim of the assessment was to generate evidence on the impacts of selected emergency seed interventions on community beneficiaries and on local seed systems. Such evidence is currently lacking and is needed to inform and improve future humanitarian and development work.

Context

Adjumani District has been hosting refugees since 1990 and has a refugee population of 245,289 (April 2022), of whom over 80% are women and children (under 18 years)[1]. Almost all the refugees come from South Sudan and constitute over 50% of the total population of Adjumani District. On arrival, each refugee household is usually allocated a small plot of land in one of 19 refugee settlements, but the plot size (either 50mx50m or 30mx 30m) is too small to produce sufficient food for the household without additional food aid. The area has limited opportunities for alternative income generating activities beyond farming.

Although South Sudan is a strongly patriarchal society in which women and young people (men and women aged 18 to 35 years) are largely excluded from decision-making, the experience of displacement has impacted the gender and power dynamics among both refugee and host communities. The majority of refugee households are headed by women, and aid agencies tend to prioritize women over men as aid recipients. Previous expectations and roles for women and men are still evolving, often leading to increased tensions and violence within families and between hosts and refugees, but also creating new opportunities, especially for women.

The seed intervention that formed the focus of the assessment was implemented through the Improved Self Reliance and Livelihoods Project, funded by WV-Australia. The project aimed to rebuild sustainable livelihoods for refugees in Maaji II, Maaji III and Mungula II settlements and for the surrounding host communities in Itirikwa and Ukusijoni sub-counties. Under the first phase of the project (2019-21), farmer groups received agronomic training and vegetable seeds to establish kitchen gardens. Under the second phase (2021-22), the project negotiated access to land in the form of 'block farms', and seeds of maize, beans, rice, soyabean and groundnut were provided through direct distribution along with training in good agronomic practices.

Methodology

Data collection was purely qualitative, comprising 12 focus group discussions (FGDs) with farmer group members (70% women) and 22 key informant interviews with district-level officials, registered agro-input dealers, various officials in the refugee settlements, Local Seed Businesses, and officials at the Sub-County level (42% women). Each of the three refugee settlements and the two sub-counties targeted by the project were visited by the assessment team, where information was collected from a total of 11 WV-supported farmer groups. The specific groups visited by the assessment team were selected by WV staff to ensure a

[1] The total refugee population includes 53% women and 47% men. Children aged under 18 constitute 63% of the total population with a roughly even gender breakdown. The adult population (aged 18 or over) constitutes 37% of the population (22% women, 15% men). The total proportion of youth (aged 15-24 years) is 26%.

balance between refugee groups, host groups, and mixed refugee / host groups that had received seed support in 2021. Participatory impact assessment (PIA) tools (historical timelines, before and after scoring, proportional piling, and seasonal calendars) were used across six focus group discussions to determine the impacts of the seed interventions on crop production, household food security, and livelihoods. An additional six focus group discussions (without PIA tools) were carried out in the same communities to understand the effects of the emergency seed interventions on community seed management practices, including changes in the crops and varieties cultivated over time, and changes in the seed acquisition channels for different crops. The FGD participants included both women and men, including three discussion groups of female participants only.

Conclusions

The conclusions below provide answers to the research questions (in italics) that guided the assessment.

How have emergency seed interventions impacted on household food security of male and female refugee and host community smallholder farmers?

There was improved food security for both male and female refugee and host smallholder farmers, but the role of seed in contributing to this increase was relatively minor. Increased access to fertile land was the main reason for the increase in food security among refugee farmers, both male and female. Planting times, rainfall and climate change are key influencing factors on the productivity of seed. Anticipated increases in yield due to the use of improved varieties could not be attributed to the WV intervention, because many of the varieties provided by WV were already being cultivated by beneficiary farmers. Production decreased in the case of groundnuts due to the poor genetic quality of the seed provided.

How have emergency seed interventions impacted on the livelihoods (especially incomes) of male and female refugee and host community smallholder farmers?

Livelihood impacts were assessed according to changes in expenditure from the income from crop sales for the seeds provided. Based on this indicator, there was some evidence of increased investments in education, land and livestock by refugees, and an increase in financial investments by host and refugee men and women, especially in Village Saving and Loans Associations by women. However, the level of increases in these investments was relatively small and was not accompanied by reduced expenditure on food, as might have been expected.

How have emergency seed interventions impacted on male and female refugee and host seed management practices?

Many seed distributions over many years have allowed for the regular introduction of new varieties into local cropping systems, giving farmers an appreciation of a range of different varieties and their particular characteristics (e.g. drought resistance, marketability, duration, etc). Consequently, many of the varieties provided by WV were already locally available. In such cases, the seed provided by WV can be regarded as a free input that farmers would have otherwise had to buy for themselves. Not all crops or varieties provided by WV were adopted by all farmers; in cases where the crop or variety was not considered by farmers to be appropriate, the seed was not incorporated into local seed management systems.

How have emergency seed interventions impacted on informal and formal seed systems (including seed markets) in the local area?

The introduction of appropriate, new varieties into informal seed systems is considered to be a positive impact, effectively strengthening the resilience of local cropping systems in the face of drought, floods, pests, diseases and climate change. Within formal seed systems, emergency interventions (along with agricultural development projects) have created considerable demand by NGOs and other implementing partners for certified seed and QDS. This has led to an increase in the number of agro-input dealers and possibly also

Local Seed Businesses (LSBs). Whilst the capacity and seed sales of many agro-input dealers have increased, there is little evidence to suggest that these businesses are sustainable without NGO support. There are also concerns about market distortions due to over-dependence on NGO/project demand, displaced seed sales, and weak seed marketing efforts. At a national level, it is also possible that the high demand for seed by emergency interventions has contributed to the widespread problem of 'fake' or adulterated seed.

Recommendations

1. Free seed distribution should not be used as a response to chronic poverty or weather events associated with long-term climate change. Chronic poverty must be addressed through other means. To avoid negative unintended consequences on local seed markets, seed interventions must be based on a better understanding of local seed systems and seed markets, including the nature of seed demand by smallholder farmers and the factors (e.g. climate change, new markets) that are driving changing needs.

2. Issues relating to land access by male and female refugees must continue to be addressed more effectively and, in a gender-sensitive manner. Related to this, beneficial linkages between refugees and hosts must continue to be encouraged.

3. Future seed interventions should shift their focus from seed to appropriate and preferred varieties. This involves a greater understanding about the range of varieties currently being cultivated by farmers, which varieties have market value, and which types of varieties will likely be needed to meet future needs, particularly given the realities of climate change.

4. The importance of farmer-saved seed should be reinforced, and opportunities should be created for farmers to learn from each other and others about seed selection and seed-saving practices and technologies.

5. The quality of informal sector seed available in local markets should be enhanced by working with traders who produce and sell own-grown seed.

6. NGO interactions with formal seed sector actors (e.g. LSBs, agro-input dealers) must avoid creating market distortions. They should instead be re-oriented to promote market linkages, resilience and sustainability, especially through linkages with informal seed systems.

7. The availability of appropriate vegetable seed and seedlings in local markets and communities should be increased. There are various ways in which this might be achieved, and it is recommended to start with a pilot project to test different approaches, as proposed by the report.

8. Given that women play a particularly important role in informal seed systems, it is necessary to understand the gender-related aspects of household seed management and informal seed markets. It is essential that a gender lens is applied to all recommendations listed here.

1. Introduction

This report presents the findings of a participatory impact assessment (PIA) of emergency seed interventions implemented by World Vision in Adjumani District, Northern Uganda, under the Improved Self Reliance and Livelihoods Project. The assessment was designed and carried out by the USAID-funded Supporting Seed Systems for Development (S34D) activity, led by Catholic Relief Services.

The aim of the assessment was to generate quality evidence on the impacts of selected emergency seed interventions on beneficiaries and local seed systems[2]. Such evidence is currently lacking and is needed to inform and improve humanitarian and development work. The specific research questions (RQ) addressed were:

- RQ1: How have emergency seed interventions impacted male and female refugee and host community seed management practices?
- RQ2: How have emergency seed interventions impacted household food security of male and female refugee and host community smallholder farmers?
- RQ3: How have emergency seed interventions impacted the livelihoods of male and female refugee and host community smallholder farmers?
- RQ4: How have emergency seed interventions impacted informal and formal seed systems (including seed markets) in the local area?

Another underlying aim of the fieldwork was to develop, test and refine a methodology that can be replicated elsewhere to assess the impacts of emergency seed interventions. Methodological findings and reflections will be reported in a separate report that synthesizes the findings from the three assessments[3] undertaken by the S34D team.

[2] See Annex 1 for an explanation of various types of seed systems.

[3] In addition to the assessment of WV interventions in Adjumani District, S34D also undertook similar assessments of emergency seed interventions implemented by Lutheran World Federation in Adjumani District and by Catholic Relief Services (CRS) in Central Kasai Province, Democratic Republic of the Congo.

2. Geographical and Project Context

2.1 Adjumani District

Adjumani District is located in the West Nile sub-region of Northern Uganda. Adjumani Town, the main administrative and commercial centre is 115 km northwest of Gulu, the largest city in Uganda's Northern Region. The current refugee population (April 2022) is 245,289, of which 63% are children (under 18 years), 22% are women and 15% are men[4]. The total refugee population includes 53% women and 47% men. Children aged under 18 constitute 63% of the total population with a roughly even gender breakdown. The adult population (aged 18 or over) constitutes 37% of the population (22% women, 15% men). The total proportion of youth (aged 15-24 years) is 26%. In 2017, the refugee population constituted 59 percent of Adjumani's population. Adjumani District currently has 19 refugee settlements, each established in different years[5]. Some are relatively small and old while others are big. Refugees from South Sudan arrived in Northern Uganda in two different waves, the first of which was in the 1990's. Many of these refugees returned to South Sudan in the early 2000's. The second wave of refugees arrived after a renewed outbreak of civil war in South Sudan in 2013. Assessment data was collected from farmers in Maaji II, Maaji III and Mungula II refugee settlements and the surrounding host communities in Itirikwa and Ukusijonie sub-counties, approximately 30 km south-west of Adjumani Town.

Land allocation: On arrival in Uganda, new refugees are usually allocated a small area of land in a designated refugee settlement area where they can establish a homestead and plant food crops. Land is allocated by the Adjumani District local government, Office of the Prime Minister (OPM) and UNHCR. Up to 2016, the size of land was 50m x 50m but after 2016 the land area allocated was reduced to 30m x 30m. Some refugees have been able to secure additional land through informal negotiations with the host community. but this has often led to problems because many landowners subsequently claim back the land after it has been cleared, or after just one season. A study on gender and displacement undertaken by Saferworld reported that male landowners prefer to lease land to female refugees possibly because it is seen to be easier to evict a woman, and also because women are vulnerable to sexual exploitation (Watson and Figueras, 2020). The same report also notes that some refugee women enter into intimate relationships with landowners through their own choice.

Refugee and humanitarian organisations have helped groups of refugees to negotiate access to block farms. Some of these block farms are farmed entirely by refugees while some are farmed with host community members. The average land size per refugee household is 0.23 acres (UNDP, 2018). The allocation of land is guided by availability and not land productivity. The quality of land therefore varies across settlements. Some settlements such as Mungula I and II in Adjumani are reported to have fertile soils while others are reportedly rocky, infertile and unproductive (e.g. Alere in Adjumani) (*ibid.*).

Livelihoods and food security: Almost all the refugees in Adjumani come from South Sudan. The refugee population is composed of many different tribes, including Dinka, Nuer, Kuku, and Madi. Culturally, the Dinka and Nuer are pastoralists, whereas Kuku and Madi are predominantly crop farmers. Land allocation cannot support household food sufficiency in the absence of food aid. This can partly be attributed to

[4] Figures from the recent refugee re-registration exercise (June-July, 2022) have yet to be made available. The total refugee population includes 53% female and 47% male. Children aged under 18 constitute 63% of the total population with a roughly even gender breakdown. The adult population (aged 18 or over) constitutes 37% of the population (22% women, 15% men). The total proportion of youth (aged 15-24 years) is 26%.

[5] The settlements include: Ayilo I and II established in 2015, Mungula I & II (1996), Alere I & II (1990), Olua I & II (2012), Pagirinya (2016), Baratuku (1991), Baroli (2014), Nyumanzi (2014), Maaji I, II & III (1997), Ayilo (2015), Mireyi (1994), Oliji (1991) and Elema (1992).

insufficient land for food production, as well as low productivity and limited opportunities for alternative income generating activities. An estimated 88% of the local population consume at least two meals a day. Some 46% of children are moderately and severely stunted in the West Nile sub-region. The UNHCR Food Security and Nutrition Report of 2017 puts the level of Global Acute Malnutrition prevalence in Adjumani at 11.8% and prevalence of stunting in children at 14%.

Agriculture: Among the sites visited by the assessment team, there is a diverse and dynamic cropping system with changes in recent years due to the arrival of the refugees, changing diets and new produce markets. The main food crops grown by farmers in the areas visited are maize, beans, cassava, sorghum, rice, sweet potato and groundnuts. Maize, beans, cassava, millet and groundnuts are also important for sale. Soybean and sunflower are grown as cash crops among host farmers. Vegetables are grown by women both for home consumption and for sale and include sukumawiki (collard greens), onion, okra, tomato, eggplant, sweet pepper and cabbage.

Cultivation methods are traditional and highly dependent on natural rainfall. Adjumani District has an average annual rainfall of 750-1500mm. One study found that access to seeds of improved high yielding varieties is limited, and that refugees are more likely to use improved seeds than the host communities: in Adjumani District, about 80 percent of refugees reportedly use improved seeds compared with less than 10 percent of hosts[6] (UNDP, 2018), though our assessment was unable to confirm this finding.

Gender dynamics[7]: Although South Sudan is a strongly patriarchal society in which women and young people (men and women aged 18 to 35 years) are largely excluded from decision-making, the experience of displacement has impacted the gender and power dynamics among both refugee and host communities. The majority of refugee households are headed by women, and aid agencies tend to prioritize women over men as aid recipients. Previous expectations and roles for women and men are still evolving, often leading to increased tensions and violence within families and between hosts and refugees. As noted above, the gender dynamics involved in renting land from the host community leaves women vulnerable to sexual exploitation. However, the shifting gender roles has also created new opportunities, especially for women. Many women shoulder the double burden of being the main income provider while still taking care of the household. In some cases, this has given them a degree of freedom, allowing them to acquire decision-making powers on how to use the income that they generate.

[6] The UNDP study attributes the high usage of improved seeds among refugees to seed interventions from implementing partners.

[7] The information about gender dynamics presented here comes from a report published by Saferworld (Watson and Figueras, 2020).

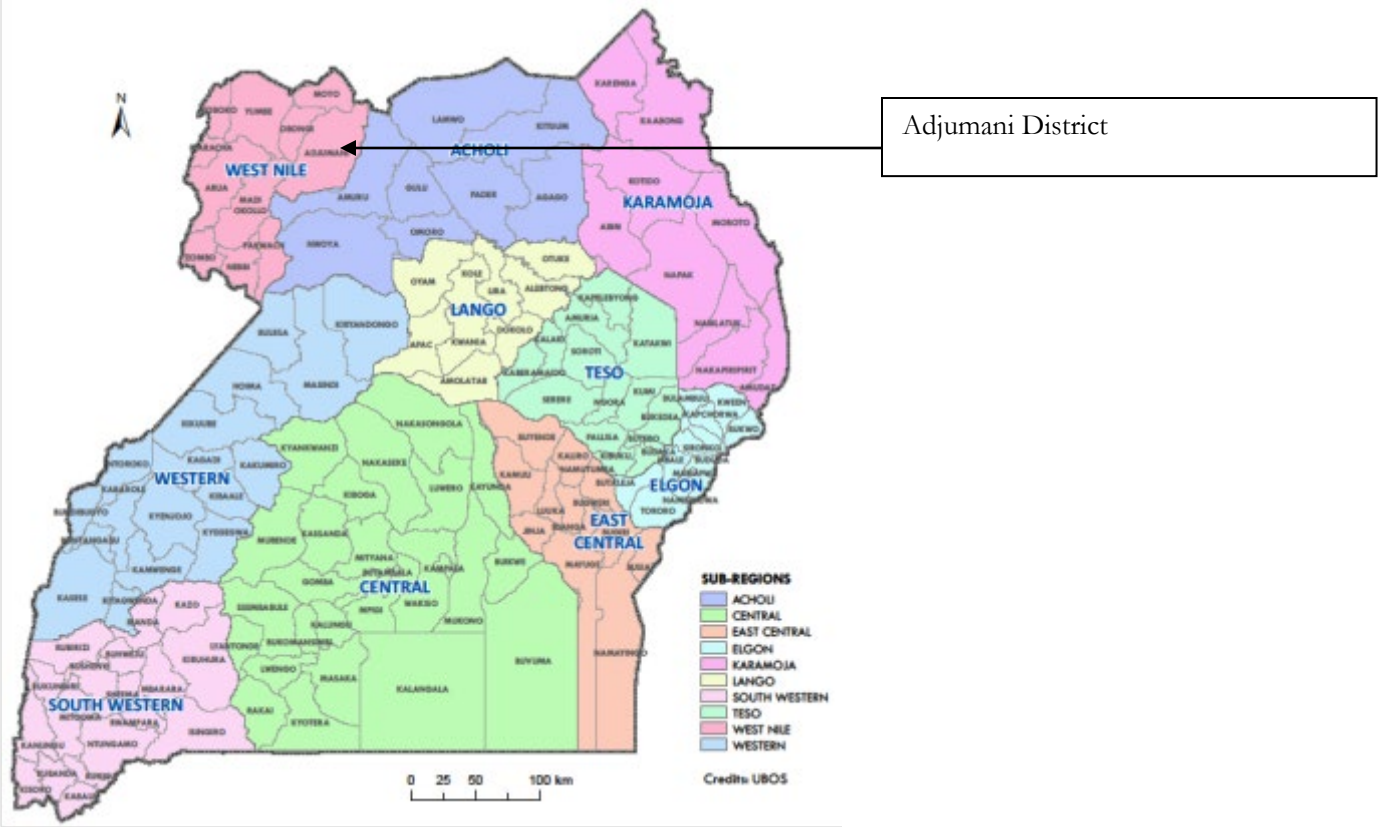


Figure 1: Map of Uganda indicating Adjumani District

2.2 Adjumani Improved Self Reliance and Livelihoods Project - Phase 1 and II

Background: Funded by WV Australia, the purpose of the project was to rebuild sustainable livelihoods for refugees and host communities in Adjumani District with a specific target of assisting refugees to produce their own food to supplement the food rations provided to refugees through WFP food assistance. The project was implemented in Maaji II, Maaji III and Mungula II refugee settlements and their surrounding host communities in Itirikwa and Ukusijoni sub-counties. It was funded under two phases: Phase I was implemented January 2019 - September 2021 and Phase II implemented October 2021 - March 2022.

Planned project outputs and outcomes: The project's planned outputs and outcomes included the following:

- Increased household agricultural production and productivity;
- Increased access to improved agricultural technology and inputs;
- Improved community-led environmental conservation practices;
- Increased household income through diversification of income-generating activities;
- Improved knowledge and skills on off-farm alternative livelihoods, and;
- Improved access to profitable markets.

Approach: In 2020, 2021 and 2022, WV assisted 25, 25 and 30 groups respectively with a total number of 9,640 members (6,748 refugee's households and 2,892 ghost community households). There were various group types, including refugee-only groups, host-only groups, and mixed groups of refugees and hosts.

Under the first phase of the project, groups received agronomic training through demonstration sites to establish kitchen gardens on their plots. They also received seed: cabbage, eggplant, African eggplant, green pepper, tomatoes, collard greens (sukumawiki), okra and onions. Many of the group members harvested vegetables for their household consumption and the surplus produce was sold to augment household income.

In the second phase of the project, the project also negotiated access to land in the form of 'block farms' to allow refugees to access larger areas for cultivation. In 2021, 100 acres of land were opened for the farmer groups, and seeds of maize, beans, rice, soyabean and groundnut were provided to 31 groups, along with training in good agronomic practices.

Linkages were facilitated between refugee and host smallholder farmers and agro-input dealers[8] to learn about different agro-input packages, but the network for input distribution remains poor due to the distances involved, among other factors (World Vision, 2022). Planned linkages between farmers and seed companies were not possible due to the COVID-19 lockdown, but a farmer learning visit was made to Namulonge research station[9]. Both male and female farmers have taken the initiative to produce their own bean and groundnut seeds by multiplying certified seed, though this is not certified as Quality Declared Seed (QDS) as foundation seed is not available. Building private sector linkages for value chain support was also supported by the project[10].

Project learning: Unpredictable weather patterns continued to affect implementation in some areas. Limited funds in the first half of the financial year made planning for activities difficult and some activities were not implemented due to lack of funds (and abrupt reduction in project funds in Phase II). Funding delays had knock-on effects including late distribution of inputs. A key lesson is that early planting is important to make use of seasonal rains in lower rainfall areas (World Vision, 2022). A review of project documents and interviews conducted by the assessment team suggest that no specific gender-sensitive approaches were applied, apart from targeting women as project participants.

[8] A consultation meeting was held for 55 farmer participants with 8 specialists, including Gang-pur and Omia agro-input dealers.

[9] The research station at Namulonge (27 km north of Kampala) is known as the National Crops Resources Research Institute (NaCRRI). It is one of seven National Agricultural Research Institutes of the National Agricultural Research Organisation (NARO). NaCRRI conducts research of national strategic importance, focusing on legumes, root crops, cereals, horticulture and oil palm. Its crop improvement and development focus areas include pest and disease resistance, climate resilience, tolerance to low soil fertility, yield improvement, pre- and post-harvest management, and nutrition enhancement, among others.

[10] This was done through a consultation meeting with: Vision Fund- Micro finance service provider, Omia Agro business development - Agro-input stockists, Adjumani Town council Sacco - Microfinance service provider, Agu-Uwira Investment Ltd - Processors, COSMESS - Micro credit service provider, Mukwano group of company - Grain Off taker and Processors, Gang Pur farmers' corner - Agro-input stockist, Government representative from District production and marketing department.

3. Methodology

Data collection was purely qualitative comprising focus group discussions (with and without PIA tools) and key informant interviews, as described below. A literature review was undertaken of project documents and various other studies. The data collection tools were pre-tested in Boroli Settlement and then refined prior to starting the fieldwork in the project area.

Each of the three refugee settlements and the two sub-counties targeted by the project were visited by the assessment team, where information was collected from a total of 11 WV-supported farmer groups. The specific groups visited by the assessment team were selected by WV staff to ensure a balance between refugee groups, host groups, and mixed refugee / host groups that had received seed support in 2021. Additionally, the assessment team requested that the refugee groups should be crop farmers rather than pastoralists (i.e. from the Madi or Kuku ethnic groups, rather than Dinka or Nuer)[11], and that approximately 8 to 10 group members should be invited to take part in the discussions, with a representative sample of men, women and people with disabilities.

3.1 Participatory Impact Assessment (PIA) methods

PIA tools were used with farmers from six WV-supported groups (four refugee groups, two host groups) to determine the impacts of the seed interventions on crop production, household food security and livelihoods. (See Annex 2 for a general overview of PIA and the approach used by the assessment team). The PIA discussions involved both mixed-gender and single gender discussion groups. The proportion of male to female participants in each group was approximately 36% male and 64% female with a total of 60 farmers participating in the discussions. Five members were selected by the group to score on their behalf once the questions had been adequately discussed and answered. The scoresheet used to record the data collected by the PIA teams is presented in Annex 3. Additional explanatory information was recorded in notebooks and then typed into an Excel spreadsheet and later converted into a single Word document for analysis.

(i) **Historical timelines** were developed by group participants to determine significant and memorable events in the community and to establish exactly when the intervention started. The discussions following the exercise also established and prioritised, by consensus, the most significant activities and seed types provided by World Vision.

(ii) **Proportional piling** with 20 counters (small stones or seeds) was used to establish the production levels of each crop "before" and "after" the intervention. The scoring for the proportional piling exercise was carried out by five individuals, chosen for their involvement in the project and their ability to articulate their experiences. These five individuals also explained the reasoning behind their allocated scores, aided by other group members.

(iii) **A seasonal calendar** was used to establish changes in household food security. This was done by allowing the five respondents to use the counters to show which months their households had staple foods (mostly maize, sorghum, cassava, sweet potato, beans) from their own harvest and which months there was no stock of staple food in the household, before and after the intervention. The months without an adequate stock of staple food were recorded as "hunger months" which were then recorded.

[11] The rationale for this was because emergency seed interventions are generally implemented among crop farmers rather than pastoralists, and the refugee context for this particular project (which provided seeds to farmers who traditionally regarded themselves as pastoralists) was considered to be unique to Uganda.

(iv) Finally, the respondents were asked to score, through **proportional piling**[12]**,** how they spent the income from the sale of crops before and after the intervention in order to establish how the different livelihood capitals changed as a result of intervention.

3.2 Focus Group Discussions (FGDs)

The aim of the FGDs (without PIA tools) was to compile detailed information relating to changes in the crops and varieties cultivated over time, and changes in the seed acquisition channels for different crops. Two different checklists were used for the focus group discussions (FGDs) with farmer group members (Annex 3), and these were subsequently merged into a single checklist. Six FGDs were conducted: two with refugee farmer groups; two with host farmer groups (one of which was a Local Seed Business); and two with mixed refugee / host farmers groups. The number of participants in each discussion varied from 7 to 16 (76% women in total), including three discussion groups with women participants only. Notes from the FGDs were typed up into Word documents and subsequently organised into an Excel sheet to allow for comparison and triangulation across groups and locations. The Word files were merged into a single file to allow for keyword searches of particular topics and themes at the analysis stage.

3.3 Key Informant Interviews (KIIs)

Key informant interviews (KIIs) were undertaken with district-level officials and agro-input dealers, with the various officials in the refugee settlements (OPM Assistant Settlement Commandants, Refugee Welfare Council Chairpersons (RWC 3, RWC 1), Local Seed Businesses, and with officials at the Sub-county level (LC 3, LC 1, Agricultural Officers). A list of those interviewed is provided in Annex 4, and the interview guides are provided in Annex 5. As for the FGDs, the notes from the KIIs were typed up into Word documents and merged into two files (one for agricultural officials, organisations and companies, the other for area-based officials) to enable theme-based analysis and key word searches. The KII information was also summarised into two Excel sheets to allow for comparisons and triangulation across different informants at different levels and locations.

[12] Proportional piling is a semi-quantitative method for determining community priorities is proportional piling. Circles can be drawn on the ground or pictures can be drawn on cards, which represent the problems mentioned. The respondents are then asked to pile pebbles or beans in proportion to the importance of the problem.

4. Impacts on crop and varietal diversity and seed management practices

4.1 Seeds received by WV-supported farmer groups included in the assessment

All the groups assessed had received seed through direct distributions, both from WV and also other NGOs in some cases. Some had received seed only once from WV, while others had received seed two or three times from WV. Some groups had received seed multiple times from up to four different agencies across different years.

WV reported that seed of the following varieties was provided in May-June 2021 to 30 farmer groups (925 farmers): Maize (Bazooka variety) 100kgs; Beans (NABE 16 variety) 1,200kg; Groundnuts (Serenut 4 variety) 750 kgs; Rice (Nerica 4 variety) 250kgs; and Soybeans (MakSoy 3N variety) 250kgs. WV supported household with different types of vegetable seeds which included; Cabbages (Fenaka F1), Eggplant (Black beauty), African Eggplant (nakati), Green pepper (California wonder), Tomatoes (perdima F1), Kale (Sukuma Wiki), Okra (Clemson spineless) and Onions (primer) in the period January – December 2019. These figures imply that each group received relatively small quantities of seed for some crops (e.g. 3kg of maize). With the exception of the hybrid maize variety, the intention was for the group to multiply the seed received so that they could bulk up the quantities and then distribute the multiplied seed to the individual group members. Seed was not sold to others outside the group

Box 1. Seed reported by farmers to have been received from World Vision

1. Salama (Refugee group, Mungula II): Received beans, vegetables and maize in 2019.
2. Refugee Group in Mungula II: Received vegetables, beans, cowpea in 2018; soybean, bean, groundnut in 2019; and gnut, cassava, soybean, sunflower in 2022.
3. Arinya (Host group, Itirikwa sub-county, also an LSB): Received beans, vegetables and rice in 2018, 2019, 2020.
4. Emeabako (Mixed group, Maaji II): Received beans, tomatoes, carrots in 2021.
5. Amavuli (Mixed group, Maaji II): Received maize and beans in 2021.
6. Amanzora (Refugee group, Maaji II): Received: beans, onions and sukumawiki in 2020
7. Tesababa (Refugee group, Maaji II): Received beans, tomato, cabbage, sukumawiki, okra, eggplant in 2020.
8. Amavuleko (Host Group, Ukusijoni sub-county): Received beans, maize, vegetables (tomato, okra, eggplant, onions) in 2020 and again in 2021.
9. Ecitialu (Host group, Ukusijone sub-county): Received maize, groundnuts and beans in 2019
10. Chandire (Refugee group, Maaji III): Received beans and maize in 2021.
11. Refugee group, Maaji III received beans, maize and vegetables in 2020; and groundnuts, beans, maize in 2021.

4.2 Impacts on crop and varietal diversity

There is a dynamic cropping system in the project area, with various changes in recent years relating to the influx of refugees and their consumption preferences, the increase in the production and consumption of vegetables, new markets for new crops, and climate change. The local production of okra has increased considerably since the arrival of the refugees because dried okra is a common ingredient in South Sudanese cooking. Both the diversity and scale of vegetable production is thought to have increased in recent years due to increased demand for local consumption and widespread vegetable seed distribution. Soybean was

introduced as a new crop in recent years to enhance farmers' incomes and is being promoted among host farmers by various donor-funded value chain projects linked to oil seed processing companies in Gulu and Lira.

In general, farmers appreciated the range of different varieties and their characteristics, especially drought resistance. Refugee farmers commented that, in Uganda, there are lots of new varieties provided by NGOs each year, whereas in South Sudan they planted the same varieties for many years. Among the hosts, one farmer explained that since she had more money available to purchase seed (from the rental income from leasing land to refugees) she now looks for specific varieties of seed rather than just any seed. See Annex 8 for farmers' descriptions of the range of varieties that are locally cultivated.

4.3 Seed saving by farmers

With two or three vegetable exceptions (see below), individual farmers reported that they save the seed (or planting material) of all crops from one season to the next. General information about seed-saving practices within the informal seed system can be found in Annex 1. For open-pollinated maize and sorghum, farmers select the best cobs or panicles at harvest time so that these can be kept as seed. Many farmers hang their selected maize cobs above the cooking fire to prevent insect pests. As a cross-pollinated crop, farmers claimed they recycle maize seed for two or three years before replacing the seed (as they would have been trained to do), but discussions revealed little, if any, replacement of seed stock in practice. As described below, it is very rare for farmers to purchase seed from agro-input dealers; the few cases that were reported were not to replace maize seed but to obtain either vegetables or a new variety of bean or maize, the seed of which was subsequently recycled.

For vegetables, only okra, local varieties of tomato, sukumawiki and eggplant are typically saved from one season to the next. Onion, cabbage, improved tomato varieties, and green pepper seed[13] is not saved and is occasionally bought from agro-input dealer shops in Adjumani, though most farmers appear to rely on NGO seed distributions for these seeds. NGO seed distributions have significantly expanded the cultivation of vegetables in the zone for both consumption and market. However, for the seed that cannot be saved, some farmers were not aware of where such seed could be purchased.

Most of the WV groups who were cultivating a plot together reported to have saved seed for subsequent re-planting by the group. In one case, a group was planning to bulk up the seed so that there would be enough to divide among the group members so that each could plant individually. One group, however, said that they did not save their bean and maize seed after harvest because WV had reportedly told them they would be distributing seed again the following year. Apart from the seed multiplication groups and LSBs, farmers had not received any training on seed saving practices. As far as could be determined, no effort had been made by the NGOs or agricultural officials to compile local knowledge or local practices on seed selection and seed saving.

Farmers reported various problems with own-saved groundnut seed. Some farmers described how the groundnut seed received through NGO distributions did well at first, but then deteriorated over time, becoming less productive. Groundnut has also been particularly susceptible to drought and because of this saving seed has been challenging[14]. Three varieties of groundnut are grown in the zone: Serenut 2, 3, and 4.

[13] Onion and cabbage seed are notoriously difficult to produce, and some tomato varieties are hybrids, but there is no reason why farmers should not be able to save green pepper seeds.

[14] The multiplication rate of groundnuts is relatively low compared to other crops, so the amount that is saved as seed forms a larger proportion of the harvest than for other crops. If the overall harvest (for all crops) is reduced by drought, the crops with the lowest multiplication rates (e.g. groundnuts, beans) will be most challenging to retain as seed.

According to information from WV, Serenut 4 was provided in 2021. Serenut 2 is drought tolerant.[15] One group reported that Serenut 2 is no longer yielding as well as it used to saying that they would be abandoning that variety. However, a large agro-dealer/local seed business in Pakele multiplies and sells the seed indicating that demand remains strong for the variety. Subsequent discussions with NARO staff revealed that they stopped the multiplication of Serenut 1 and 2 in 2002, Serenut 3 and 4 in 2010, and Serenut 5 and 6 in 2011 because they had developed better varieties[16] that were bred to overcome the challenges of these varieties. Such challenges include susceptibility to pests, rosette disease, drought, poor taste, long maturity, and long dormancy period for some of the seed. Since 2011, there has been no production of foundation seed of these varieties, implying that any seed of these varieties purchased from any source would have been multiplied from recycled foundation seed that is likely to have deteriorated due to mixtures, poor seed handling practices, or decline in performance due to susceptibilities to biotic and abiotic stresses.

4.4 Off-farm seed sources and acquisition

In cases where farmers are unable to save their own seed, they generally acquire it from other farmers or purchase it from the local grain market. Within the focus group discussions, one woman from a host community described how she purchased groundnut seed from a neighbour in the previous year, after her own crop was lost to drought. Seed purchases are also common between refugees and host farmers; refugees go to host farms to buy, and hosts also go to refugee markets to sell seed. Host farmers explained that these sales are one-off, whenever they need cash. Hosts do not regard these types of opportunistic seed sales as a business, and quantities are generally small because they lack transport to take large quantities.

Seed acquisition appears to be dominated by cash transactions among refugees, though loans and exchanges were mentioned among host farmers. Host farmers explained that seed can be exchanged for anything agreed, e.g. other seed types, grain or a small goat. If loaned, then double the quantity will typically be returned at harvest. While seed sharing (as free gifts) among farmers was common in South Sudan, it is less common among refugee groups in Uganda. This is presumably because the social networks among the refugees are not as strong as they would have been in their home communities in South Sudan, and household needs are such that they cannot afford to give seed away for free.

Upon arrival from South Sudan, refugees typically purchased seed from host farmers in the local market or selected the best grains from their food rations (maize and beans) that they planted as seed. Refugees reported that they were able to buy all types of seed and vegetative material from hosts - banana, cassava, beans, groundnut, maize. In some cases, the seed sold in this way had been selected and saved as seed by the host farmers; refugee farmers reported that they knew it was seed because it was black with smoke from having been stored above the kitchen fire. In other cases, however, it is likely that what was being sold was grain from the farmer's harvest rather than seed that had been selected and saved as such. When asked about whether any seeds were collected from the wild, some refugee farmers mentioned that they had collected sweet potato, cassava and okra seed / planting material from other farms (presumably without permission of the owners).

Agro-dealers were rarely frequented by the farmers that took part in the discussions, and were generally regarded as a last resort for seed acquisition, partly because of the travel needed to access them (in Adjumani Town), and partly because the cost of certified seed is simply beyond the reach of most smallholder farmers. Among the few farmers who said they had purchased seed from agro-dealers, most had not actually travelled

[15] https://teca.apps.fao.org/teca/fr/technologies/6899

[16] The new varieties that have been promoted from 2011 to date are Serenut 7 - 14 and Naronut 1 and 2. Early generation seed of these varieties is being actively multiplied at NARO on-farm multiplication fields, and thus are the varieties recommended for uptake by seed producers, distributors, and LSBs.

themselves to the agro-dealer shop, but had instead purchased the seed through another trader or another farmer or by sending someone on a motorbike. For one focus group, out of 11 farmers, across 6 years (12 planting seasons), there were only two cases cited of seed that had been purchased from agro-dealers[17]. Across all the focus group discussions, only maize, beans and vegetables were cited by a handful of FGD participants as being occasionally purchased from agro-dealers. For maize and beans, the seed was purchased once in order to obtain a specific variety, and then recycled. Although farmers are aware of the existence of agro-dealer shops in Adjumani Town, they prefer instead to source seed from farmers or local markets. One female farmer who was planning to plant onions described how she would first try to find other farmers who had received seed from NGOs and try to acquire seed from other farmers. Failing this, she would go to the local market and ask the women selling vegetables if they could sell her some seed. Her final option would be to go to Adjumani to the agro-input dealer shops.

[17] In both cases (one male farmer, one female) the reason for purchasing the seed from the agro-dealer was to obtain a specific bean variety.

5. Impacts on food security

5.1 Production trends

Production trends 'before' and 'after' the WV intervention were determined with reference to the historical timelines developed by each of the farmer groups that participated in the PIA exercises. 'Before' referred to the period prior to 2018, even though some groups were receiving other forms of support from other partners. The 'after' period taken here is 2021 when they had at least received some seed and associated support from WV, as summarised above. Before the WV intervention, farmers reported that production was generally on a small scale for home consumption. There was low production of crops due to relatively small portions of land for production, with drought and flood affecting the crops in some cases, and a lack of knowledge in good agronomic practices[18] (e.g. they were broadcasting their seeds instead of line planting). Farmers said there was an increase in production due to an increase in land planted[19]. They also reported increased yield for all crops after the WV intervention due to a combination of factors including fertile soils, good weather conditions, the agronomic training received (e.g. early planting in rows at the correct spacing, and timely weeding), alongside the use of the seeds provided. Use of manure and chemical pesticides was also attributed for increased vegetable production.

Some challenges that made production not to increase optimally as expected or generally decline after 2021 were prolonged drought, floods, pests, and diseases, especially in vegetables, for which farmers lacked control measures. Late planting of crops also caused a decline or less optimal increase in production. Rice, which was reported by just one group, was affected in some cases by drought and birds, while vegetables were affected by low germination rates in a few cases. In spite of the different challenges, farmers indicated that there was a general increase in the production of most of the crops although this was to varying levels, as illustrated by Figure 2. According to the information from farmers, groundnut yields generally declined due to prolonged drought, floods, pests, and diseases. As noted in the previous section, information from a NARO researcher subsequently revealed that many of the varieties of groundnut provided by NGOs had been discontinued, and the seed provided in 2021 would have been multiplied from foundation seed that had been recycled for at least 10 years.

[18] It is likely that farmers talked about good agronomic practices partly because some of these practices helped to contribute to increase yields, and partly because this is what they thought the assessment team wanted to hear. For example, as noted above, although farmers talked about refreshing their seed (as part of good agricultural practices), the assessment team did not find anyone who actually did this in practice.

[19] The increase in land was not necessarily accessed through WV but their interpersonal interactions with host households.

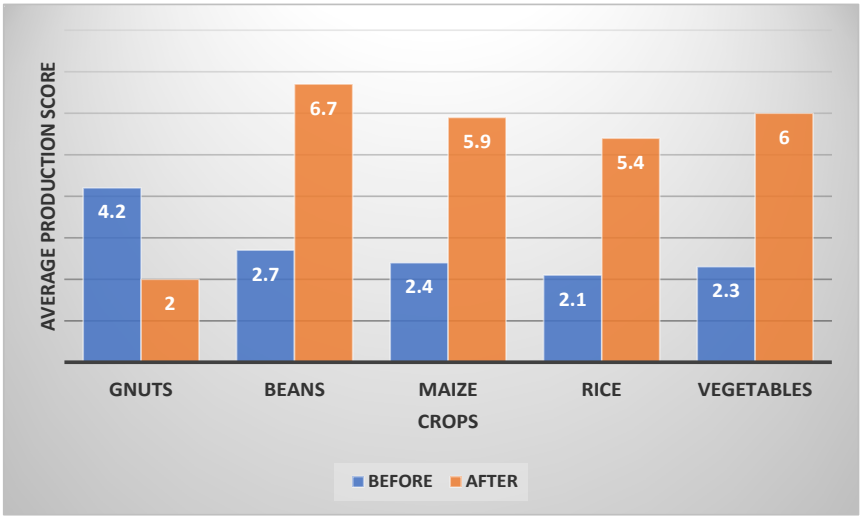


Figure 2. Average production scores by crop, before and after WV intervention (N=30)

Overall, women reported greater production improvements than those reported by men (Figure 3). Comparisons between the scores for men and women may relate more to gender-based perceptions rather than absolute values, but it is interesting to note that women reported lower production levels before the intervention for all crops except vegetables, which are more important to women than to men. In most cases, there was joint decision making between spouses and at times including other family members. Among some of the refugees, however, decisions were made by individual women (notably in cases where their husband was not living within the settlement) or their spouses.

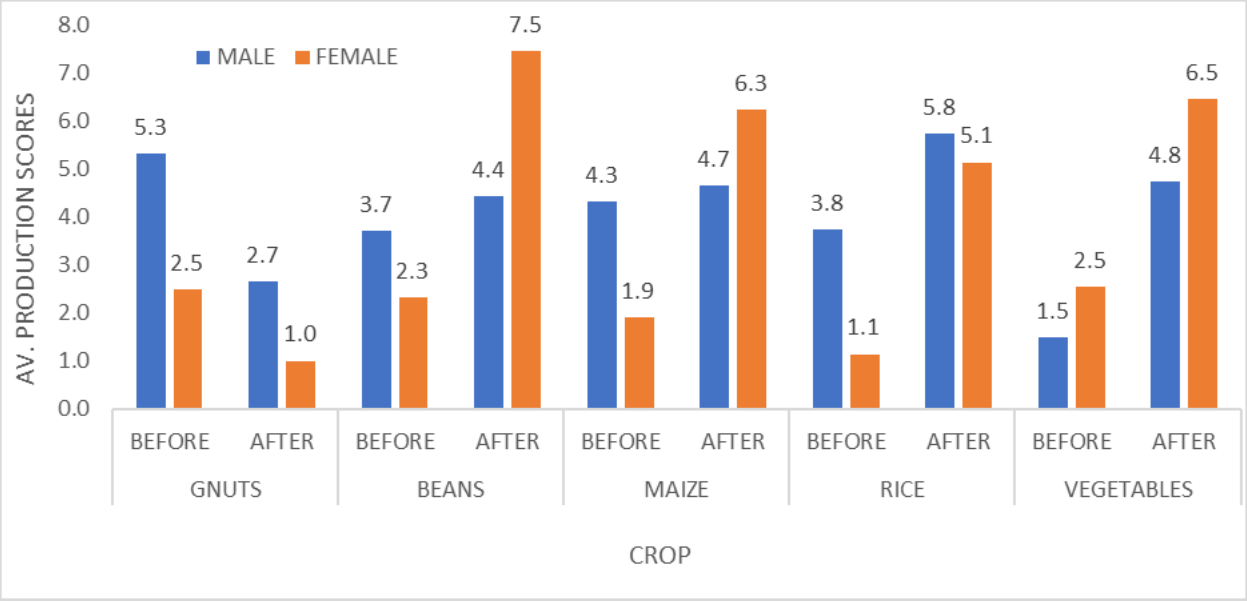


Figure 3. Average production scores by crop, disaggregated by gender (N=30)

Refugees generally reported higher production increases after the intervention than hosts (Figure 4). This can be attributed to the increased land area planted by refugees after the intervention than before. In many cases, access to land was negotiated by individuals In addition, it was noted that the level of support reported by the

host groups was generally less than the level of support reported by the refugee groups, both in terms of seed provision and training.

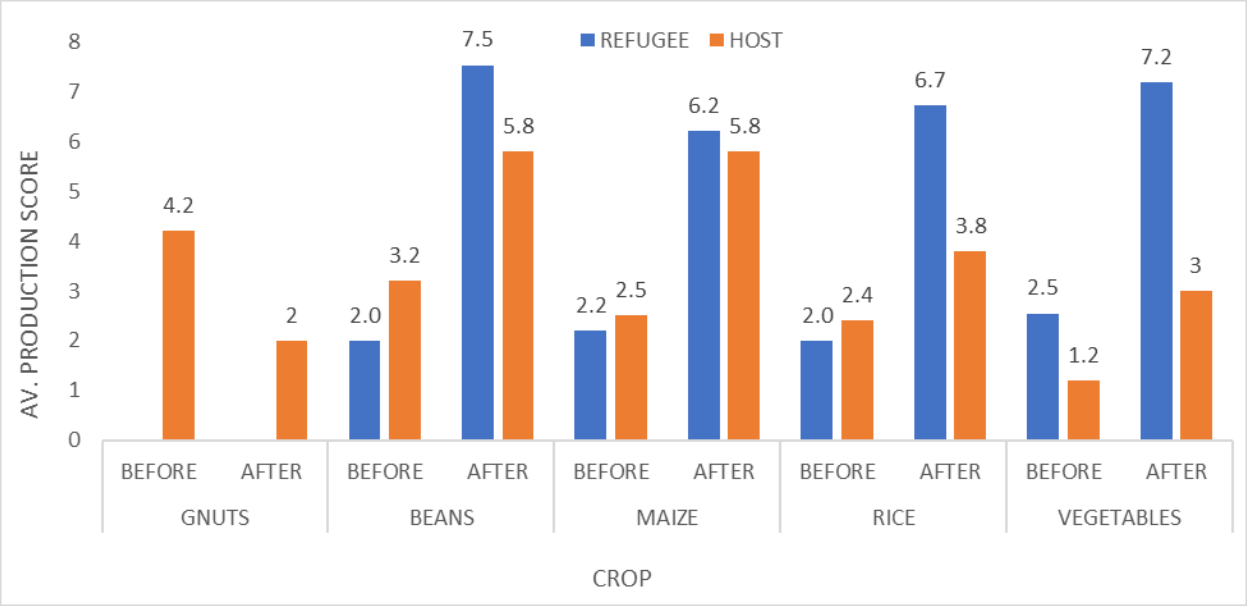


Figure 4. Average production scores by crop, disaggregated by farmer status (N=30)

5.2 Hunger Months

Overall, the farmer groups reported a reduction in hunger months from an average of 1.8 months before the WV intervention to an average of 0.8 months after the intervention. Before the intervention, the hunger months used to fall mainly during June, July, and August. After the intervention, farmers reported a reduction in hunger months due to the increased production (as described above), combined with better management of the harvested output at the household level which was made possible partly by the introduction of the VSLAs. Increased production of food crops such as cassava and sorghum – whose seeds were not provided by WV – also contributed to the reduction in the hunger months. Farmers reported that they were also trained by WV to plan their harvest better to meet the household food and income needs, helping them to be more food secure. Some farmers used to sell all of their food reserves to pay for school fees or other emergencies, but the VSLAs allowed farmers to save their money and cover these costs without selling all of their food. This observation illustrates the positive effect of integrating VSLAs with agricultural interventions, providing a safety net in times of need.

Some groups reported that the prolonged drought 2021 affected their harvests especially for beans and groundnuts, in effect impeding the bridging of the hunger gap. For some households (especially refugee households), the hunger months did not decline because the increased production coincided with increased household size (often the result of taking in other children from South Sudan who had relocated to benefit from the education available in Uganda).

The difference in the hunger month scores by men and women (Figure 5) may be attributed to the fact that women often have a better sense of food needs in a household than men and also feel the food insecurity more acutely than the men would due to their overall responsibility for feeding the household. The gender-based difference in the results is also supported by the 2018 Uganda Refugee and Host Communities Household Survey, which showed that poverty rates among refugees in West Nile were higher for male-

headed households than female-headed households at 63 percent and 53 percent, respectively (World Bank, 2019).

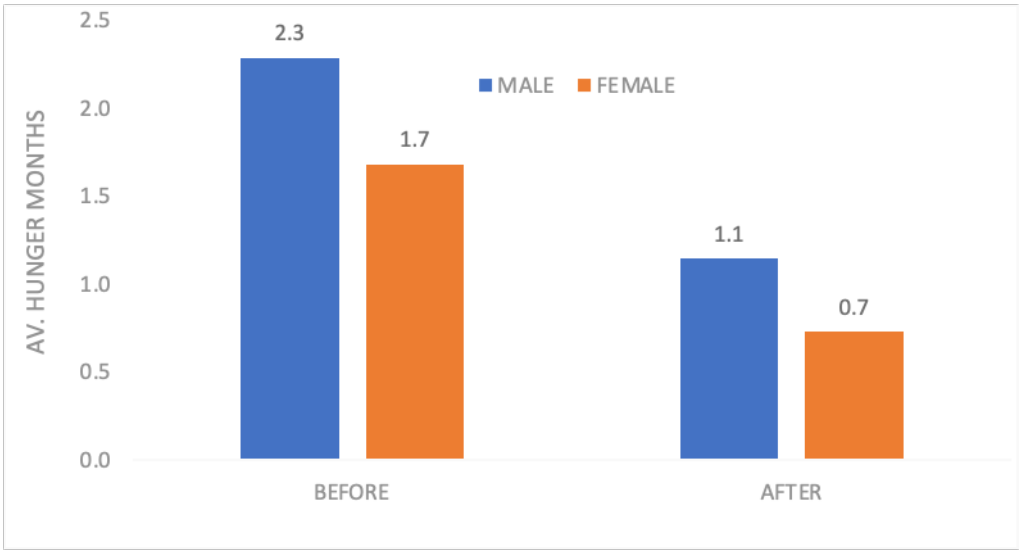


Figure 5. Average hunger months before and after the intervention, by gender (N=30)

All households, both host and refugee indicated that they experienced a decrease in the number of hunger months after the support from WV (Figure 6). Generally, the hosts had fewer hunger months both before and after the interventions.

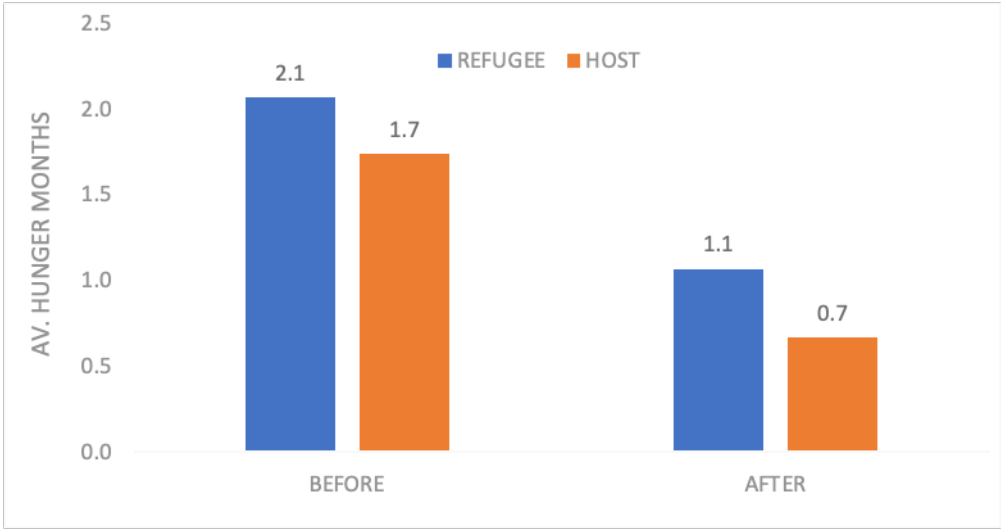


Figure 6. Average hunger months before and after the intervention, by farmers status (N=30)

6. Impacts on livelihoods

A livelihood comprises the capabilities, assets, and activities required for a means of living. The assessment used the sustainable livelihood framework to categorise farmers' responses regarding their spending patterns before and after the intervention. Additional information about the sustainable livelihoods framework is provided in Annex 6.

6.1 Expenditure from crop sales

To establish the impact of the seed support, farmers were asked how they spent the income from the sale of the crops harvested from the seeds received. Selected farmers used proportional piling with 20 counters to indicate their spending patterns before the intervention and after the intervention[20]. The overall average score results are presented in Figure 7. The figures represent relative changes in the proportion of crop sales income spent on different categories rather than absolute values. As such, any increase in income must be inferred from relative spending patterns, as detailed in Section 6.2.

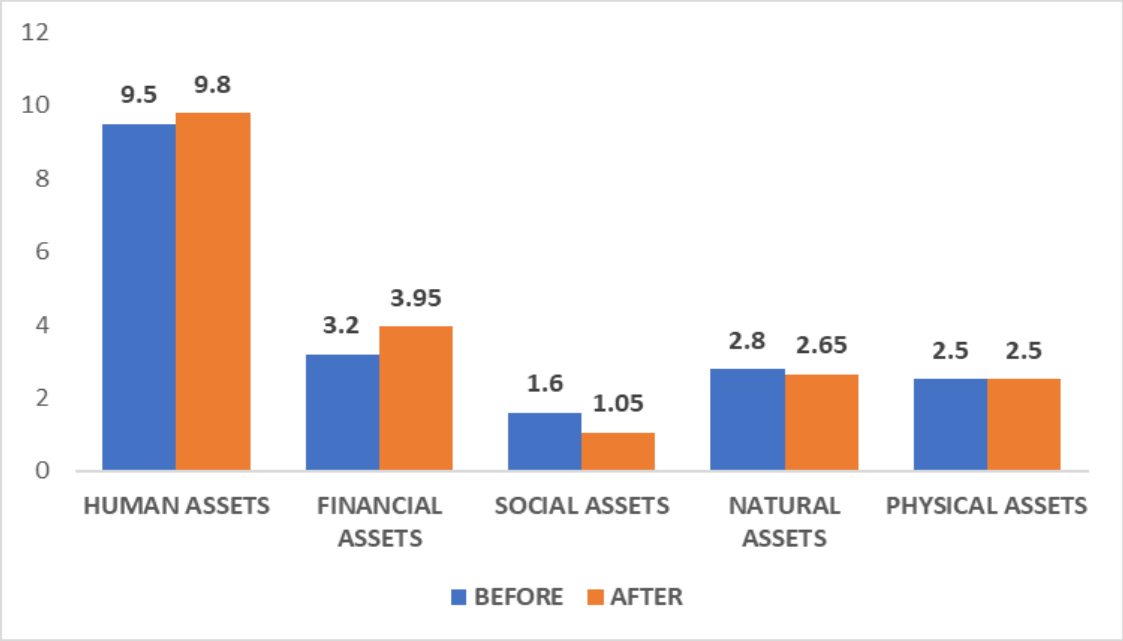


Figure 7. Average scores for expenditure of income from crop sales on different livelihood assets (N=30)

Spending on human capital assets included payment of school fees and purchase of learning materials, spending on food and nutrition, and medical expenses, as detailed in Figure 8. Social capital included spending on welfare activities such as weddings, bride price, and funerals within and outside the settlement. For refugees, these sometimes involved travel back to South Sudan where most households still maintained kinship ties. Natural capital included lease of farmland and purchase of livestock. For the purpose of this exercise, physical capital was limited to expenditure on home acquisition and repairs as well as other physical assets within the home such as clothes. Financial assets in which most households invested was the Village

[20] Where the farmer did not grow the crop before the intervention, they scored '0' for expenditures 'before'. Where the farmer had grown the crop before, and only got a different variety and possibly training and other support from the agency, they scored the expenditures both 'before' and 'after'.

Savings and Loans Association (VSLA); some also invested in petty trade and small businesses as part of securing the household financial base.

As seen in the graph above, there was only marginal upward change in spending on human and financial assets before and after the intervention; spending on social assets and natural assets declined slightly, and physical assets remained the same. Figure 8 shows the disaggregated figures for spending on human assets (education, health, food & nutrition).

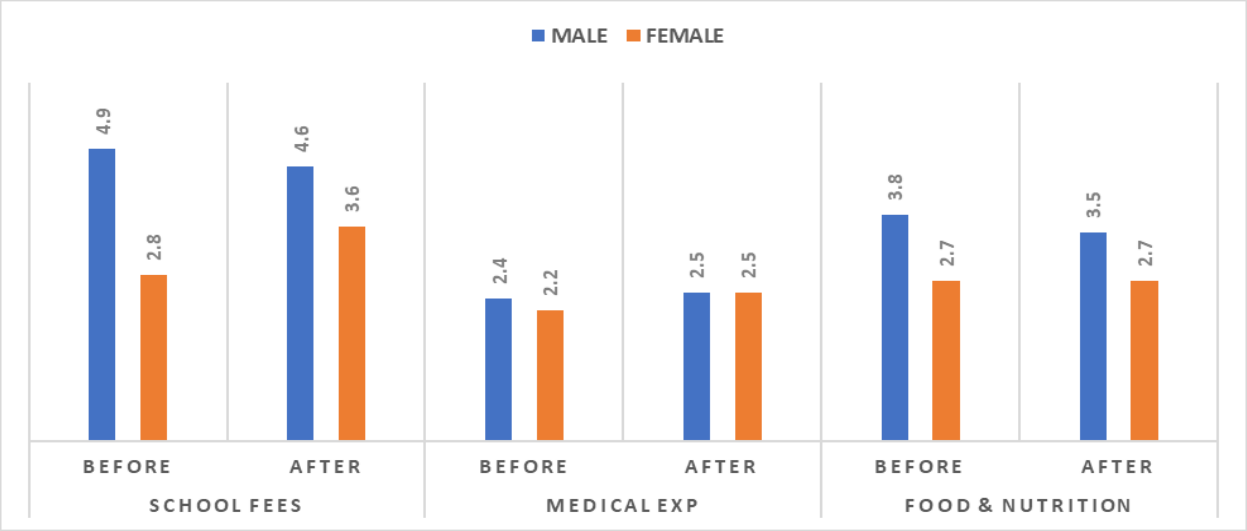


Figure 8. Proportionate spending on human capital assets by male- and female-headed households (N=30)

The largest expenditure of income from crop sales was on the human assets of education, health (medical expenses), and nutrition (food). Male-headed households spent more on school fees both before and after the intervention, though expenditure on school fees increased slightly for female-headed households. In many cases, this increase is due to the increase in the number of school-aged children in the household. Expenditure on medical costs remained roughly the same, with little difference between male- and female-headed households. Expenditure on food decreased slightly for male-headed households and remained the same for female-headed households.

Spending on financial assets increased for both male- and female-headed households (Figure 9), suggesting an overall increase in income. Female respondents reported to invest slightly more than men in the Village Savings and Loans Associations (VSLAs), reflecting their confidence in the VSLAs as a vehicle to support their livelihood strategy. This was the second highest proportion of spending after human capital (as above) for the female respondents. Their male counterparts invested slightly more in natural assets (farmland and livestock) than in financial assets before the intervention. Men's investment in financial assets went up whereas their investment in natural assets went down after the intervention.

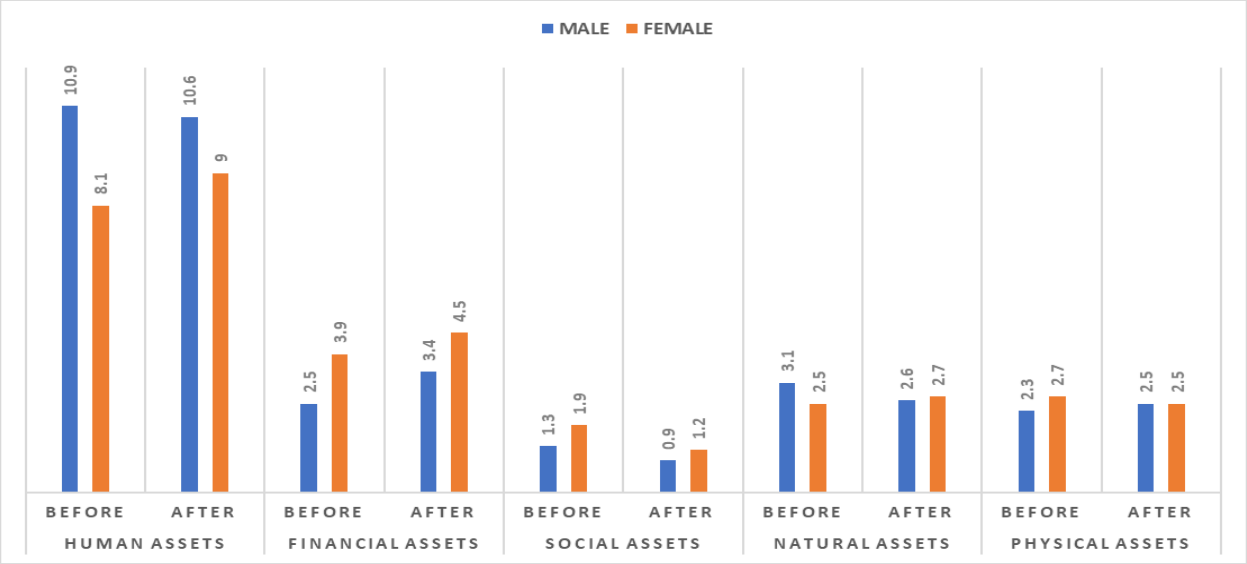


Figure 9. Scores on expenditure of income from crop sales by gender (N=30)

There was also a marked difference between how the refugees and host community households spent incomes from crop sales on the different livelihood assets, as shown in Figure 10 below. Overall, the higher figures for expenditure on natural, financial and physical assets, combined with lower figures for human assets, suggest that the host farmers were better off both before the intervention and after the intervention. The increase in refugee expenditure on human assets is largely explained by increased investments in education.

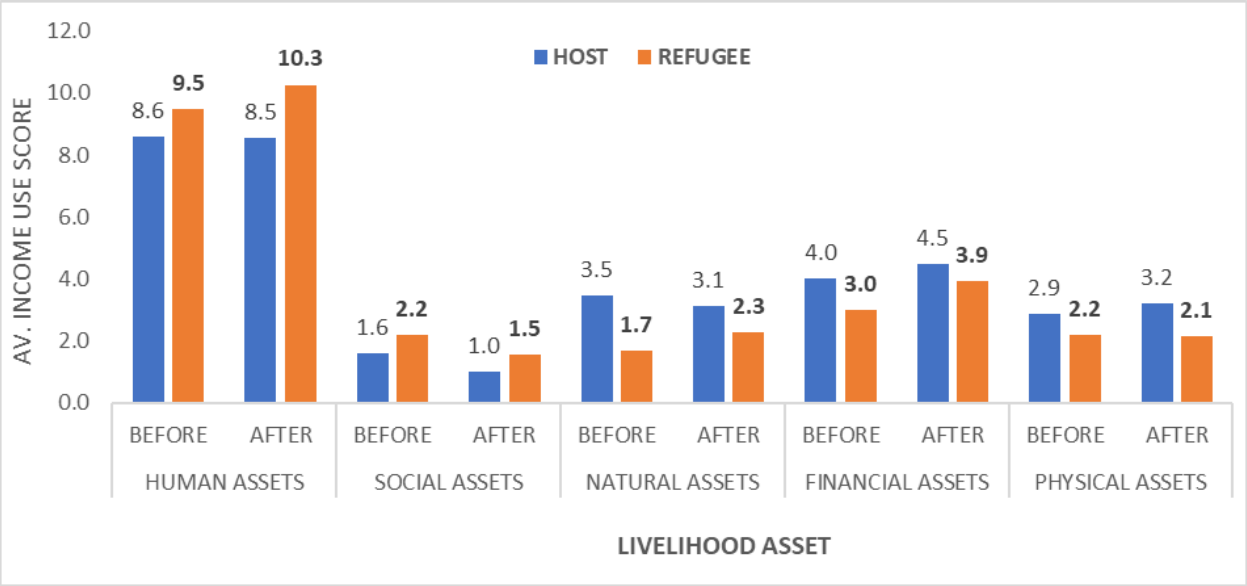


Figure 10. Scores on expenditure of income from crop sales by farmer status (N=30)

6.2 Impacts on Livelihoods

Although there was enhanced production for most crops following the WV intervention, this did not translate to reduced expenditure on food, as might have been expected. This was perhaps because the increase in production coincided with the reduction in the monthly transfers to the refugees, so that

households had to sell some of the produce of a particular crop to buy another type of food need There is some evidence of increased income from crop sales, as suggested by the increase in refugee investments in education, land and livestock, and the increase in financial investments by men and women, especially in VSLAs by women. However, the level of increases in these investments was relatively small.

Education of children was reported as a long-term investment for the well-being of the household. The high costs of education notwithstanding, many refugee parents interviewed noted that the quality of education was better in Uganda than back in South Sudan, so getting the children to attend school in Uganda meant that they would get better education. In addition, getting education allows young people the opportunity to seek employment at the settlement or later back home, providing cash income for their household. As such, education is seen as an investment for future financial security.

For those who could afford to invest in them, livestock, especially small stock (sheep, goats and poultry) were regarded as a good investment. Households bought livestock with the cash income from crop sales and sold either the same animals or the offspring at opportune times to help meet major financial needs, especially school fees or medical needs. Similarly, access to farmland by refugees allowed for increased crop production and food security, though challenges with the lease arrangements were widespread. The terms of such leases are agreed between the landowner and the leaseholder, but the going rate was reported as UGX 100,000 (approx. US $ 25) per acre per year (i.e. two cropping seasons, with continued access to crops such as cassava for up to three years). However, it was not uncommon for the landowning family to increase the rent after the first cropping season, or to break the terms of the agreement and return the money. The refugee would then be forced to find alternative land to rent and to start again in clearing and ploughing the land for planting (a very labour-intensive activity in itself).

From the perspective of the farmers, the most consistently impactful crops across both the settlements and the villages were beans and vegetables. Beans mature quickly and therefore do not require a long rainy season. However, the weather impeded both crop production and livelihood benefits. Farmers reported instances where they lost entire harvests to floods or drought. Nutritionally, beans were reported to provide plant protein, an alternative to the more expensive animal protein for the households, thus helping to improve nutrition at the household level without spending the meagre household financial resources on animal protein. Beans also fetch very good prices in the market, depending on the variety. Vegetables were noted as a source of cash; most farmers interviewed called it their "cash account" as there was always demand for it in the local markets. However, some of the vegetable seeds provided (e.g. carrots) lacked local markets and therefore farmers chose not to incorporate them into their cropping systems. Farmers noted that many households do not even know how to prepare carrots for consumption.

7. Impacts on Seed Systems Actors

A description of informal intermediate and formal seed systems is provided in Annex 1, which also describes the key seed system actors in Adjumani District. This section explores the impacts of the WV intervention on the informal seed system and on key actors within the intermediary and formal seed systems (Local Seed Businesses and agro-input dealers).

7.1 Impacts on Informal Seed System Actors

As described in Section 4, the local informal seed system has incorporated new crops and new varieties over time. Some of these have been provided through emergency seed interventions, some originated from government schemes and development projects, and others were introduced by refugees (e.g. specific maize and sorghum varieties). The informal seed system relies largely on farmer-saved seed, local markets, and seed sales and seed exchanges among farmers. Hosts commonly sell small quantities of own-saved seed, vegetative planting material and potential seed (i.e. grain) to refugees; such sales are opportunistic rather than being regarded as a business[21].

Within the two local markets visited by the assessment team, there is a distinction between traders' own-saved seed, trader-sorted seed, and grain (potential seed). Box 2 provides details of two female traders in Pakele Market who produce and sell own-saved seed; the seed is multiplied on their own farms and is selected and managed separately from grain. In Nyumanzi market, several female traders explained how they purchase good quality grain of maize, beans and simsim from local farmers at harvest time and then clean this by winnowing and removing shrivelled or poor-quality grains and off-types. In the case of simsim, the grain was sourced from the trader's brother. Another trader dealing in red sorghum sourced grain from other markets and then cleaned it to sell as seed. Such seed is typically sold at twice the price of grain. Finally, any grain, regardless of source or management measures, can potentially be sold for planting – such grain is commonly referred to as 'potential seed' and is indistinguishable from grain. If farmers use such grain for planting, they typically clean and sort it themselves.

Apart from smallholder farmers, the assessment did not find any evidence to suggest that the WV intervention had impacted on informal seed system actors, such as locally recognised farmer seed providers or market traders. Farmer seed providers are often lead or model farmers, though the assessment did not identify farmer seed providers or explore whether or not this was the case in Adjumani. General support to the WV farmer group leaders would have undoubtedly enhanced their capacity in many ways, but there was nothing to suggest that their role in informal seed systems (if any) had changed. Traders appear not to have been supported in any way in relation to their seed provisioning activities, though they effectively function as individual Farmer Seed Producers, as described below.

Box 2. Traders as informal seed system actors

Example 1: Lucy
Lucy is a young woman trading in grain of maize and beans and dried cassava. She has her own farm and rents a store in Pakele market. During the planting season she also sells maize and bean seed to farmers. Both beans and maize are sourced, stored and sold separately from grain. She produces the seed on own farm. Maize is "Katumani" (Longe 4) variety. Cobs are selected at harvest; the shucks are left intact and the cobs are hung above the fire to prevent pests. Bean seed is also stored separately from grain to avoid pests. This seed is sold at a 30% to 40% premium.

Example 2: Josephine
Josephine is an elderly woman who was selling fresh okra in Pakele market. During the planting season she sells seeds of okra, pumpkin, maize and sorghum as well as teak tree seedlings. She supplies two varieties of okra seed and two varieties of pumpkin seed, all of which are grown by Josephine herself on her own farm. The varieties of each crop are sold at different prices by using a different measure – one variety is measured in jerrican lid and the other in a small cup. She cultivates Katumani maize on her own farm and she manages and sells the seed and grain separately.

Outside the WV project area, the assessment team found Farmer Seed Producer (FSP) groups that had received support from other NGOs. These groups are similar to Local Seed Businesses (LSBs, see below), but they are not officially registered and their seed is not certified. As such, FSPs might be considered to be part of the intermediary seed system. FSPs sell seed and planting materials to farmers within the local community and also participate in seed fairs organised by NGOs. Some FSPs reportedly sell vegetative planting material of cassava and sweet potato to agro-input dealers who have contracts to supply to NGOs for seed distribution projects.

7.2 Impacts on Local Seed Businesses (LSBs)

A Local Seed Business (LSB) refers to an individual or a registered group (normally of 25-30 farmers) that produce Quality Declared Seed (QDS) (see Annex 1). Typically, an LSB is formed and promoted by a specific NGO, government project or development partner to enable farmers to multiply seed on a commercial basis. In Adjumani District, LSBs have largely been promoted by the Integrated Seed and Sector Development (ISSD) Project, Lutheran World Federation (LWF), WV, the Project for the Restoration of Livelihoods in the Northern Region (PRELNOR) and the District Farmers Association (DFA). It was reported that many LSBs cease to exist once external support from an NGO or project comes to an end. The assessment team also identified two cases of farmer-initiated LSBs which were considered (by both the assessment team and various key informants) to be more business-oriented than those initiated by NGOs and other projects[22]. Though the exact number of LSBs in the district could not be ascertained, there are probably between 15 and 25, and increasing with on-going support.

LSBs play a specific role in the multiplication and distribution of QDS for true breeding (self-pollinating) crops such as beans, rice and groundnuts for which private sector seed companies may not be able to make profit, also crops with vegetative planting material (cassava, sweet potato) which is perishable and difficult to transport. Much of the seed produced by LSBs in Adjumani District is sold to NGOs (for emergency seed interventions) and projects such as PRELNOR, the Northern Uganda Resilience Initiative (NURI) and Operation Wealth Creation (OWC), often through the sub-county agricultural office. In some cases it is also sold directly to farmers and traders. Vegetative planting material is often sold to agro-input dealers for onward supply to NGOs and agricultural development projects.

Emergency interventions have impacted LSBs in two main ways: (i) In some cases, the VSLAs established by WV and other emergency interventions have themselves become LSBs. This was the case with the Arinya Farmers Saving and Loan Association in Itirikwa sub-county, which was established as a VSLA in 2007 with 100 members. In 2019, 30 of the VSLA members formed an LSB which has since received support from both WV (training, equipment and foundation seed) and PRELNOR (hand tiller and seed purchases); (ii) Emergency seed interventions have created considerable demand for QDS, allowing LSBs to sell some of their seed outputs to NGOs. This is further discussed below, in Section 8.4.

7.3 Impacts on Agro-input Dealers

As described in Section 4, agro-dealers play a minor role as a seed source for smallholder farmers who participated in the assessment. Despite this, the number of agro-dealers has reportedly grown from one (for livestock) in 2013 to over 10 now in Adjumani town, most of which sell seed. This impressive increase in

[22] One of these was the Ori-Limi Seed Producer Group located in Angwarapi East, Dzaipi Sub County. The other was Agrumundo Mixed Farm which had also established an agro-input shop in Pakele Town; see Box 4 for details. Apart from these two cases, most LSBs tend to be highly dependent on NGOs for most of their value chain such as accessing foundation seed, capacity building, payment of inspection fees, and accessing markets. This poses a critical question of LSB sustainability, particularly when donor funds cease to support their activities. It was reported that many LSBs cease to exist after external support ends.

agro-input dealers has been stimulated by the growing demand for seed that is attributed to the seed relief market by NGOs and to programs such as OWC, NURI, and PRELNOR. Out of the eight agro-input dealers interviewed by the assessment team, six reported to have had supply contract(s) with an NGO or development program. NGOs were 'good customers' because they buy in bulk and generally pay within reasonable time from the time of supply. The seeds most in demand by these NGO/projects were vegetables, followed by cereals (maize), pulses (beans) and oil seed (soybean, groundnuts, sunflower, simsim/sesame). There was also demand for cassava cuttings and potato vines which the agro-input dealers sourced from Farmer Seed Producers and Local Seed Businesses. Certified seed is bought from Kampala-based seed companies such as Simlaw, House of Seeds, East African Seeds, Syova, Starke Ayers, and BRAC, among others.

Emergency seeds are purchased from agro-dealers through a formal competitive bidding and contracting process. This has led participating dealers to improve their internal capacity not only to write competitive bids but also to manage the contracts and meet the contract terms. Contracted agro-input dealers must also conduct germination tests as a requirement for NGO contracts. Some NGO or project contracts include the provision of training to farmers by agro-dealers, and this has reportedly encouraged agro-dealers to expand the services offered to farmers[23]. On the other hand, due to the existence of a big NGO seed market, some input dealers have reportedly made less effort to develop/ tap into farmer seed markets, making them more vulnerable to unfavourable changes in NGO demand for seed (see below). A few smaller agro-dealers who do not have sufficient capacity to qualify for NGO contracts complained about free seed distributions taking away their business because they sell directly to farmers and farmer groups. One such agro-dealer remarked that "farmers cannot refuse free seed offered by NGOs and go to buy from the dealer where they are required to pay".

[23] It is likely that the expansion of services by agro-dealers is not solely due to NGO contracts but more closely related to the need for agro-dealers to develop stronger relationships with farmers for marketing purposes and to promote customer loyalty. A number of agro-input dealers reported that they were offering additional services to farmers in the form of extension and advisory services, market information (including market prices and market trends) and market linkages, e.g. for vegetables and sunflower. At least two of the input dealers maintained an up-to-date database of farmer customers for follow up, while others indicated that they kept the contacts of regular customers for referencing and updates on stock availability.

8. Analysis: Impacts on Seed Systems and Seed Markets

This section combines the fieldwork findings with documented knowledge about seed systems to analyse the impacts on seed systems and seed markets.

8.1 Impacts on Farmers' Seed Management and Informal Seed Systems

Feedback from farmers presented in Section 4 and analysis by the assessment team suggest that the seed from the WV intervention may have served various different purposes within local seed management practices. Some of these have not been fully validated, especially those towards the end of the list. The seed received may have served to provide: (a) a new variety or even a new crop (e.g. some vegetables) that is incorporated into a farmers' planting repertoire because it is appropriate to the local agroecology as well as the preferences of farmers and local markets – such seed will be saved after the harvest for subsequent planting; (b) seed that is planted because it is free and farmers (especially poorer farmers) would otherwise have had to find the money to acquire seed – the variety in this case is less important, and farmers may or may not decide to save the seed after the harvest for subsequent planting; (c) an input for which the main aim is to support a group activity, allowing farmers to establish a block farm, apply good agricultural practices, and work together for shared benefit; (d) quality seed of a variety that is already being cultivated locally – in this case the seed might offer fresh (replacement) seed stock that can subsequently be recycled for several seasons.[24]

The previous section suggests that seed from emergency interventions impacts on informal seed systems in different ways, depending on whether the variety provided is a new, appropriate (or inappropriate) variety, or one that is already locally available:

- When seed of new, appropriate varieties has been provided, these varieties have been fully incorporated into informal seed systems, and are subsequently available through seed-saving, from other farmers, and from local markets. What is appreciated by farmers is not the seed per se – both refugee and host farmers can readily access seed through informal seed systems[25] – but the addition of new varieties into the seed system.

- When seed of new, inappropriate or less preferred crops or varieties has been provided, these were abandoned by farmers after planting them for one or two seasons, and they were not incorporated into informal seed systems.

- When seed of locally available varieties has been provided, feedback from farmers suggest that there is little lasting impact on informal seed systems. However, it is possible that such seed might usefully serve as replacement seed within the local seed system, particularly for cross-pollinating crops such as maize.

- In the case of groundnuts, the varieties provided by WV and other aid agencies (Serenut 4, also Serenut 2 and 3) had been discontinued by researchers and the seed was of poor quality. There also appears to be a very limited range of groundnut varieties available in local seed systems, such that

[24] Note that although farmers have been trained to replace their (maize) seed stocks every two or three years, this does not happen in practice. It is not clear whether or not farmers recognize any advantages in replacing their seed stocks. For self-pollinating crops such as beans, groundnut, and sorghum, seed can be recycled for considerably longer and still maintain its genetic quality, particularly if farmers practise seed selection and/or rogue out off-types or inferior seeds.
[25] In a small number of cases, farmers mentioned that the provision of seed meant that they did not have to spend their own money to purchase seed. In general, it was reported that farmers who did not have money to buy their own seed would find some casual work to earn the money needed to buy seed.

farmers had no alternative but to cultivate the varieties provided. As a result, farmers suffered production losses over time from the seed provided by aid agencies[26].

8.2 Understanding Seed Markets

It is important to note that the majority of seed planted by smallholder farmers is seed that they have saved for themselves from the previous season. As such, the quantity of seed that is acquired through seed markets is considerably smaller than the total quantity of seed planted. Table A1.1 (Annex 1) explains the nature of seed demand by farmers. The main types of seed demand among refugee and host farmers in the project area currently stem from chronic poverty, periodic emergencies due to drought and floods, crop-specific constraints, and the occasional need for variety change. The different types of seed demand may be continuous (e.g. relating to poverty), recurrent or more sporadic, applying to different farmers, in different locations at different times, and different crops.

Table 2 provides an analysis of the differentiated nature of seed markets in Adjumani District. Broadly speaking, there are two distinct types of seed (uncertified and certified, including QDS) and three different types of seed markets: (1) informal sector seed markets in which uncertified seed is supplied by farmers and traders, and purchased by farmers; and (2) intermediate sector seed markets in which uncertified seed and QDS is produced by FSPs and LSBs and purchased by farmers, NGOs and projects, traders and agro-dealers; and (3) formal sector seed markets in which QDS and certified seed supplied by LSBs and agro-input dealers is purchased mainly by NGOs and projects and some more commercially-oriented farmers.

In the informal seed market, uncertified seed is generally supplied on an opportunistic basis through non-commercial channels, or through grain traders for whom it constitutes a side-business rather than their main form of income. In the intermediate market, uncertified seed and QDS is supplied on a commercial basis, but the commercial viability of FSPs and LSBs is not certain. The commercial viability of the formal seed market appears to depend largely on sales to NGOs and projects[27].

The nature of seed demand by farmers presents a number of challenges in terms of commercial seed supply to smallholder farmers in the district:

- The most significant, continuous level of demand for most crops stems from chronic poverty, yet poor farmers lack purchasing power and are therefore unlikely to buy more expensive certified or QDS seed, choosing instead to purchase less expensive seed through the informal seed system.
- Demand created by emergencies such as drought or flood is not only difficult to plan for due to the unpredictable nature of these events, but the local production of commercial seed (whether certified as QDS or not) will likely also be affected by the same weather events. Thus, for planting seasons that follow an emergency, local commercial seed producers may not have sufficient production to meet the level of demand, whereas in 'normal' seasons they may not be able to sell all of their seed.
- The sporadic, one-off nature of demand that is driven by the need for a new variety is insufficient to ensure continuous sales of the same variety because farmers can save the seed of the variety after

[26] Note that not all groundnut seed provided by all agencies was of inappropriate varieties. Outside the WV project area, the assessment team found cases where farmers had received seed of Serenut 11, and this variety was in very high demand by farmers.

[27] This is also true at the national level: in 2015, NARO estimated that 50% to 70% of all certified seed available for sale in Uganda (approx. 11,500-16,000 MT) was distributed for free through Operation Wealth Creation (OWC) (Longley et al, 2022). After OWC began winding down, the level of certified seed production dropped dramatically from 28,000 MT in 2017 to just 8,000 MT in 2018, suggesting the close connection between formal seed markets and project purchases (*ibid.*).

they have acquired it, and as soon as a critical mass of farmers have acquired the variety then it can be supplied through the informal seed system.

Table 2. Different seed market types in Adjumani District

Non-certified seed	Informal seed system	Farmer-grown seed	This market consists of sales or exchanges by better-off or more meticulous farmers and opportunistic sales by farmers in need of cash. Such sales are not regarded as a reliable source of income. Seed is generally considered by farmers to be of good quality, especially in cases where the grower is known to the buyer. Farmer-grown seed includes all crops except for onion, cabbage and green pepper.
		Trader-grown seed, trader-sorted seed and potential seed	Three different categories of seed found in local markets - trader-grown seed, trader-sorted seed and potential seed. This constitutes a seasonal business sideline for some grain traders, depending on their knowledge and capacity for managing seed as distinct from grain. Such seed is purchased by farmers only. The quality of trader-grown seed is likely to be comparable to farmer-grown seed, but the quality of trader-sorted seed and potential seed is likely to be poor. Trader-grown seed, trader-sorted seed and potential seed theoretically includes all crops except for onions, cabbage and green peppers, though this has not been verified. It is unlikely that all seed types for all crops are available in all markets.
	Intermediary seed system	FSP-grown seed and LSB-grown seed (not certified as QDS)[28]	Produced on a commercial basis by farmers who have been trained in seed production. It is sold to farmers in the local community (sometimes through seed fairs). The source seed should (theoretically) be of known origin, and the quality of seed should be good, though this is not externally verified. FSP-grown seed and uncertified LSB-grown seed includes mainly cassava, sweet potato, beans, groundnuts, soybean, and rice.
Certified seed		Quality Declared Seed (QDS)	Produced on a commercial basis by trained and registered LSBs. Seed is certified as QDS and is generally sold to NGOs/projects, to traders and agro-input dealers (e.g. cassava and sweet potato planting material), and to farmers in the local community (sometimes through seed fairs). The source seed is foundation seed from one of the research institutions, though in practice this has sometimes been recycled[29]. In Adjumani District, QDS includes cassava, sweet potato, beans, groundnuts, soybean, sesame, greengrams and rice.
	Formal seed system	Certified seed	Produced on a commercial basis by seed companies located outside Adjumani District. Seed is sold by agro-input dealers to more commercially-oriented farmers and to NGOs/projects. Some seed companies also have contracts to sell directly to NGOs/projects. The source seed is foundation seed and the certification standards are more stringent than for QDS. Despite this, however, Uganda faces major challenges in ensuring the quality standards of certified seed.[30] Certified seed includes mainly hybrid and OPV maize and vegetables[31], with smaller, variable quantities of beans, groundnuts, rice, and sorghum. Small but increasing quantities of sesame and sunflower are also produced.
		Foundation seed	Produced by research institutions located outside the Adjumani District. Seed is mainly sold to seed companies and LSBs for the purpose of seed multiplication, though one of the agro-dealers reported to sell foundation seed to commercial farmers for grain production because they did not trust the quality of certified seed. Quality control standards and certification are more stringent than for certified seed. Foundation seed includes those crops that are sold as QDS and certified seed, as listed above.

[28] In some cases, is might take a year or two for LSBs to be registered and for their seed to reach the required quality standards for QDS certification. In other cases, established LSBs might not be able to afford to pay for the costs of seed certification.

[29] It is allowed for foundation seed to be recycled

[30] This is due to both poor quality certified seed as well as 'fake' or counterfeit seed. Demand for seed from the relief seed business is thought to act as a driver in pushing up the levels of counterfeit (fake) seed in the market (Longley et al, 2021).

[31] Many vegetable seeds are imported rather than produced in-country.

Given these challenges, the most reliable source of demand that can potentially sustain a commercial seed business is either seed of specific crops that are difficult for farmers to save (e.g. soybean, onion, cabbage, cassava) or crops for which farmers recognize the need for replacement seed stocks because they are hybrids (mainly hybrid maize and some vegetables). Only some of these crops are suitable for production by FSPs or LSBs (e.g. cassava, soybean, cabbage[32]), others must be sourced from seed companies and agro-input dealers (e.g. onion[33] and all hybrid varieties).

8.3 The impacts of emergency seed interventions on seed markets

Seed supplied through emergency seed interventions is either QDS or certified seed purchased from LSBs, agro-input dealers in Adjumani or other input suppliers that operate at national level, or seed companies. The increase in demand for certified seed for emergency seed interventions and agricultural development projects has led to a big increase in the number of agro-input dealers in Adjumani Town. Whilst this has been positive in many ways (see section 7.3), not all agro-input dealers have benefitted from NGO/project contracts, and there are concerns that the free distribution of seed may have 'crowded out' or displaced seed purchases by farmers who would have bought certified seed. There are also concerns that some agro-input dealers become dependent on seed sales to NGOs and development projects and do not make the effort to develop their marketing strategies to promote sales to farmers. If emergency seed distribution and other projects were to come to an end, some of these agro-dealers may not have the necessary structures or capacities to sustain their business through seed sales to farmers. In this scenario, some agro-dealers may be forced out of business, or to re-locate to other districts where they can continue to rely on seed sales to NGOs and development projects.

The high demand for emergency seed has reportedly also contributed to seed quality challenges relating to the adulteration of seed. Key informants attributed seed quality issues both to seed companies that supply the input dealers or the input dealers themselves. For large orders of emergency seed, it was reported that the seed companies and input dealers may include expired seed, or grain packaged as seed. Recognition of the problem of adulteration has led to the need for agro dealers to conduct their own germination tests on seed supplied by seed companies (as described above), and for the District Agricultural Office to conduct additional checks. While there is widespread awareness of the contamination of the seed supply by adulterated seed, the seed can often pass germination tests and hence go undetected by both the agro dealers and the agricultural officers, resulting in low productivity. Over time, there is a concern that farmers will lose confidence in certified seeds and resort to home-saved seeds or even QDS, as reported by one LSB (Box 4).

Emergency seed interventions have also created demand for QDS because certified seed cannot meet the level of NGO demand for all crops, and informal sector seed lacks the necessary quality assurance protocols. There is a growing number of LSBs in the district, but their growth has also been accompanied by concerns over their sustainability. Much of the QDS produced by LSBs is sold to NGOs and development projects. Both district and sub-county agricultural officers assist in creating linkages between LSBs and NGOs / development projects for seed sales. In the case of the Arinya LSB, for example (see Section 7.2), all of their seed to date had been sold to PRELNOR. In some cases, LSBs may be linked to agro-dealers who have supply contracts with NGOs / projects to supply QDS. Although LSBs are trained on how to effectively market their seed directly to farmers within the local area, the team found little evidence of such marketing efforts.

[32] Only some varieties of cabbage are appropriate for seed production in the tropics; some cabbage varieties require vernalization (a prolonged period of exposure to low temperature) to stimulate flowering.
[33] Onion seed production in tropical countries is complicated by the fact that onion is a biennial crop and requires vernalization.

As described above for agro-dealers, unless LSBs are able to re-orient their sales away from NGOs and development projects, many will cease to exist when such projects come to an end. One of the most successful LSBs in Adjumani District has targeted its seed sales to respond to other types of seed demand (Box 4). Rather than focusing solely on seed for NGO emergency interventions or for farmers' acquisition of new varieties, Agrumundo Mixed Farm LSB responds to farmers' crop-specific constraints to seed-saving through the supply of cassava and soybean. This example suggests that the sustainability of LSBs depends on their ability to tap into various different types of seed demand (Table 1).

Box 4. An LSB success story

Angelo Ruga of Agrumundo Mixed Farm sells an estimated 46% of his seed to individual farmers. Cassava cuttings make up the largest sales. Because cassava is drought resistant, demand has increased as the impacts of climate change are being felt. Recycling is difficult because roaming livestock destroy cassava stems, so farmers regularly need to plant fresh stems. He even sells QDS soybean seed to commercial farmers who are reluctant to buy certified seed because of issues with adulterated seed and poor germination.

9. Conclusions and Recommendations

This final section of the report is organized according to the five research questions (RQs) that formed the focus of the assessment, including the recommendations.

9.1 Conclusions

RQ1: How have emergency seed interventions impacted on male and female refugee and host seed management practices?

- *Many seed distributions over many years have allowed for the regular introduction of new varieties into local cropping systems, giving farmers an appreciation of a range of different varieties and their particular characteristics (e.g. drought resistance, marketability, duration, etc). Many different varieties have been incorporated into local seed management practices and markets, to the extent that most of the varieties provided by WV were already locally available and therefore not considered to be 'new'. In such cases, the seed provided by WV may have provided a free input that farmers would have otherwise had to buy for themselves, and/or helped to support a farmer group to expand their cropping area and learn to work together. Not all crops or varieties provided by WV were adopted by farmers; for an emergency seed intervention to achieve long-lasting production improvements, the seed provided must be of new varieties that are locally appropriate and preferred by both farmers and local markets.*

Farmer seed systems are effective in allowing farmers to access seed. Newly-arrived refugee farmers relied on host farmers, local markets and food rations to acquire seed. Specific varieties of different crops can be traced to particular UN and NGO seed distributions, which have since been incorporated into local seed systems. Farmers have considerable knowledge about different varieties, seed selection and seed saving, and they are interested to learn more (Recommendation 3). Conversations about varieties, however, are hampered by the various local names for varieties in some cases, and an apparent lack of local names or lack of knowledge about names for varieties in other cases. Different farmers have different types and levels of knowledge and experience about varieties, seed selection and seed saving, and there are opportunities for farmers to learn from each other, as well as from modern or improved agricultural practices and technologies (Recommendation 4).

RQ 2: How have emergency seed interventions impacted on household food security of male and female refugee and host community smallholder farmers?

- *Food security increased for both male and female refugee and host smallholder farmers, but the role of seed in contributing to this increase is relatively minor. Increased access to fertile land was the main reason for the increase in food security among refugee farmers. Planting times, rainfall and climate change are key influencing factors on the productivity of seed. Anticipated increases in yield due to the use of improved varieties could not be attributed to the WV intervention, because many of the varieties provided by WV were already being cultivated by beneficiary farmers. Production decreased in the case of groundnuts.*

Among refugee farmers, increased production through increased access to fertile land was the main reason for improved food security, though they complained about problems in lease arrangements. Refugee farmers felt that they were being taken advantage of by landowning families who often reclaimed the land after it had been cultivated for just one season, after it had been cleared and opened up by the work of the refugees. Both NGOs and local officials are aware of the challenges with lease arrangements and have been encouraging written lease agreements that are witnessed by local leaders and several members of the landowning family (Recommendation 2). Mixed host / refugee groups are being promoted by WV and LWF (and possibly other NGOs), and both host and refugee group members agree that greater interactions between the communities

have led to greater trust and improved social relations. Seed exchanges between host and refugee farmers can also potentially help to promote social relations between the communities.

Feedback from the farmer groups suggest that the VSLAs and agronomic training also contributed to food security and increased productivity. In some cases, money saved through the VSLAs was used to rent land for cultivation. It was also used to help pay for school fees and medical costs, allowing for farmers to better manage the food from their own harvests. Agronomic training contributed to increased yields, along with fertile soils, good weather conditions, and the seeds provided. See Recommendation 4 in relation to agronomic training.

Planting times, rainfall and climate change are key influencing factors on the relative productivity of the seed provided. In general, seed has little or no impact when it is delivered late, unless it can be kept and planted in the following season – this applies mainly to vegetables. Both drought and flooding reduced the productivity of the seed. NGO staff are aware of recent changes in the seasons due to climate change, and they are trying to take these changes into consideration in their planning (see Recommendation 3). Feedback from farmers revealed a decline in groundnut production which is thought to be due to the promotion of discontinued varieties (i.e. Serenut 1 to 6) and the provision of poor quality seed. See Recommendation 6 regarding the need for more effective linkages between LSBs, foundation seed producers and researchers.

RQ3: How have emergency seed interventions impacted on the livelihoods of male and female refugee and host community smallholder farmers?

- *Livelihood impacts were assessed according to changes in expenditure from the income from crop sales for the seeds provided. Based on this indicator, there was some evidence of increased investments in education, land and livestock by refugees, and an increase in financial investments by host and refugee men and women, especially in VSLAs by women. However, the level of increases in these investments was relatively small and was not accompanied by reduced expenditure on food, as might have been expected.*

Beans and vegetables (especially tomato, okra, sukumawiki and onions) were the crops considered by farmers to have the greatest impact on livelihoods. These crops play an important role in terms of household nutrition, and – provided that the right varieties are provided[34] – they can readily be sold for a good price in local markets. Vegetables were regarded by farmers as their "cash account", though carrots have no local market and have not been incorporated into local cropping systems. The local production of okra (by both hosts and refugees) has increased since the influx of refugees since dried okra is well-liked in the South Sudanese diet and can be exported to South Sudan. Given the importance of vegetables, combined with the observation that some seed types are not available in local markets, it is recommended that a particular effort is made to ensure that such seeds are made available through informal seed systems (Recommendation 7).

RQ4: How have emergency seed interventions impacted on informal and formal seed systems (including seed markets) in the local area?

- *The introduction of new, appropriate varieties into informal seed systems is considered to be a positive impact, effectively strengthening the resilience of local cropping systems in the face of drought, floods, pests, diseases and climate change. Within formal seed systems, emergency interventions (along with agricultural development projects) have created considerable demand by NGOs and other implementing partners for certified seed and QDS. This has led to an increase in the number of agro-input dealers and possibly also Local Seed Businesses (LSBs). Whilst the capacity and seed sales of many agro-input dealers have increased, there are also concerns about market distortions due to over-dependence on NGO/project demand, displaced seed sales, and weak seed marketing efforts. At a national level, it is*

[34] The varieties provided by WV and known locally as 'solopelo' and 'binyeba' can be sold in local markets, whereas a red type with smaller grains that was provided by WV in 2021 was not as popular.

also possible that the high demand for seed by emergency interventions has contributed to the widespread problem of 'fake' or adulterated seed.

Informal seed systems have benefitted in cases where emergency interventions have introduced quality seed of new, appropriate varieties. In such cases, new varieties have been fully incorporated into informal seed systems. Where good quality seed of varieties that are already locally available have been provided, this might usefully serve as replacement seed within informal seed systems, particularly for maize, allowing for the genetic purity of a variety to be retained over time. However, since smallholder farmers themselves generally do not recognize the need to replace their seed stocks (with the exception of hybrid maize), the benefits of such seed replacement could not be ascertained through discussions with farmers.

Formal seed systems have benefitted from the increase in the number of agro-input dealers in Adjumani Town and farmers' increased awareness about new, improved varieties. However, there appears to be a disconnect between many of these agro-input dealers and smallholder farmers, raising concerns about the sustainability of agro-dealers in case support from NGOs and development projects were to end. The expansion of agro-dealers in the district has been heavily dependent on emergency seed interventions and agricultural development projects. As these interventions / projects are eventually phased out, agro-dealers will need to adjust their strategies and there will be an inevitable consolidation in the market. There is little evidence that once free seed ends, WV beneficiaries will patronise agro-dealers on a regular basis. Given this conclusion, it seems inevitable that some agro-dealers will go out of business.

Similarly, there is questionable sustainability of the LSB model currently being promoted by NGOs and other LSB supporters. The LSB model clearly failed in the case of groundnuts, in which varieties such as Serenut 2 and 4 are being multiplied long after they had been discontinued by researchers. This example suggests that there is a need for stronger links between researchers, foundation seed producers and LSBs, and more effective verification of QDS seed sources at the district level.

In general, there seems to be a limited understanding of the nature of smallholder seed demand, combined with unrealistic expectations of the extent to commercial supply of QDS and/or certified seed can meet farmer needs. Informal seed markets, in contrast, are more opportunistic and do not rely to the same extent on commercial seed production. Rather than aiming to formalise seed markets, NGOs should aim to support the creation of resilient and sustainable seed markets, both in the formal and intermediate seed systems. Following the example of the District Farmers Association, one way in which this can be encouraged is by linking LSBs to more informal Farmer Seed Producers (including traders who produce their own seed) to ensure that farmers and traders have access to QDS of appropriate new varieties for their own informal multiplication (not necessarily on a commercial basis) – see Recommendation 5.

9.2 Recommendations

Recommendation 1: *Free seed distribution should not be used as a response to chronic poverty or weather events associated with long-term climate change.* ***Chronic poverty*** *must be addressed through other means. To avoid negative unintended consequences on local seed markets, seed interventions must be based on a* ***better understanding of local seed systems*** *and seed markets, including the nature of seed demand by smallholder farmers and the factors (e.g. climate change, new markets) that are driving changing needs.*

The ongoing demand for seed by NGO emergency interventions and other development projects is having negative consequences on the development of a formal seed system (for both certified seed and QDS) that is oriented towards the needs of farmers. Emergency seed interventions are not an appropriate response to chronic poverty or recurring weather events associated with climate change. A better understanding of local seed systems, seed markets, and the nature of seed demand by smallholder farmers can help in designing appropriate seed system interventions.

Recommendation 2: *Issues relating to* ***land access*** *by male and female refugees must be addressed more effectively and in a gender-sensitive manner. Related to this, beneficial linkages between refugees and hosts must continue to be encouraged.*

Given that access to land is the main way in which refugees can increase their production, problems relating to land access must be addressed as a matter of priority. This can be achieved by supporting the efforts of the OPM and local authorities to encourage written, signed and witnessed lease agreements between refugee farmers and landowning families. Mixed refugee–host groups have been seen to be effective in promoting good relationships between the two groups and should continue to be supported. Further investigations may be needed to understand and address any gender disparities in relation to land access.

Recommendation 3: *Future seed interventions should shift their focus from seed* per se *to appropriate and preferred* ***varieties****. This involves a greater understanding about the range of varieties currently being cultivated by farmers, which varieties have market value, and which types of varieties will likely be needed to meet future needs, particularly given the realities of climate change.*

The current assessment has provided some information about local seed systems and local seed markets, and this can be further elaborated by a better understanding about the range of varieties already being cultivated by farmers, which varieties are preferred by local markets, and which types of varieties will likely be needed in response to climate change and other adversities (e.g. drought, flood, pests, disease). Farmers are already moving cropping from the primary to the secondary season as rainfall is now more reliable in the second season. In addition, they are adjusting their crop mix by planting more resilient crops such as cassava. WV can support these adjustments by promoting more drought-resistant and climate resilient crops and varieties. Rather than seed distributions, varieties can be promoted through variety fairs, small test packs of specific varieties, and demonstration plots. A participatory study could be undertaken with farmers to document the varieties cultivated locally, their characteristics (both advantages and disadvantages, particularly in relation to climate change) and marketability.

Recommendation 4: *Reinforce the importance of* ***farmer-saved seed*** *and create opportunities for farmers to learn from each other and others about seed selection and seed-saving practices and technologies.*

Farmer-saved seed constitutes the main source of seed planted by smallholder farmers. The importance of seed saving should be reinforced to ensure that farmers continue to save their own seed, and to ensure that seed is available from other farmers within the community for those who are unable to save their own seed due to poverty. Farmers from different ethnic groups may have different seed-saving practices, creating a wealth of diverse local knowledge among host and refugee communities that farmers can share and learn from. Local traders who regularly produce their own seed can also take part in such learning opportunities. This recommendation emphasises participatory learning among farmers and others, rather than top-down training by agricultural officers, though there are also opportunities to learn from scientific knowledge[35].

Recommendation 5: *Enhance the* ***quality of informal sector seed available in local markets*** *by working with traders who produce and sell own-grown seed.*

Many poorer farmers rely on local markets to acquire seed, yet the seed available in local markets is of variable quality. Some traders produce seed on their own farms and sell it at a premium at planting time. These traders can be supported to provide reasonably-priced, good quality (non-QDS, uncertified) seed of improved varieties. Such support should be tested through a pilot project, but might include linkages with LSBs for access to QDS of improved varieties as source seed, knowledge about seed storage technologies, and loans to enable access to appropriate and locally-available storage technologies (e.g. insecticide, storage

[35] It should be possible for farmers to save seed of green peppers – it is not clear why farmers are not already doing this and needs to be explored.

drums). Potential linkages and pricing structures might also be explored to consider whether traders might sell seed produced by FSPs or LSBs. As a pilot, the project should be co-designed with traders who are willing to participate and who have prior experience in seed management and seed sales. It will also be necessary to work closely with district agricultural officers and ensure that they understand and accept the rationale for the approach.

Recommendation 6: *NGO interactions with formal seed sector actors (e.g.* ***LSBs, agro-input dealers****) must avoid creating market distortions. They should instead be re-oriented to promote market linkages, resilience and sustainability, especially though linkages with informal seed systems.*

The assessment has highlighted various unintended negative consequences of large-scale seed purchases from formal sector seed actors, and unrealistic expectations regarding the growth and commercial viability of FSPs and LSBs. Future seed and seed system interventions must be based on a realistic understanding of the nature of seed demand among poor smallholder farmers and should aim to strengthen the resilience and sustainability of both informal, intermediate and formal seed systems. For LSBs, it is essential that they have good links with foundation seed suppliers who themselves are closely linked with researchers. LSBs can potentially tap into informal seed markets by providing QDS to market traders who produce their own seed (see Recommendation 2 above) and by providing QDS to Farmer Seed Producers. Where there is sufficient demand, agro-input dealers need to market appropriate seed types to farmers, e.g. through vegetable seed sales agents in local markets (see Recommendation 3 above).

Recommendation 7: *Enhance the availability of appropriate* ***vegetable seed and seedlings*** *in local markets and communities. There are various ways in which this might be achieved, and it is recommended to start with a pilot project to test different approaches, as proposed below.*

Information collected by the assessment reveal that farmers are able to save their own seeds of okra, sukumawiki, and local tomato varieties but that they rely on NGOs for access to seed of improved tomato, onions, cabbage and green pepper. Some of these seeds are particularly small and therefore difficult to extract (e.g. onions, cabbage), whereas others might be hybrids (e.g. improved tomato, green pepper[36]), or even both. Given that farmers tend to seek to acquire seed from other farmers and local markets before resorting to agro-input dealers, it is recommended that a pilot project might involve the identification of suitable market traders (i.e. those already dealing with vegetables who also have knowledge and experience in handling seed) who could be trained (and registered by the District Agricultural Office) to act as sales agents for agro-input dealers. Another approach might be to work with some of the more successful vegetable producer groups to test the level of local demand and profitability of selling vegetable seedlings. Given the delicate nature of vegetable seedlings, it is unlikely that they could be transported far, and suitable packaging (seed trays) using locally available materials would need to be found.

Recommendation 8: *Given that women play a particularly important role in informal seed systems, it is necessary to understand the* ***gender-related aspects*** *of household seed management and informal seed markets. It is essential that a gender lens is applied to all recommendations listed here.*

The study confirmed that women have considerable knowledge and experience in seed management at the household level, including seed selection at harvest time, seed storage, as well as seed exchange and seed acquisition. All of the traders who were found to sell seed in local markets were women, illustrating the important role that women play in informal seed markets. The roles of women in informal seed systems must be understood through a gender lens to identify both the constraints and opportunities available to them, particularly given the dynamic nature of gender relations among both refugee and host communities in the district.

[36] If the green pepper variety is not a hybrid, then it should be possible for farmers to save their own seed.

Annex 1. Understanding seed systems in Adjumani District

This annex combines the fieldwork findings with relevant documented knowledge to characterize and describe seed systems and farmer seed management practices among refugees and host communities in Adjumani District.

Smallholder farmers access seed through a variety of channels. The major ones fall into two categories: formal and informal seed systems, with additional intermediary seed systems that have emerged through integrated seed sector development efforts and by the activities of NGOs. These are described below and illustrated by Figure 11.

The **formal seed system** provides farmers with new 'modern' varieties that are offered as 'high quality', certified or quality-declared seed (QDS). Formal channels include government bodies and commercial companies. Within formal systems, seed and grain are produced differently, with clear standards dictating what may or may not be labelled as seed.

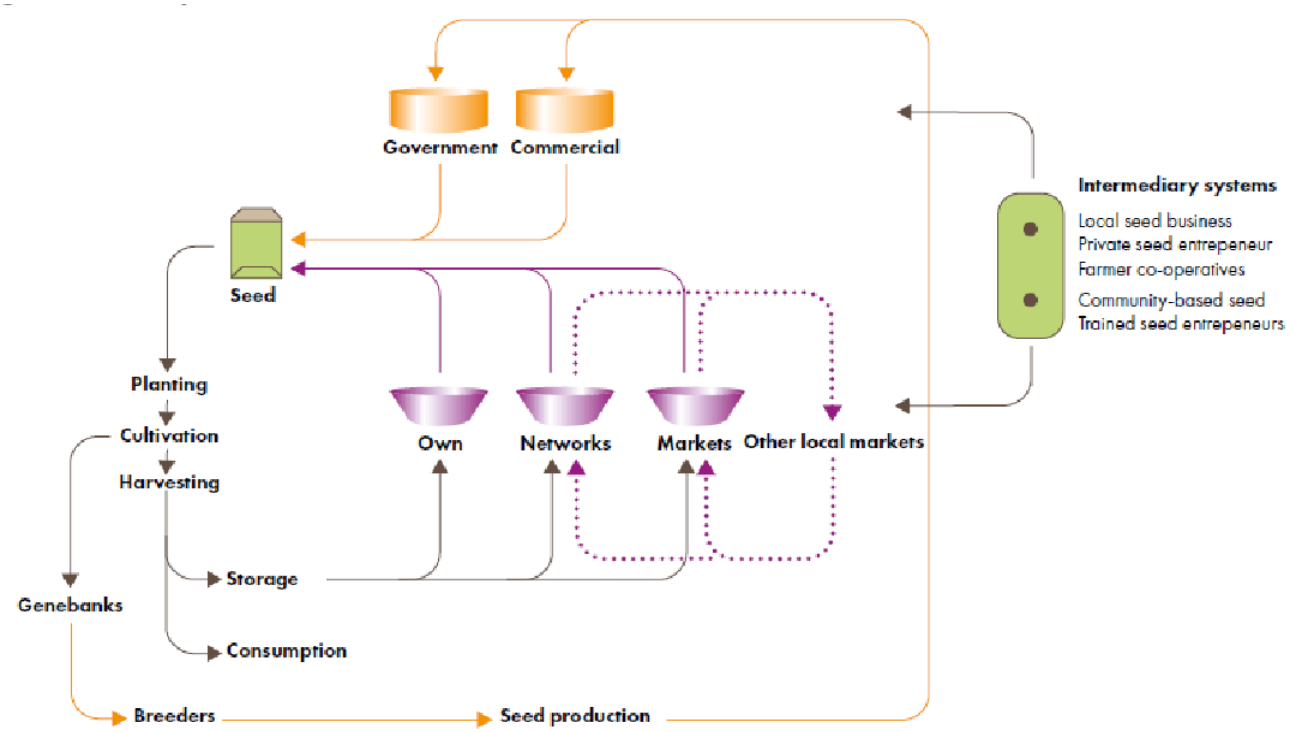
The **informal seed system**, also known as the 'local', 'traditional' or 'farmer' seed system, centers on farmer or local varieties. The informal system includes most of the ways farmers and traders themselves produce, select, disseminate, and procure seed: directly from home harvest, through barter or sale among friends, neighbors, and relatives, and through local grain markets and traders. In the informal system, seed is mainly produced or sorted as an integral part of grain production. Despite its name, the informal seed system also plays a role in disseminating modern varieties, sometimes labelled 'improved', that have been further multiplied on farm.

Intermediary seed systems refer to varied, small-scale enterprises, often local or community-based, including community seed production, farmer cooperatives, smallholder seed enterprises, Local Seed Businesses (LSBs), and local seed system development programs (see Walsh *et al.* 2015). They integrate elements of both formal and informal seed systems.

Smallholder farmers routinely tap these multiple sources for their different seed needs. For example, in Southern Africa, farmers typically procure maize hybrids through agro dealers (formal) and sorghum seed from their own harvest or from neighbors (informal). Smallholders might also use multiple channels even for a single crop. Bean farmers in much of East Africa, for example, obtain some seed from their own stocks, some from markets, and might also get seed of new varieties from an extension agent or research station.

Evidence shows smallholder farmers in Africa access over 90% of their seed from the informal system, with own-saved seed and local markets being particularly important. Seed from the formal system accounts for only about 3% of what is sown (dominated by maize), and the rest comes from a variety of sources, including aid projects and the intermediary seed system (McGuire and Sperling, 2016).

Figure 11. Seed systems and their interconnections



Channels through which farmers obtain seed are depicted by the cylinders. Farmers' own seed stocks, social networks, and local seed/grain markets constitute informal channels. Commercial seed companies, and government or research outlets are formal channels. Intermediary forms vary, but can include farmer cooperatives and other community based seed sources.

Source: modified and expanded from Almekinders and Louwaars, 1999

Source: Sperling et al, 2022: p.9.

A1.1 Informal seed systems and farmer seed management practices in Adjumani District

As mentioned above, the informal seed system includes the selection, production and diffusion of seed by farmers. Varieties can be either 'local' (i.e. inherited from one's grandparents) or introduced from elsewhere (e.g. by farmers, by government, NGO or church projects, or by relief interventions). As such improved varieties are commonly incorporated from the formal seed system into the informal seed system.

One of the main differences highlighted by refugees in their seed management practices between their crop farming in South Sudan and Uganda was that new varieties are made available with much greater frequency in Uganda as compared to South Sudan, allowing them to adopt new varieties. Farmers' decision-making on whether or not to incorporate a new crop or a new variety into their cropping repertoire depends on a wide range of factors, including its adaptation to the local agro-ecology (including drought tolerance), the consumption preferences of the household, the marketability of the crop and variety, and its duration as compared to other crops and varieties to ensure that the harvest season is staggered to some extent by having

a combination of early-maturing and late-maturing crops and varieties[37]. These factors are illustrated by Annex 7 which captures some of the comments made by farmers about specific crops and varieties.

Seed saving by farmers. Across Africa, most farmers keep seed from one season to the next, though levels of seed saving vary across different crops and different farmers. In general, poorer farmers find it more difficult to save seed at harvest time because there are so many competing household needs to be met from the harvested output. Better-off or more meticulous farmers, on the other hand, are able to save enough seed for themselves and for others. Such farmers are often known by others within the community for their seed-saving ability and might be locally regarded as model or master farmers. Women are often especially knowledgeable about seed saving, particularly in agro-pastoral communities where men tend to take responsibility for livestock and women are responsible for crop farming.

The amount of seed saved by a farmer from one season to the next is generally determined by the amount of seed needed for planting the following season, not according to the amount harvested, as is often assumed to be the case (as reported in project documents that are used to justify the need for emergency seed interventions). After the harvest, the proportion of seed saved as compared to the amount of grain that is used for consumption or sold is generally relatively small, though this varies for different crops, depending on both the multiplication rate and the seeding rate of the crop[38]. As mentioned above, some farmers regularly save more seed than they need for themselves. In some cases, if a farmer has a small quantity of seed of a variety of which they would like to grow more, they will make a concerted effort to bulk or increase the amount of seed saved over successive harvests until they have the quantity required.

The focus group discussions found that a challenge in seed saving across all crops for both host and refugee farmers is if the seed is not dried properly the viability is compromised. Rats and weevils were commonly reported as an issue in storage, but no chemical products were used to protect the seed. Some farmers mentioned the use of neem in storage to deter insects. For maize, cobs selected for seed are commonly hung above cooking fires to preserve the seed and discourage pests. For vegetables, seed can be kept in plastic bags or plastic bottles and kept in a warm place, e.g. in the ceiling. Challenges of vegetable seed saving include caterpillars and weevils. Seed of local varieties of tomato is commonly mixed with ash for storage.

Informal sector seed markets. In cases where farmers are unable to save their own seed, they generally acquire it from other farmers or purchase it from the local grain market. In the grain markets visited by the assessment team (in Pakele and Nyumanzi), there were two distinct types of "seed" reported for maize, beans and sorghum. A small number of traders had their own farms where they cultivated both grain and (uncertified) seed for the market. The seed was selected at harvest time and stored separately, taking particular care to avoid pests and damage in storage. Such seed (referred to here as 'trader-grown seed') was sold at a premium at planting time. A market trader selling fresh okra also explained how she regularly sold seed of okra (two varieties) and pumpkin (two varieties) that she cultivated herself. Other traders simply selected and cleaned their best grain by hand and sold this at a premium at planting time (referred to here as 'trader-sorted seed'). Farmers will pay a premium knowing that the seed came from a known variety from a reliable source and that the seed would be fresh. It is also recognized that farmers buy grain which they then clean and select good-looking grains for planting. This is commonly referred to as 'potential seed'. In effect, almost any grain can be potential seed.

[37] This was apparent from the focus group discussions, and has also been documented by Doss (2006) and Fisher et al (2015), among others.

[38] Cereal crops such as sorghum or maize have high multiplication rates and low seeding rates, so the proportion of seed saved out of the total amount harvested is relatively small. Legumes (e.g. beans, groundnut), on the other hand, have lower multiplication rates, so the proportion of seed saved out of the total amount harvested will be higher.

A1.2 Formal seed systems in Adjumani District

Under the formal seed system of Uganda, four dominant seed classes exist: pre-basic seed which is produced by a breeding unit in small quantities for multiplication; basic seed (also known as foundation seed) which is produced by a multiplication unit that is one or two generations after pre-basic seed; certified seed which is the progeny of basic seed produced according to the standards prescribed for the crop being certified; and quality declared seed (QDS) which is also derived from basic seed and certified to less stringent standards. QDS is seed produced by a registered seed producer (individual or a group of farmers) from basic seed and conforms to the minimum standards for variety purity and germination. It particularly offers farmers access to better quality seed than is available through the informal seed system especially for improved groundnuts, soybean, beans, green gram, beans, simsim and sunflower.

In Adjumani District, the main formal seed system actors include Abi ZARDI, the District Agricultural Office and District Commercial Office, MAAIF, farmers and farmer organizations, development and humanitarian partners/programmes, and agro-input dealers. Though seed companies play a key role as primary suppliers of certified seed, they do not have a physical presence in the district. The main private sector players in the formal seed sector are agro-input dealers, who also act as agents, representing multiple seed companies.

Quality control within the formal seed system is regulated through the certification process, with additional checks and seed testing at the District level (see below, Section A1.5).

A1.3 Intermediary seed systems in Adjumani District

The intermediary seed system (also referred to as the semi-formal seed system) is particularly well-developed in Uganda, largely due to government's support for community-based seed multiplication (Mubangizi et al, 2012) and the subsequent efforts of the Integrated Seed Systems Development (ISSD) program (2012–2021). Since its establishment in 2001, the public National Agricultural Advisory Services (NAADS) was training farmers and farmers' groups in seed production and linking them to seed users (*ibid.*). The ISSD approach contributed to the development of the intermediary seed system by promoting the production of Quality Declared Seed (QDS) by Local Seed Businesses (LSBs), as described below. In Adjumani District, another type of seed producer in the intermediary seed system is Farmer Seed Producers.

Local Seed Businesses (LSBs). There are currently thought to be between 15 and 25 LSBs in Adjumani District, promoted initially by ISSD, and subsequently by LWF, WV, PRELNOR and the District Farmers Association (DFA). The LSBs are initially trained by the sub-county agricultural officer and must pass the quality tests before registration by the District Production Office. The LSBs are further trained in all relevant aspects of running the business, including leadership and governance, financial literacy, record keeping, seed production planning, cost benefit analysis (CBA), seed production, post-harvest handling, seed demand forecasting, and marketing, among others. The LSB training approach aims to ensure that LSBs are technically well equipped, professionally organized, market oriented, and strategically linked.

QDS production involves oversight by the District Agricultural Production Department, under supervision and in collaboration with the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). QDS fields are inspected prior to planting and during the growing season. LSBs are supported to access foundation seed (basic seed) through links with NARO and other research institutions such as Makerere University. QDS is produced through multiplication of foundation seed, which can only be obtained from NARO, its Zonal institutes e.g. Abi ZARDI and Makerere University. The production level of foundation seed is generally low, and LSBs have to compete with seed companies and private individuals for the limited supply. One LSB reported a year waiting period after they ordered foundation seed.

LSBs are trained on how to effectively market their seed directly to communities. Their marketing efforts are supported by District Agricultural Offices who are also involved in promoting the uptake of quality seed of improved varieties. Also LSB promoters create market linkages for farmers e.g. LWF links farmers to LSBs; and agricultural officers link qualified LSB to development projects such as NURI (for the sale of groundnut seed) and to NAADS (for sale of cassava cuttings). In some cases, LSBs may be linked to agro-dealers who have supply contracts with NGOs for QDS through the District production office or NGOs.

LSB supporters help to create linkages between farmers and LSBs, including through seed fairs that sometimes form part of emergency interventions. These marketing efforts are also supported by agricultural officers and others who promote the uptake of quality seed of improved varieties. The District Farmers Association, for example, also links LSBs to farmer seed producer groups (FSPs) for the supply of quality source seed. Such efforts are aimed to respond to farmers' demand for seed of new varieties. However, it must be noted that such demand is sporadic and will wane over time, as more farmers acquire the variety and it becomes incorporated into local seed systems.

A1.4 Emergency seed interventions and associated activities by implementing partners in Adjumani District

Interviews with the local authorities in each of the refugee settlements and the two sub-counties visited by the assessment team revealed that seed has been provided by a range of nine different international and local NGOs and three large-scale projects involving the Government of Uganda.[39] Direct distribution was reported as the main modality through which seed has been provided, though LWF and ACF have conducted seed fairs, providing farmers with vouchers to access the seeds. A range of different crops has been provided by the agencies, mainly vegetable seeds, maize, and beans; but cassava, sweet potato, groundnuts, cowpeas, sesame, soybean, rice, and tree seedlings have also been provided.

Seed interventions implemented among refugee and host farmers typically also involve the provision of agronomic training for farmer groups, as well as support for Village Savings and Loans Associations (VSLAs), land access for refugee households, ploughing, and market linkages. Such assistance is consistent with Pillar 3 (Resilience and Self Reliance) of the Government of Uganda's Comprehensive Refugee Response Framework.

Key informant interviews revealed that the perceived purpose of emergency seed distributions is to promote household food security and nutrition through self-reliance; some key informants also indicated that the seed interventions were also intended to increase household income, alleviate poverty and promote more sustainable livelihoods. Longer-term value chain initiatives that provided soybean seed to host farmers were considered to be development interventions (e.g. PRELNOR) and were not the focus of the discussions and interviews undertaken by the assessment team. Interestingly, none of the key informants mentioned the promotion of improved crop varieties as the aim of emergency seed distributions – this is typically a more development-oriented objective, yet it was among the documented outcomes of the WV intervention, as noted in Section 2.2 (i.e. "increased access to improved agricultural technology and inputs").

In addition to the activities under the WV intervention to link smallholder farmers to agro-input dealers, Action Against Hunger (ACF) implemented a one-year project (2021 – 2022) to support agro-input dealers in

[39] These include World Vision, Self Help Africa, Action Against Hunger (ACF), Lutheran World Federation, Caritas, Food for the Hungry, Danish Refugee Council, Community Empowerment for Rural Development (CEFORD, a Ugandan NGO), Alliance Forum for Development (AFOD, a Ugandan NGO), GIZ, and the Northern Uganda Resilience Initiative (NURI). Outside the refugee settlements, seed has additionally been provided by the Red Cross, Project for the Restoration of Livelihoods in the Northern Region (PRELNOR), and Operation Wealth Creation (OWC). NARO also supports Local Seed Businesses for seed multiplication.

Adjumani District to link with smallholder farmers. This was done through the provision of extension services, trade shows, trade fairs, and training. After one year, it was reported that out of 120 farmers who had participated in the project, a total of 10 had purchased inputs from the agro-input dealers.

A1.5 Steps to ensure seed and varietal quality in Adjumani District

In general, seed quality was reported to be an issue for emergency seed interventions, both in terms of the physical quality of the seed itself, as well as the appropriateness of the varieties provided. In terms of physical quality, there have been cases where the seed provided to farmers failed to germinate. The problem of so-called "fake" or counterfeit seed, combined with low quality certified seed (including expired seed) is widespread in Uganda, particularly in emergency seed distributions (Longley et al, 2021).[40] The authorities in Adjumani District have tried to address this in the past two years by multiple inspections and quality tests which are carried out both at the point of supply[41] and at the point of distribution. These tests are undertaken by the District Agricultural Office (DAO) and sub-county agricultural officers respectively. In addition, some NGOs who procure seed from agro-input dealers require that the dealer undertakes their own seed germination tests. In the refugee settlements, seed distributions are witnessed by representatives from the Office of the Prime Minister (OPM) and the Refugee Welfare Council (RWC) to ensure that the seed quality inspections are undertaken and that the correct seed is distributed in the correct quantities. Although it was generally felt that these controls had led to improvements in seed quality, senior-level officials reported that counterfeit or adulterated seed is very difficult to detect and is still being distributed to farmers. The implication was that this issue must be addressed at a higher level.

In terms of varietal appropriateness, it was reported that some seed distribution projects failed to consult with farmers as to their preferred crops and varieties. In the case of WV, field staff first asked farmers which crops and varieties they prefer, and they also consulted with the District Agricultural Officer who advised on which varieties are locally appropriate. In general, various cases in which the wrong variety was provided to farmers were noted from both the key informant interviews and the farmer group discussions. For example, although the NARO CAS1 cassava variety has some level of disease tolerance, farmers do not like it because it rots easily and must be dried before cooking.

A1.6 Understanding farmers' seed demand

Drawing on the findings from the assessment and existing literature (Tripp, 2000), Table A1 summarises the nature of off-farm seed demand by farmers. The nature of seed demand is further explored in Section 8.2.

Table A1. Types of seed demand by smallholder farmers in Adjumani District

Origin of demand	Crop type, level and frequency of demand
Emergency: seed shortage due to displacement, drought or flooding	Large-scale displacement led to high level of seed demand for all crops in first year after re-location, with levels reducing in subsequent years. Scale and frequency of drought / floods determine scale and frequency of seed demand; different impacts on different crops according to timing and extent of drought and floods and multiplication / seeding rates of crops affected.

[40] Fake seed is generally defined to be a combination of expired certified seed, some QDS that has been illegally purchased and re-packaged and in the worst case, grain that is cleaned, packed and sold as certified seed. The government estimates that fake seed in Uganda accounts for 30-40% of all seed offered for sale (GoU, 2018).
[41] Seed is tested for germination, homogeneity and cleanliness before it is approved by the DAO for supply.

Origin of demand	Crop type, level and frequency of demand
Poverty: shortage due to low harvest and/or sale/ consumption of seed stocks	On-going, continuous shortages due to chronic poverty affect poorest households only, among both refugees and hosts. Despite training, harvests may remain low due to small farm size and competing labor demands which result in late planting and late weeding. Pressing demands for food and income at harvest time make it difficult for poor farmers to set aside seed for most crops, especially those with low multiplication and high seeding rates.
Seed quality: hybrid seed use; market standards for grain require quality seed	Occurs mainly in more commercial farming systems, where farmers recognise the need to replace seed stocks for some crops and have the necessary purchasing power to do so. Hybrid maize is the main crop in this category that is relevant to the target farmers, also hybrid vegetables (e.g. some varieties of tomato, green pepper, onion, cabbage). This category also applies to cash crops for which market standards for grain quality encourage the regular purchase of seed; apart from possibly soybean (which is also difficult to store), the assessment team were not aware of such crops grown by the target farmers.
Crop-specific constraints to seed-saving	Applies to crops for which the seeds are difficult to store (e.g. soybean) or difficult to extract (e.g. onion, cabbage). Seed demand for these crops is recurrent. This may also apply to cassava planting material which is challenging to maintain in large quantities on-farm throughout the dry season because it is reportedly often trampled by grazing livestock after other crops have been harvested.
Variety change: seed as a source of new variety	This type of demand is one-off or occasional rather than continuous; once a farmer has acquired seed of a new variety, then the seed can be saved from one season to the next. Depending on the crop, demand may be constrained by the limited number of varieties available.

Source: Adapted from Tripp (2000).

Annex 2. Participatory impact assessment approach

Overview (extracted and adapted from Catley et al, 2013)

Participatory impact assessment (PIA) involves adapting participatory methods to measure changes in people's livelihoods over time, and to understand how different factors caused these changes. In contrast to many traditional project monitoring and evaluation (M&E) approaches, PIA aims to measure the real impact of a project on the lives of project participants. This differs from evaluation because many evaluations focus on measuring project objectives, the extent to which they were achieved, and if they weren't, why not. PIA goes beyond typical evaluation and the measurement of objectives, and examines how project activities actually benefited the intended recipients, if at all.

There are three main types of PIA methods – ranking or scoring, visualization, and informal interviews. Conventional statistics can be used to summarize and analyze the numerical data produced by standardized ranking, scoring and visualization methods, and this can include comparisons of different types of activity or support. Measures of project impact can be translated into economic values, which, in turn, support benefit–cost analysis. These aspects of PIA are particularly useful when engaging in policy reform processes or developing good practice guidelines.

Information and numbers from participatory methods are validated through triangulation, and analysis of a project's technical plausibility. The question of attribution is addressed through different types of comparisons. Using comparisons in PIA can be very useful for improving the credibility of the findings, but needs a good understanding of the project design and activities, and the wider context in which the project took place. When PIA is well-designed, with a good understanding of local context and the systematic use of comparisons and triangulation, it seems to produce evidence that is of reasonable quality and which a range of people – from community members to policy makers – can understand and use.

Design of the PIA used for the WV seed intervention, Adjumani District

PIA STAGE	RESPONSE IN THE CONTEXT OF THE PROJECT
Stage 1: Define the questions to be answered by the PIA	1. How have changes in food production and productivity impacted HH food security? This was done through use of SEASONAL CALENDAR for select cereals to establish hunger months. 2. How have beneficiaries invested income from sale of crops to bring about HH livelihood gains? [The study used the Sustainable Livelihoods Framework (SLF) to score on Social, Financial, Human, Physical, Natural capitals].
Stage 2: Define the geographical and time limits of the project	Time Boundaries were established through the use of Historical timeline to establish significant and memorable events in the community as well as when the interventions started. Through conversation, each community group was able to place the start date of the intervention on their historical timeline. Geographical boundaries: This exercise was not done due to limitation of time and also because the areas of project coverage were relatively well defined by the agencies as well as the refugee settlement leadership.

PIA STAGE	RESPONSE IN THE CONTEXT OF THE PROJECT
Stage 3: Identify and prioritise locally defined impact indicators	**Quantitative Indicators:** Two main indicators understood by the farmers were used for the conversations: 1. Production of crops and 2. Expenditure of Income from crop sales **Qualitative indicators:** 1. Improved knowledge & skills of agricultural practices or technologies, savings and investment 2. Gender inclusion in decision-making at HH level
Stage 4: Decide which methods to use for measuring change, and test them	**IMPORTANT NOTE:** Data collection was undertaken in mixed-gender and single gender groups. The ideal number was 10 people per group but this was often exceeded. Where more than 10 community members came to the venue of the meeting the study team allowed the additional members to stay and listen to the conversation but not to participate. In the FGD groups of 10, only five participants were invited to score. The five were chosen carefully from the group of 10 to include individuals who had a considerable history in the project and were also able to articulate the history of the community. The participation of the 10 or more individuals in conversations about the intervention aided recall even for the scorers and was a very empowering experience for the participants. **PIA ACTIVITIES/METHODS** 1. The focus group discussions happened within the context of already established socio-economic groups either formed or adopted by the agencies for purposes of undertaking the project intervention. They were all farmer groups particularly involved in crop production. The interview venues were mostly in common community facilities such as under a tree at a community centre or compound. 2. Once everyone was comfortable, the chief investigator, working with two assistants who were conversant with the local language and etiquette then introduced the subject and started by drawing the community **historical timeline** and encouraging conversation around the main events in the community's recent history. The meeting also established and prioritised by consensus the most significant intervention and seed provided by World Vision. 3. The investigators then used **proportional piling** method (20 counters) to establish the production of each crop "Before" and "After" the intervention. Each of the 5 individuals selected to score in each group were then given the opportunity to score and requested to explain the reasoning behind the proportions. The responses were carefully recorded by the study team in the note books and prepared score-sheets (See Annex).

PIA STAGE	RESPONSE IN THE CONTEXT OF THE PROJECT
	4. Next, the investigators used the **Seasonal Calendar** to establish household food security. This was done by allowing the five respondents to use the counters to show which months their households had food (mostly grains – cereals and legumes) and which months there was no food in the household, before and after the intervention. The "Hunger Months" were then recorded 5. Finally, the respondents were requested to score through **proportional piling** what they did with the income from sale of crops – before and after the intervention.
Stage 5. Decide which sampling method and sample size to use	The sampling of the various settlements to visit was purposive and was done in consultation with the agency staff guided by the following factors: 1) Focus on the same three settlements where data were collected for the 2021 end of project evaluation (Mungula II, Maaji III, and II). 2) Focus on crop farmers (not pastoralists) 3) Representativeness ● Gender (and age if possible) – male headed/female headed Hhs ● Balance between Refugee HHs (70%) and vs Host Community HHs (30%) ● Veg garden groups and block farm groups ● Individually targeted farmers vs group members (how to sample?)
Stage 6. Decide how to assess project attribution	It was established prior to the field work and with the farmers during data collection that there were various similar interventions by other agencies. However, the methodology ensured that conversations were focused on the specific activities sponsored by WV, allowing for project attribution.
Stage 7. Decide how to triangulate results from participatory methods with other information	The data from the PIA conversations was triangulated with information from the FGDs and Key Informant Interviews undertaken during the assessment and with information from previous project monitoring reports.
Stage 8. Plan the feedback and final cross-checking of results with communities	Feedback was provided to WV at field-level in Adjumani and later to members of the WV national team. The draft final report was shared with WV staff for their review prior to finalisation.

Annex 3. PIA Score Sheet

S34D PARTICIPATORY IMPACT ASSESSMENT

FIELD SCORE SHEET

INFORMED CONSENT

Enumerator, to seek consent along

Hello, my name is _____.

We are interested to learn about your experience with the LWF / WV project and the impacts that it has had on your household. This information will help us understand how LWF / WV and other NGOs can provide better support in the future. You can choose to be part of the discussion or not, as you please. Whether or not you participate in this discussion, the current support that you receive from LWF / WV will not be affected in any way. The discussion will take about 2 hours. Do you agree to take part in this discussion and to answer our questions?

DESCRIPTION	SCORES					
	R1	R2	R3	R4	R5	
Partner organisation: World Vision/LWF						
Site/Community:						
GROUP DESCRIPTION:						
RESPONDENT PROFILES						
· Age: Adult [A] Youth [Y]						
· Gender: Male [M] Female [F]						
Married with spouse at camp [M] Married with spouse away (A) Widowed [W] Single [S]						

· HH size (How many are in your HH and Feed from the same pot?) [NUMBER SCORE]						
· Who makes decisions about what seeds are planted in your HH? (Self (M), Spouse (S), both of us (B), All in HH including children (A))						
Persons with Special Needs: Disabled [D], Elderly (E), Caregiver (C)						
· Refugee (R), Host (H)						
PERIOD OF SEED INTERVENTION (from Tool 1 and agency briefing):						
TOOL1: DRAW HISTORICAL TIMELINE AND PLOT KEY EVENTS AND INTERVENTION IN THE COMMUNITY TO AID THE CONVERSATION [NOT FOR SCORING BUT FOR CONVERSATION. SOME QUESTIONS: 1) WHEN WAS GROUP FIRST FORMED? 2) WHAT ACTIVITIES HAVE YOU DONE? 3) WHAT ELSE HAS HAPPENED IN THIS COMMUNITY THAT YOU CAN REMEMBER AND WHEN DID THEY HAPPEN?] 4) WHEN DID YOU RECEIVE SEED INTERVENTION? NOTE ANY KEY POINTS HERE:						

TOOL 2: NGO SUPPORT & AGREEMENT ON 3 MOST IMPACTFUL SEED TYPES 1. WHAT TYPES OF SUPPORT DID LWF/WVI PROVIDE [LIST ALL SUPPORT] 2. WHAT CROP-SEEDS DID YOU RECEIVE FROM WVI/LWF? 3. FOR EACH SEED, WHAT HAVE BEEN THE BENEFITS? 4. WHICH WERE THE 3 MOST IMPACTFUL SEED TYPES AMONG THOSE YOU RECEIVED?						
TOOL 3: PRODUCTION /PRODUCTIVITY IN THE 3 ENTERPRISES [Tell them to focus the 3 crops for the next bit of the conversations]						
CROP 1:						
BEFORE						
AFTER						

CROP 2:						
BEFORE						
AFTER						
CROP 3:						
BEFORE						
AFTER						

PROBES: What reasons would you give for the increase/decrease in production/productivity?

REASON FOR INCREASE	REASON FOR DECREASE
· New crop (didn't plant this before the project) [ ] · Good rainfall [ ] · Fertile soils/ fertilizer application […..] · Accessed more land through the project [….] · Accessed more land for myself; […..] · Variety provided is higher-yielding; […..] · Varieties provided were more resistant to pests, diseases, and weather challenges [……] · Agronomic training from the project; […..] · Motivation / support from group; […..] · Cash from VSLA paid for farm labour […..] · Other (specify) [……]	· Drought/ poor rainfall […….] · Waterlogging […….] · Poor/ infertile soils [….] · Land was small [……] · Pests and Diseases [……] · Seed not adequate [……] · Other (specify) [……]

TOOL 4: HUNGER MONTHS How many months of the year would you have the LEAST amount of food in your Household from your garden/ fields harvest?							
BEFORE							
AFTER							
PROBE: What were the reasons for this lack of food?							
TOOL 5: WHERE INCOME FROM THE SALE OF PRODUCE OF THE 3 FOCUS CROPS WAS USED IN THE HH?							
SCHOOL FEES	BEFORE						
	AFTER						
MEDICAL NEEDS	BEFORE						
	AFTER						
BRIDE PRICE	BEFORE						
	AFTER						
LAND/LIVESTOCK	BEFORE						
	AFTER						

INVEST IN BUSINESS	BEFORE						
	AFTER						
SAVED IN VSLA	BEFORE						
	AFTER						
FOOD FOR MY FAMILY	BEFORE						
	AFTER						
LOAN REPAYMENT	BEFORE						
	AFTER						
HOUSING/HH ITEMS & CLOTHING	BEFORE						
	AFTER						
In your Household, who makes the decision on how this income is spent? (Self (M), Spouse (S), both of us (B), All in HH including children (A))							
PROBE:							

Annex 4. Checklists used for Focus Group Discussions

A. Introductions:

- Self-introductions of team members
- Self-introductions of farmers [Note number of women and men and whether youth or adult][42]
- Purpose of visit & informed consent

> We are interested to learn about how you manage the seeds for some of the crops that you grow. This information will help us understand how LWF and other NGOs can provide better support in the future. You can choose to be part of the discussion or not, as you please. Whether or not you participate in this discussion, the current support that you receive from LWF will not be affected in any way. The discussion will take about 2 hours and refreshments will be provided. Do you agree to take part in this discussion and to answer our questions?

B. Identify focal crops: I want to understand which crops are most important in this area, whether grown as a group or as individuals:

a) which crops contribute the most to household consumption?
b) which crops generate the most income from sales?
c) are there any other crops that are important to you? Why?
d) agree on three or four most important crops from (a) (b) and (c) to focus the remaining discussion. Check that these crops are grown individually, not only on group farm.

C. For each focal crop:

1. Is it a "new" crop (compared to what you cultivated in South Sudan, or compared to before the refugees arrived)?
2. How many varieties of this crop are commonly grown locally?
3. Describe each variety:
    i. Is it a local variety (from their grandparents), a variety brought from South Sudan, or an improved variety.
    ii. What was the original seed source / when was it introduced?
    iii. What were the seed sources for last season?
    iv. Has anyone sold or shared seed with others? Provide examples if so.

Specific points of interest for probing / follow-up:

- Any changes in seed saving practices and quantities / frequency of seed saving
- Seed sales / exchanges between hosts and refugees
- New crops or varieties from NGOs or other sources
- Information about local seed markets and informal traders
- Sources and frequency of purchase
    - Which crops and why
    - Agro-dealers (where, who, which crops)
    - LSBs / FSPs (where, who, which crops)

[42] The number of participants by the end of the meeting will likely be different (as others may join later), so the number of participants should also be noted at the end of the meeting.

Annex 5. List of key informants interviewed

Date	Position / Place / Organization / Company	Name	Gender
29-Jun	OPM Asst Commandant, Boroli Settlement	[redacted]	Female
29-Jun	RWC1, Boroli 1 Settlement	[redacted]	Female
29-Jun	LC1 Chairperson & VSLA Group member	[redacted]	Male
30-Jun	District Agricultural Officer	[redacted]	Male
30-Jun	Omia Agri Business Development Group	[redacted]	Female (2)
30-Jun	Apiviva Agro-dealer	[redacted]	Female
30-Jun	Farmers Hive Agro-dealer	[redacted]	Female
1-Jul	District Production Officer	[redacted]	Male
1-Jul	District Commercial Officer	[redacted]	Female
1-Jul	Kamart Ville Consultants Agro-dealer	[redacted]	Male
1-Jul	Oruba AgriLink Agro-dealer	[redacted]	Male
1-Jul	Planet Agro Inputs	[redacted]	Female
1-Jul	District Farmers Association	[redacted]	Male
4-Jul	OPM Assistant Commandant, Mungula	[redacted]	Male
4-Jul	Mungula II RWC1	[redacted]	Male
4-Jul	Itirikwa S/C Agricultural Officer	[redacted]	Male
4-Jul	Itirikwa S/C LC3 Chairman	[redacted]	Male
5-Jul	OPM Asst Commandant, Maaji Settlement	[redacted]	Male
6-Jul	Ukusijone s/c LC3 Chairman	[redacted]	Male
6-Jul	RWC2 Maaji III	[redacted]	Male
12-Jul	KII Agro-dealer/LSB Pakele	[redacted]	Male
12-Jul	Agro input dealer	[redacted]	Male
12-Jul	Pakele Market traders (3)	[redacted]	Female (3)

Annex 6. KII checklists

At the start of each interview, introduce yourself and explain the purpose of the project:

- I am working for Catholic Relief Services on a USAID-funded project called Supporting Seed Systems for Development (S34D)
- We are undertaking a study to determine the impacts of Emergency Seed Interventions on farmers and seed systems in Adjumani District.
- I have some questions that I would like to ask you about [seed systems in Adjumani / seed interventions in this area / your company and your involvement in seed projects / as appropriate]
- The information you provide will help us to understand the broader context relating to seed systems / how refugee and host communities can access seed / how seed interventions can create more sustainable seed systems and encourage greater self-reliance among refugees]
- This interview will take approximately [30 minutes / 1 hour].
- Do you agree to proceed with the interview?
- I can provide the email contact of the Team Leader in case you need this: [kate.longley@crs.org – if requested]

A. Interview checklist for OPM Assistant Settlement Commandant

1. What is your name?
2. Which Settlements are you responsible for?
3. How long have you been working in this / these Settlements?
4. Which agencies have been involved in seed distributions that you're aware of?
5. What are the different ways in which they've provided seed? (e.g. direct or in-kind distribution; seed fairs and vouchers; other)
6. Do they provide to groups or individual farmers? Refugees and/or hosts? Mixed refugee/host groups, or separate groups?
7. What would you say is the main objective of the seed support?
8. What other types of support or complementary activities are provided with the seed?
9. What are the different ways in which land can be accessed by refugee farmers?
10. Are you aware of any land that has been cleared but not planted due to lack of seed, or late delivery of seed? Describe if so.
11. What are some of the other ways that farmers in this area can access seed, apart from the seed provided by NGOs and government projects? [Probe for details about markets, traders and other seed providers, including gender]
12. Are there any Local Seed Businesses (LSBs) or Seed Producer Groups in the Settlement?
    a. If yes, when were each of these established and how do they operate, who do they sell seed to?
    b. What have been their successes?
    c. What have been their challenges?

B. Interview checklist for Refugee Welfare Council Chairperson (RWC 1 or 2)

1. What is your name?
2. What are your responsibilities?

3. How long have you been in this Settlement?
4. Which agencies have been involved in seed distributions that you're aware of?
5. What are the different ways in which they've provided seed? (e.g. direct or in-kind distribution; seed fairs and vouchers; other)
6. Do they provide to groups or individual farmers? Refugees and/or hosts? Mixed refugee/host groups, or separate groups?
7. What would you say is the main objective of the seed support?
8. What other types of support or complementary activities are provided with the seed?
9. What are the different ways in which land can be accessed by refugee farmers?
10. Are you aware of any land that has been cleared but not planted due to lack of seed, or late delivery of seed? Describe if so.
11. What are some of the other ways that farmers in this area can access seed, apart from the seed provided by NGOs and government projects? [Probe for details about markets, traders and other seed providers, including gender]
12. Do you know of any Local Seed Businesses (LSBs) or Seed Producer Groups in or near the Settlement?
    a. If yes, when were each of these established and how do they operate, who do they sell seed to?
    b. How have they benefitted the farmers?
    c. What have been their challenges?

C. Interview checklist for Host Community LC1 Chairperson

1. What is your name?
2. How long have you been LC1?
3. Are you involved in any NGO or government projects involving seed? Describe if so.
4. Which agencies have been involved in seed distributions that you're aware of since the refugees came to this area?
5. What are the different ways in which they've provided seed? (e.g. direct or in-kind distribution; seed fairs and vouchers; other)
6. Do they provide to groups or individual farmers? Refugees and/or hosts? Mixed refugee/host groups, or separate groups?
7. What would you say is the main objective of the seed support?
8. What other types of support or complementary activities are provided with the seed?
9. What are the different ways in which land can be accessed by refugee farmers?
10. Are you aware of any land that has been cleared but not planted due to lack of seed, or late delivery of seed? Describe if so.
11. What are some of the other ways that farmers in this area can access seed, apart from the seed provided by NGOs and government projects? Does the host community provide seed to refugee farmers? [Probe for details and provide examples, including gender details]
12. Do you know of any Local Seed Businesses (LSBs) or Seed Producer Groups in or near the Settlement?
    a. If yes, when were each of these established and how do they operate, who do they sell seed to?

b. How have they benefitted the farmers (members / non-members / hosts / refugees)?
c. What have been their challenges?

D. **Interview checklist for Sub-County LC3 Chairperson, Agricultural / Extension Officer and /or Community Development Officer**

It might be necessary to interview these together as a group due to time constraints

1. What is your name?
2. Name of sub-county. Which Settlements are located in this sub-county ?
3. How long have you been working in this sub-county?
4. **For Agricultural / Extension Officer: What is your role in seed projects?**
5. Which agencies have been involved in seed distributions since you've been working here?
6. What are the different ways in which they've provided seed? (e.g. direct or in-kind distribution; seed fairs and vouchers; other)
7. Do they provide to groups or individual farmers? Refugees and/or hosts? Mixed refugee/host groups, or separate groups?
8. What would you say is the main objective of the seed support?
9. What other types of support or complementary activities are provided with the seed?
10. What are the different ways in which land can be accessed by refugee farmers?
11. Are you aware of any land that has been cleared but not planted due to lack of seed, or late delivery of seed? Describe if so.
12. What are some of the other ways that farmers in this area can access seed, apart from the seed provided by NGOs and government projects? [Probe for details about markets, traders and other seed providers, including gender]
13. Are there any Local Seed Businesses (LSBs) or Seed Producer Groups in the Settlement?
    a. If yes, when were each of these established and how do they operate, who do they sell seed to?
    b. What have been their successes?
    c. What have been their challenges?
14. **For Agricultural / Extension Officer:**
    a. Based on your experience, what have been some of the positive impacts of the seed interventions? What are the key factors that contribute to positive impacts?
    b. Have there been any negative impacts or unintended consequences?
    c. How can refugee farmers have sustainable access to seed in the future?

E. Interview checklist for Agro-input dealers

1. Name of AD Shop, name Interviewees
2. What's your position / gender – years in this position / shop
3. Gender of Owner
4. Years in business in Adjumani
5. Other branches in Uganda
6. Other sales outlets / sales agents in Adjumani
7. Products and services sold: what types of seed; what other services? (e.g. training, extension, tractor services, etc). Do you sell QDS or other seed classes (e.g. foundation seed)

8. Who do you sell seed to – different customer types, e.g. NGO / Govt projects; Other Agro-input retailers; Large commercial farmers; smallholder farmers; project-supported farmers; institutional buyers (e.g. schools, prisons – specify)
9. Size of business - Options in order of preference:
    a. Compared to other agro-dealers in Adjumani
    b. Annual Sales
    c. # of individual clients + # of institutional (including NGO's buyers)
10. For the different crops, what proportion of seed sales are purchased by the different customer categories?
11. Do you help to link your farmer customers to (grain) output markets in any way? Examples
12. How is seed supplied to NGOs / govt programmes, e.g. delivery to office, deliver to farmers, seed fair / vouchers, collection from AD shop.
13. Any other processes or services involved in seed purchases / contracts from NGOs / govt projects?
14. How has demand for seed from NGOs /govt projects affected your business? Have seed sales gone up or down? Quantify if possible. Any other changes in the way you do your business?
15. Have any NGOs or govt project helped you to establish or strengthen links with refugee farmers / host community smallholders for continued sales? E.g. gaining clients through seed fairs or subsidy programs. Please provide examples
16. Challenges to business
17. Opportunities

F. Interview checklist for Farmer Seed Producer Groups / Local Seed Businesses (LSBs)

1. Name of interviewee(s) and position in Group / LSB
2. Type and name of Group / LSB
3. Location, incl. sub-county:
4. How long have you / your group been multiplying seed?
5. How many group members / seed growers are there (male / female)? Do you have a group farm and / or individual plots? How many farms? How many plots? Approximate total area for seed production.
6. Describe how your group / LSB was established. What types of support did you receive, from which agencies / projects? Is the support on-going? If no, when did this support end?
7. Does your group have any certification / registration? Describe if so.
8. Which crops and varieties do you multiply?
9. What type of source seed do you use? How and from where do you obtain your source seed for the different crops / varieties?
10. Have you had any challenges in obtaining source seed? Describe if so.
11. What are the quality checks that are done and who does these – both during the growing season and after harvest / processing?
12. Do you package your seed in any way? Describe.
13. Who are your customers? (Different customer types)
14. How do you link to customers / market the seed that you produce?
15. Please provide approximate percentages of seed sold to different customer types (by crop).

16. Please summarize production and sales (by crop / variety) for recent years, including sale price.
17. Have you had any challenges in selling your seed? Describe if so.
18. How has your business benefited farmers, both group members and non-group members?

G. Interview checklist for Informal Traders (*Awara*)

1. Name
2. Name of business
3. Number of years in this business
4. Are you a member of any Traders Association or Co-operative or other Group? Which one, if so. What support does this provide to your business?
5. Please describe your business – products sold, where/ how purchased, where / how sold
6. Do you differentiate seed from grain? Describe how you differentiate, e.g. sourcing, quality assurance / quality checks, handling, processing, packaging, storage, price, etc.
7. Who are your preferred seed suppliers? How do you find your seed suppliers?
8. What are the purchasing arrangements? Any advance arrangements, e.g. advance loans, input supply, etc.
9. Who do you sell your seed to? (Customer types)
10. How do you market your seed? How do you find your customers?
11. Do your customers ask for specific varieties or crop types?
12. Where do you sell? Do you have any sales outlets or agents? Describe if so
13. What are the sale arrangements, e.g. do you provide seed on loan basis?
14. What are the challenges that you've experienced in the seed business?
15. What are your ideas for how can these challenges be overcome?

Annex 7. The sustainable livelihoods framework

The sustainable livelihoods framework helps to organise the factors that constrain or enhance livelihood opportunities and shows how they relate to one another. A central notion is that different households have different access to livelihood assets, which the sustainable livelihood approach aims to expand. The livelihood assets, which the poor must often make trade-offs and choices about, comprise:

- **Human capital,** e.g., health, nutrition, education, knowledge and skills, capacity to work, capacity to adapt
- **Social capital,** e.g., networks and connections (patronage, neighbourhoods, kinship), relations of trust and mutual understanding and support, formal and informal groups, shared values and behaviours, common rules and sanctions, collective representation, mechanisms for participation in decision-making, leadership
- **Natural capital,** e.g., land and produce, water and aquatic resources, trees and forest products, wildlife, wild foods and fibres, biodiversity, environmental services
- **Physical capital,** e.g., infrastructure (transport, roads, vehicles, secure shelter and buildings, water supply and sanitation, energy, communications), tools and technology (tools and equipment for production, seed, fertiliser, pesticides, traditional technology)
- **Financial capital,** e.g., savings, credit and debt (formal, informal), remittances, pensions, wages.

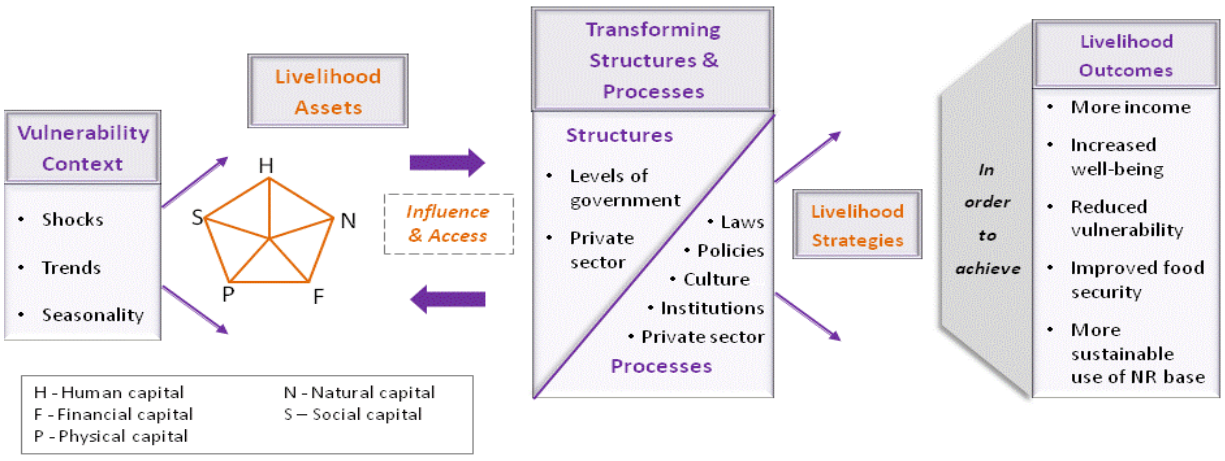


Figure 12: Sustainable livelihoods framework (Source: DFID (1999))[43]

[43] 3.1 The sustainable livelihoods framework and the asset pentagon (soas.ac.uk)

Annex 8: Farmers perceptions of crops and varieties

The different crop seeds were appreciated for various benefits including, selling of the crops, and using income for school fees payment, buying household items such as clothes and utensils, saving in VSLAs and repaying loans, renting land for production, buying livestock and poultry, and for transport, welfare, and medication. Beans and maize were specially commended for providing income and food for the households. The bean seeds provided are indicated to be early maturing, are grown in two seasons a year, rich in nutrients and good for children, are resistant to pests and diseases, easy to store and are very marketable fetching very good prices in the market and schools. Vegetables including onions and sukumawiki are mainly sold and are said to fetch more money than other crops even when grown on a small size of land, have readily available market, and provide food almost daily. The sukumawiki was appreciated for being early maturing. Groundnuts are preferred because they fetch more money if planted in time, the soil is favourable for their cultivation, they are easy to manage in the field, resistant to pests and diseases, and always have readily available market. Maize is also highly marketable, flood drought resistant, can be consumed fresh before it dries and can also be planted in two seasons during the year.

Maize: Although WV reported to have provided a small quantity of Bazooka maize seed to farmers, none of the groups that were visited by the assessment team appeared to have received this variety. One of the Group Leaders in Mungala II had been to the Gulu Trade Fair and was very impressed by Bazooka variety (hybrid, quick-maturing – 2.5 months); a local farmer (not a group member) was known to have planted it, and other farmers were also impressed. Another group (host farmers in Ukusijoni) had received different maize varieties from WV in 2020 and 2021 - seed of both varieties was retained for planting the following season, with a preference for the 2020 variety (possibly a hybrid) which does well and produces two big cobs per plant. Danish Refugee Council (DRC) first provided seed of Longe 5 in 2016 to farmers in Mungala II which was still being planted by group members. Longe 5 and Longe 10H (H standing for hybrid) varieties produce two cobs per plant (Alabi, *pers. comm.*)

Beans: Each farmer typically grows two or three varieties out of some six or seven varieties locally available. Farmers are not familiar with the names of the varieties (both local and improved), making it difficult to distinguish them. Lokiri[44] is a popular variety with long seeds and can be sold in the market - some farmers originally acquired the seed of this variety through selecting it from their food rations. The same variety was also provided by NURI in 2021. The seeds of at least three varieties were reported by refugee farmers to have been acquired originally from host farmers at the market. A variety that had originally been provided by Danish Refugee Council (DRC) is no longer planted because farmers prefer the variety that was provided by WV (known as "solopelo" because it was originally provided by Self Help Africa). This might correspond to a variety provided by WV in both 2020 and 2021 (reported by WV to be NABE 16) which was said by one group to be the same as one of the locally-available varieties. Another bean variety that was received from WV in 2021 ("binyeba") was saved and re-planted. WV also brought a red type with smaller grains in 2021 (thought to be NAROBEAN 3 or 4), though this was not very popular – only one farmer out of 11 refugee farmers in the discussion in Mungula II settlement reported to have planted the seed again in the following season. All farmers reported to save bean seed from one season to the next, but some bean varieties do not yield well in the second year, possibly due to weevil damage in storage.

[44] Lokiri is reported to be a NABE variety, and the name implies the red and white colour (Alabi, *pers. comm.*)

Rice: Farmers from a host farmer group in Ukusijoni reported to plant two varieties ('supa' and 'upland' variety), both of which were said to be local varieties[45] from their grandparents. Seed is kept from one season to the next, and can also be acquired through farmer-farmer exchange or loan.

Groundnut: In Ukusijoni sub-county, a host group reported that three varieties are grown locally (thought to be Serenut 3 and 4 mainly, with some Serenut 2). Serenut 2 was said not to be as popular because it no longer yields as well as it used to, though the LSB agro-input dealer in Pakele reported otherwise, saying that it was still in high demand by farmers and it is the main groundnut variety he carries. Serenut 3 is drought-tolerant, but Serenut 4 is reportedly not drought tolerant. The variety known as Red Beauty was not mentioned by the WV group farmers met by the field team, but it was found to be common in the north-eastern part of the District.

Soybean: Host farmers in Ukusijoni explained that this is a new crop introduced some three years ago. They first acquired soybean seed from other farmers and NURI programme subsequently provided seed as well. There are 2 or 3 common types grown locally (Maksoy 2N, Maksoy 3N, Maksoy 6N).

Okra: Okra production has increased since the influx of refugees. Seed is saved from one season to the next. It was subsequently reported that WV provided the Clemon spineless variety (Alabi, pers. comm.).

Tomato: The local tomato variety is mixed with ash for storage, but after a while it doesn't germinate well. There seems to be a preference for the improved (hybrid) tomato seed provided by WV, though farmers noted that this cannot be saved and must be purchased if not provided by NGOs.

Carrot: Farmers are not familiar with carrots: they are not part of the local diet and they do not know how to cook them. Farmers reported that there is no local market for carrot and they are not growing them.

Eggplant is often sourced from other farmers, suggesting that not all farmers save their own seed.

[45] The name "supa" or "super" has been used to refer to various different improved varieties that may have originated from an improved high-yielding lowland variety developed by the International Rice Research Institute in the Philippines. The variety known locally as "upland" is thought to be NERICA III variety (Alabi, *pers. comm.*)

References

Catley, A., Burns, J., Abebe, D., Suji, O. (2013). Participatory Impact Assessment: A Design Guide. Feinstein International Center, Tufts University, Somerville. https://fic.tufts.edu/publication-item/participatory-impact-assessment-a-design-guide/Doss, C.R. (2006). Analyzing technology adoption using microstudies: limitations, challenges, and opportunities for improvement. Agricultural Economics, 34: 207-219.

Fisher, M., Abate, T., Lunduka, R.W., Asnake, W., Alemayehu, Y., and Madulu, R.B. (2015). Drought tolerant maize for farmer adaptation to drought in sub-Saharan Africa: Determinants of adoption in eastern and southern Africa. Climatic Change, 133: 283–299.

McGuire, S., Sperling, L. 2016. Seed systems smallholder farmers use. Food Sec. 8, 179–195. https://doi.org/10.1007/s12571-015-0528-8

Mubangizi, Emmanuel, Diana Nandagire Ntamu, Wilfred Mwesigwa Thembo and Marja Thijssen, 2012. Uganda Seed Sector Assessment. ISSD Briefing Note – September 2012. ISSD Africa.

Sperling, Louise, Andrea Mottram, Wilfred Ouko and Abby Love. 2022. Seed Emergency Response Tool: Guidance for Practitioners. Produced by Mercy Corps and SeedSystem as a part of the ISSD Africa activity.

Tripp, R. 2000. Strategies for seed system development in Sub-Saharan Africa: a study of

Kenya, Malawi, Zambia, and Zimbabwe. Working Paper Series no. 2. PO Box 776, Bulawayo,

Zimbabwe: Socioeconomics and Policy Program, International Crops Research Institute for the Semi-Arid Tropics. 56 pp.

UNDP, 2018. Understanding Land Dynamics and Livelihood in Refugee Hosting Districts of Northern Uganda. https://www.undp.org/uganda/publications/understanding-land-dynamics-and-livelihood-refugee-hosting-districts-northern-uganda

Walsh, Stephen, Remington, Tom, Kugbei, Samuel and Ojiewo, Chris, 2015. Review of Community Seed Production Practices in Africa Part 1: Implementation Strategies and Models. Conference: FAO and ICRISAT. 2015. Community Seed Production, by Ojiewo CO, Kugbei S, Bishaw Z & Rubyogo JC, Eds. Workshop Proceedings 9-11 Dec 2013. FAO, Rome & ICRISAT Addis Ababa. 176 pp.

Watson, Charlotte and Julia Poch Figueras, 2020. Gender and displacement: South Sudanese refugees in northern Uganda. Saferworld.

World Bank, 2019. Informing the Refugee Policy Response in Uganda: Results from the Uganda Refugee and Host Communities 2018 Household Survey. World Bank.

World Vision, 2022. Adjumani Improved Self Reliance and Livelihoods Project-Phase II. Semi-Annual Project Narrative Report. Period: October 01, 2021 - March 31, 2022. World Vision Uganda.

World Vision, 2021. LEAP Annual Project Narrative Report. Adjumani Improved Self Reliance and Livelihoods Project Phase II. Period: October 01, 2020 - September 30, 2021. World Vision Uganda

World Vision, 2019. LEAP Programme Management Report, World Vision Uganda. Annual Report – January 01 - December 31, 2019.