UNHCR The UN Refugee Agency | Forced Displacement Survey

THEMATIC BRIEF 2

Access to Land, Agriculture and Food Security in South Sudan

Acknowledgements

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Key Findings

- Access to agricultural land appears to mitigate hunger and is related to higher food consumption diversity. However, it is not sufficient on its own to ensure food security.
- The mitigating effect of agricultural activities on food security and diversity is observed in a context characterized by high occurance of shocks in the years preceding the survey and low productivity of agricultural activities. Improved risks management and adoption of more efficient production processes may lead to better outcomes.
- Access to land is a necessary but insufficient condition to optimally mitigate food insecurity. Improvement of infrastructure, access to inputs, mechanization and access to markets are other complementary conditions to improve the potential of land. Climate-smart inputs and practices could also help mitigate vulnerability to shocks. Programmes that facilitate access to agricultural inputs and mechanization could trigger more positive agricultural outcomes and therefore help in fighting food insecurity. Support to farmers' cooperatives could be an option; some of these cooperatives count as members both hosts and refugees and could therefore also play a role in enhancing social cohesion between communities.
- Livestock ownership is positively correlated with improved food security and can serve as a consumption-smoothing mechanism. Livestock can make a difference not only through the sale or slaughtering of animals for consumption, but also through the production, consumption, and sale of by-products. Livestock ownership by refugees is less frequent than in the host population. Livestock asset transfers may enhance food diversity and potentially serve as a source of livelihood for refugees. It is however important that such an intervention adopt a comprehensive approach and considers the risk that refugees may appear as competitors to members of the host community, which may undermine social cohesion between communities.

Introduction

Food insecurity in South Sudan

South Sudan is experiencing a humanitarian crisis due to several interconnected factors: the legacy of decades of civil war, subnational inter-communal violence, economic under-development, flooding, climate change, and most recently, conflict in neighbouring Sudan. Poor infrastructure and lack of educational opportunities result in very few opportunities for self-reliance. Those forced to flee to South Sudan often face extremely vulnerable circumstances and arrive in areas with limited capacity to adequately host them. Consequently, many face humanitarian challenges, the most prominent being food insecurity. According to the World Bank, despite the country's significant potential for agricultural production, South Sudan's food security has been consistently worsening since independence, leading to one of the world's worst food crises.

As a matter of fact, South Sudan is characterized by severe and widespread food insecurity. A joint assessment UNHCR-WFP conducted at the beginning of 2023 found that 66 per cent of the refugee population is either severely or moderately food insecure. Some variations were observed across locations, and it appears that food insecurity is particularly prominent among refugees in Gorom, and Jamjang (Ajuong Thok, Pamir), where up to 90 per cent of households are either moderately or severely food insecure (UNHCR & WFP, 2023).

Shocks and the Sudan crisis

As reported by the UNHCR/WFP hub, several highly intertwined contextual factors illustrate the complexity and volatility of the situation in South Sudan and may have contributed to current food insecurity among refugees.

Since 2018, South Sudan has experienced record flooding, alongside devastating drought that has led to widespread displacement, the destruction of livelihoods of and the loss of arable land as well as infrastructure, which have together contributed to rising food insecurity (WFP & UNICEF, 2024). Furthermore, the ongoing civil conflict in Sudan, the consecutive refugee influx as well as reduced assistance have further contributed to a worsening of the situation. Moreover, the outbreak of violence in Sudan in April 2023 – South Sudan 's main source for imports - resulted in cuts of supply routes of food and non-food items and therefore the rise of the market prices of food and fuel (UNHCR & WFP, 2023). Already before the Sudan crisis, the World Bank emphasized that increasing prices on markets had become the primary factor influencing food insecurity in South Sudan (Borgomeo et al., 2023).

Reduced international assistance and shift towards an alternative approach

In 2023, when the FDS data was collected, food distribution in South Sudan was generalized. However, the rising constraints on food assistance, exacerbated by the Sudan crisis and the arrival of large number of new refugees (number of refugees and asylum seekers increased from 300,644 in March 2023 to 552,333 in March 2025), led to the adoption of a more targeted approach to assistance in 2024. Since then, only the most vulnerable households[1] (UNHCR & WFP, 2023) receive assistance and/or assistance is provided only during specific periods of the year, i.e. lean seasons.

Given the harsh food insecurity situation and limited resources for provision of assistance, it is crucial to think of policies and programmes that could enhance self-reliance.

The UNHCR/WFP hub recommended that, given the important role agriculture plays in refugees' livelihoods, future self-reliance initiatives should focus on increasing agricultural production through the provision of sufficient and fertile land, timely distribution of agricultural inputs such as seeds, fertilizers and tools, and the development of capacities in postharvest management. Furthermore, the World Bank emphasized that agriculture remains the primary source of livelihood for South Sudanese households (80 per cent of households) and the agricultural sector in South Sudan could provide the impetus for economic recovery (Mawejje, 2022).

1 For households to be categorised as among the most vulnerable households, they have to meet at least one of the following eligibility criteria: have one or more members with a disability, have one or more members with a chronic illness, be headed by older persons aged 60+ years (including older persons living on their own), be headed by children, or have members who are children at risk or unaccompanied children.

In South Sudan, refugees' access to agricultural land is not generalized but possible. South Sudanese authorities, jointly with UNHCR and their partners, engage in discussions with South Sudanese community leaders with the objective to allocate part of the land of the community to refugees living in the same area. Refugees then benefit from use rights for a specific and limited period. Factual evidence indicates that bilateral arrangements between members of the host community and refugees also exist even if marginal in comparison to community engagements.[2]

The UNHCR-WFP hub (UNHCR & WFP, 2023) emphasizes that refugee households that did not participate in farming during the six months preceding their survey (56 per cent), provided a myriad of reasons why they refrained from cultivating. The one main reason for most refugee households in all locations – reiterated by FGD participants - is the lack of access to land, followed by the lack of seeds, long distance to reach agricultural plots, the lack of farming tools and lack of skills.

Given the reduction of food assistance and prioritization of most vulnerable households, is access to land a viable path toward refugee self-reliance? Under what conditions, can refugees achieve self-reliance for improved food security? For whom and when should investment be made in expanding land access for refugees?

2 FDS team focus group discussions conducted in March 2023 in Jamjang and Maban.

Agricultural land potential in SSD

According to a recent report of FAO and the World Bank (Eliste et al., 2022), South Sudan has high agricultural potential and only a tiny proportion of arable land is exploited. The report emphasizes the following facts:

i **South Sudan has the potential to feed itself and export food to neighbouring countries too.** The country has about five times the area of agricultural land per capita compared to Kenya, Uganda or Ethiopia. Out of its estimated 64 million hectares of agricultural land, only about 4 per cent (about 2.8 million ha) has been cultivated either continuously or periodically.

ii **The agrifood sector's is also the most important source of livelihoods for most South Sudanese.** The sector is estimated to account for 36 per cent of the non-oil GDP. The agriculture sector employed about 50 per cent of the population in 2018 (about three-fifth of the female and one- third of the male employment). In a broader sense, food systems are the primary source of livelihood for around 88 per cent of rural households and about half of urban households.

iii **However, the sector productivity is currently among the lowest in the world** with an agricultural land productivity of USD 67 per hectare in South Sudan, versus USD 103 in the majority of other fragile, conflict and violence affected countries in the SSA region.

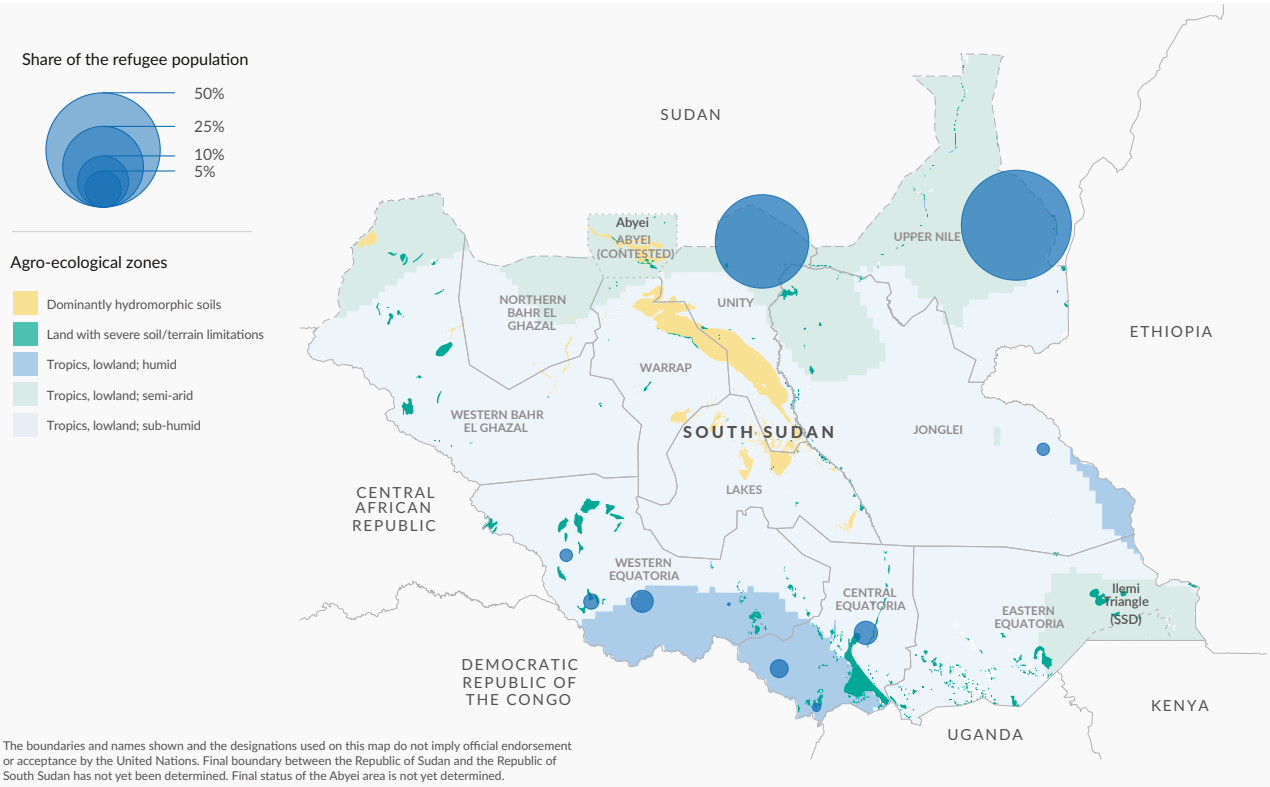
iv **The sector is also poorly diversified due to the conflict,** which has led to a concentration of agricultural activities in the most essential subsistence crops (Von der Goltz & Harborne, 2021). Cereals account for some 80 per cent or more of the cultivated area. Sorghum is the main cereal, followed by maize and millet; overall, about 80 per cent and 63 per cent of farming households grow sorghum and maize, respectively. The most commonly grown pulses or legumes in South Sudan are cowpeas and beans, grown by 27 per cent and 11 per cent of farm households, respectively. Oilseed crops, such as groundnuts (58 per cent) and sesame (34 per cent) also have an important place in the South Sudanese farming systems. Many farmers have stopped cultivating higher value crops like gum arabic, potato, sesame, and fruits (mango, lemon, banana and guava) due to conflict-related risks (Eliste et al., 2022).

Agriculture and agro-ecological systems in South Sudan

The North and South of the country differ substantively in their agro-ecology (Figure 1). Refugee hosting areas in the South have higher potential for rain-fed agriculture, the dominant form of agriculture in South Sudan, compared to those in the North (Collishaw et al., 2023). The South experiences two distinct agricultural and longer harvest seasons while the North's refugee hosting areas have lower agricultural potential on average and a longer lean season. And, although South Sudan's long rainy season ensures most areas of the country receive ample rain for agricultural production, production is threatened by more frequent severe flooding and constrained by lack of access to post-harvest storage, inputs, mechanization, and poor management practices.

Figure 1 shows that the majority of South Sudan's refugee population lives in the North of the country in Unity and Upper Nile in semi-arid low-lying areas that are subject to both spells of drought and at high risk for seasonal flooding (Collishaw et al., 2023). The arid environment combined with the flood plains has resulted in a high reliance on cattle combined with limited sorghum production. The region also has diverse soil typology and heterogenous land use. Upper Nile is regarded for fertile soil and accounts for 63 per cent of the national cropland area (FAO, 2023). However, settlements are located near wetland areas and subject to flooding that challenges cultivation. Similarly, in Unity, there is agricultural potential but diverse land quality and type necessitating tailored, site-specific agricultural intervention to improve land productivity. Refugee settlements in the tropical lowlands in the south of the country are located in or near South Sudan's greenbelt benefiting from agro-ecological conditions more favourable for rainfed agriculture and a higher diversity of crops than those in the North. Nevertheless, riverine flood risk is high.

FIGURE 1. **Agro-ecological zones and refugee populations in South Sudan.**



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined. Final status of the Abyei area is not yet determined.

Purpose of the brief

In a context of widespread food insecurity in South Sudan, this brief assesses whether access to agricultural land and own food production (including livestock rearing) are associated with lower food insecurity and higher food consumption diversity. The analysis is presented against a backdrop of increasingly constrained and more targeted food assistance since 2024, and asks whether South Sudan's agricultural potential could complement assistance as part of a pathway to reduce food insecurity.

Data and Target Populations

Populations

The main target population of the FDS is the refugee population in South Sudan, as of March 2023, before the Sudanese crisis, which started in April 2023. Data on the national population or "host community"[3] was also collected. The FDS did not cover urban refugees or asylum-seekers in Juba city due to operational and situational constraints[4].

When FDS data collection began, most refugees in South Sudan were concentrated in the northern regions, specifically in Upper Nile State and Ruweng Administrative Area, accounting for 92 per cent (274,455) of the total refugee population, according to UNHCR population statistics in March 2023 (Figure 1). In Upper Nile State, most refugees were in Maban county (56 per cent), which has four camps: Batil, Doro, Gendrassa, and Kaya. Ruweng Administrative Area hosted a substantial number of refugees in Ajuong Thok and Pamir camps (36 per cent), along with one settlement, Yida. Aside from the northern regions, there are notable refugee settlements in the equatorial regions, including Central Equatoria and Western Equatoria. These areas are near the borders with the Central African Republic and the Democratic Republic of Congo. Additionally, the capital city, Juba, and nearby Gorom settlement host refugee populations.

3 Defined as the national population living in proximity of the refugee population, interacting, and sharing space, resources, and opportunities with the refugee population.

4 Combined, these two populations constitute less than two per cent of the refugee and asylum seeker population in South Sudan.

Targeted respondents and sample size

The main unit of observation for the FDS is the household. The FDS defines a refugee household as one where members usually live together, share meals, and either the head of the household or the spouse is a recognized refugee.

The FDS collects information on households and a randomly selected member aged 15 years and older, a randomly selected child under the age of five, and a randomly selected woman who gave birth in the two years prior to the survey.

3,100 households, of which 2,100 were refugee households and 1,000 were from the host community were targeted. The final realized sample of the FDS in South Sudan is composed of 3,078 households, all located in rural areas. Among them, 2,086 (68 per cent) are refugee households and 992 (32 per cent) belong to host communities living in proximity to refugees in the North.

Timing and mode of data collection

Data was collected between April and December 2023. The mode of data collection was face to face interviews using Computer Assisted Personal Interviewing (CAPI). Data collection started at the onset of the Sudan crisis. The sampling frame of the FDS sample does not include new refugees that arrived in South Sudan after March 31, 2023. Data was, however, collected at a time of crisis that may have worsened the situation of the overall refugee population.

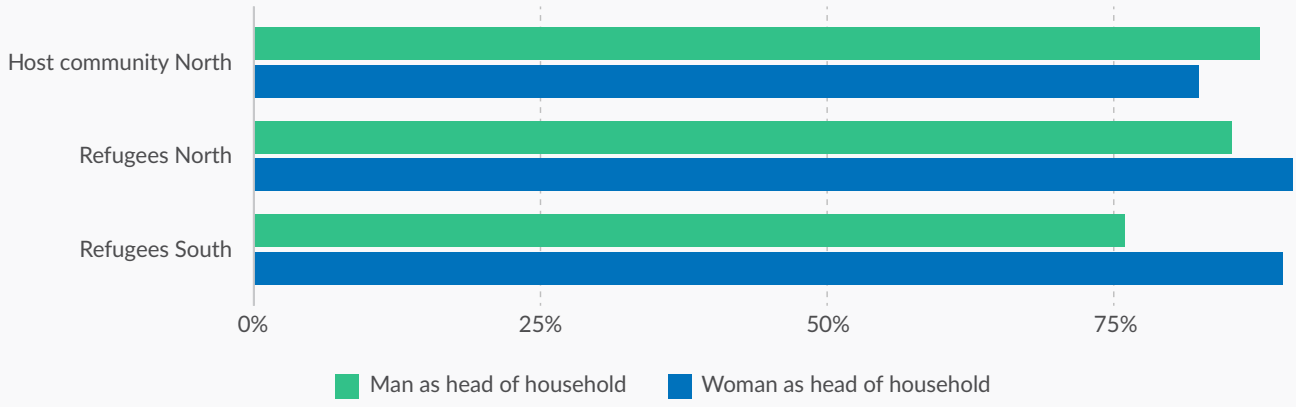
Descriptive analysis

Food insecurity in South Sudan

The FDS data confirms that a large majority of both the refugee population and host communities in the North face a situation of severe food insecurity. In both groups, 86 per cent of the population is severely food insecure, as measured by the Household Food Insecurity Access Scale (HFIAS) (Figure 2).[5]

Among refugees, households headed by men are less likely to be severely food insecure than those headed by women (85 per cent compared to 91 per cent for refugees in the North, 76 per cent vs. 90 per cent for refugees in the South). In the host community, severe food insecurity is more prevalent in male-headed households (88 per cent) compared to female-headed households (82 per cent).

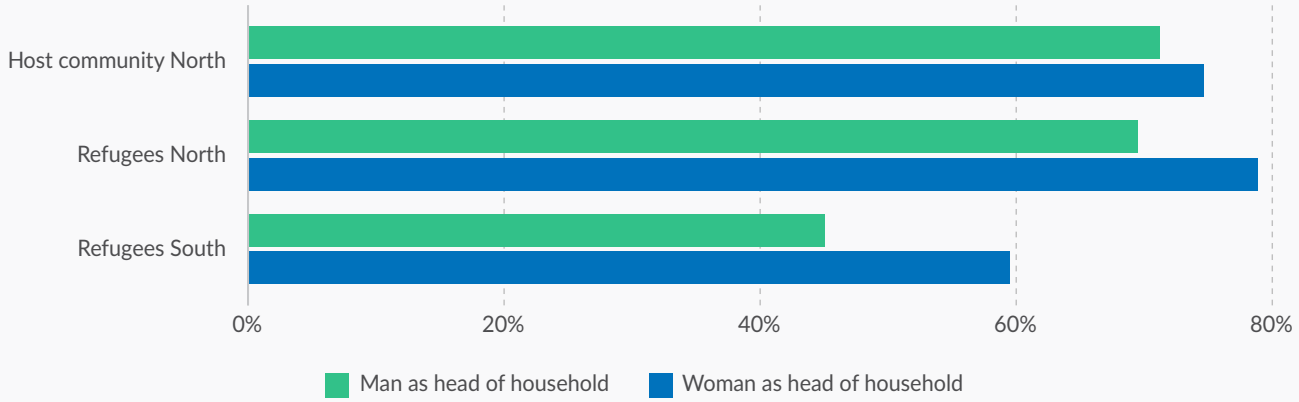
FIGURE 2. **Severely food insecure households by sex of household head**



5 The HFIAS was developed by USAID. It is a set of 9 questions used to develop a score between 0 (food secure) to 27 (severely food insecure). https://www.fantaproject.org/monitoring-and-evaluation/household-food-insecurity-access-scale-hfias

Nutrition outcomes, as measured by the Food Consumption Score (FCS)[6], are also poor for both refugees and host communities. Almost three in four refugee households in the North (74 per cent) and host community households in the North (72 per cent) have a poor FCS. Refugees in the South are less likely to have a poor FCS (53 per cent) (Figure 3). That said, among refugees in the South, the share of households headed by women with a poor FCS (59 per cent) is considerably larger than those headed by men (45 per cent).

FIGURE 3. Proportion of households with a poor FCS, by sex of household head



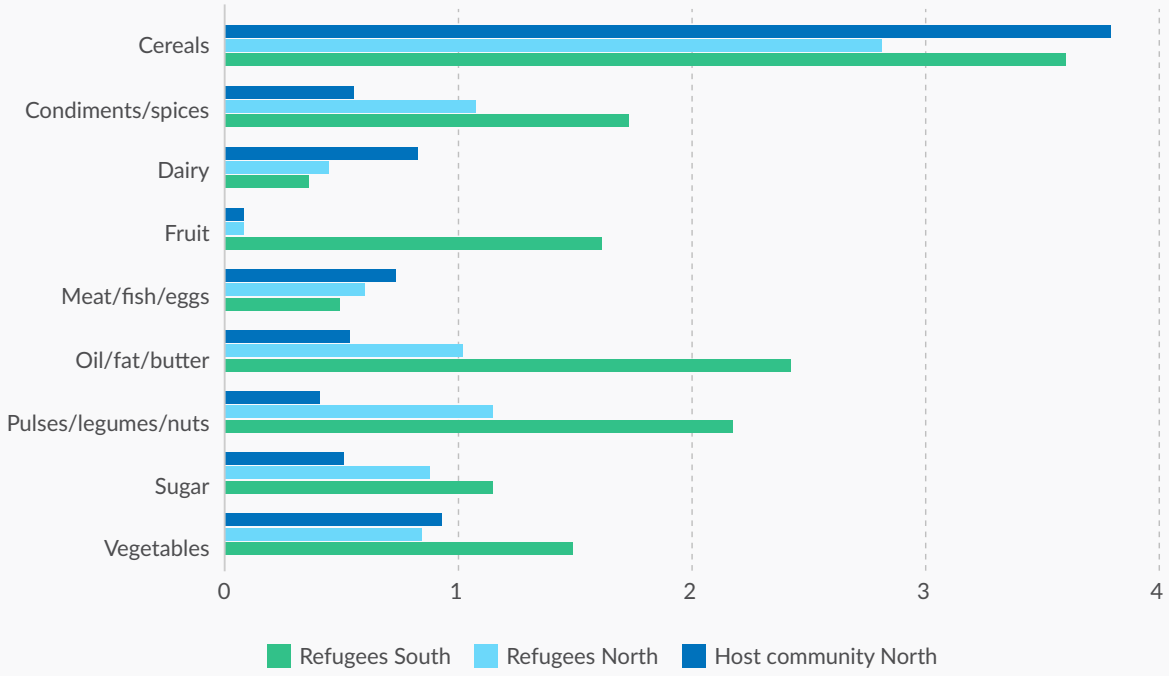
Refugees in the South exhibit the highest overall food consumption and dietary diversity. Cereals are the primary food source for all groups, with refugees in the South consuming them for an average of 3.6 days per week, refugees in the North for 3.8 days, and the host community in the North for 2.8 days (Figure 4). Average meat intake is less than one day per week across all groups. Refugees in the South have higher consumption levels in all other food categories.

Both refugees and hosts in the North have low fruit intake, averaging less than 0.1 days per week, compared to over 1.5 days for refugees in the South. Additionally, there is a significant disparity in the consumption of oils, fats, and pulses. Refugees in the South consume these items more than twice as frequently as refugees in the North and three times as often as hosts in the North.

It is important to look at these preliminary results against the backdrop of the Sudan conflict and its potential effects. Indeed, the war in Sudan interrupted usual trade routes and imports from Sudan with the North of South Sudan being the most affected.

6 The FCS is a measure of food diversity. It aims to capture the diversity of food consumed using a seven-day recall. https://resources.vam.wfp.org/data-analysis/quantitative/food-security/food-consumption-score

FIGURE 4. Mean number of food consumption days over the previous week



Income and subjective poverty

The high levels of food insecurity and poor food diversity are set against a backdrop of widespread poverty (Figure 5). The majority of households report that their monthly income is below or far below what they would need to cover basic needs (94 per cent of refugees in the South, 81 per cent of refugees in the North and 88 per cent of the host community in the North). There is a strong correlation between the food consumption diversity and subjective poverty and food insecurity and subjective poverty (Figures 6 and 7).

FIGURE 5. Subjective poverty by population group

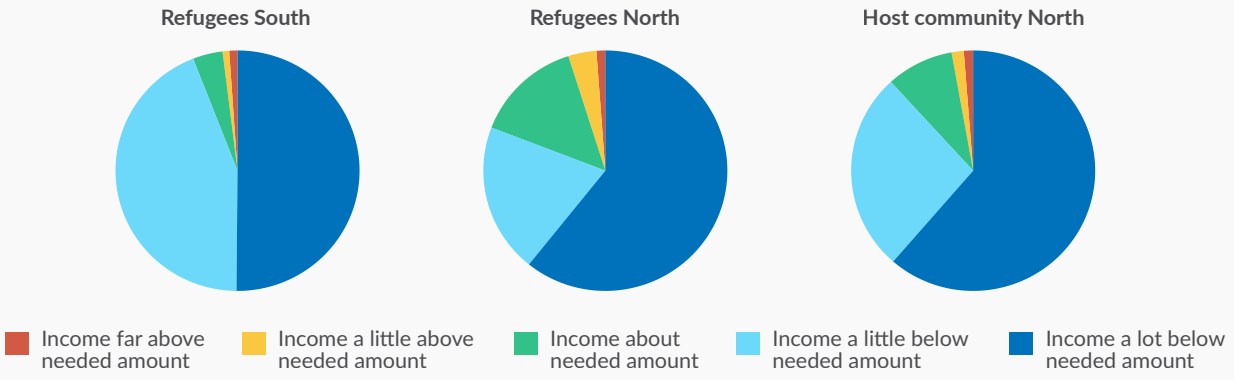


FIGURE 6. Share of households by HFIAS category and measure of subjective poverty

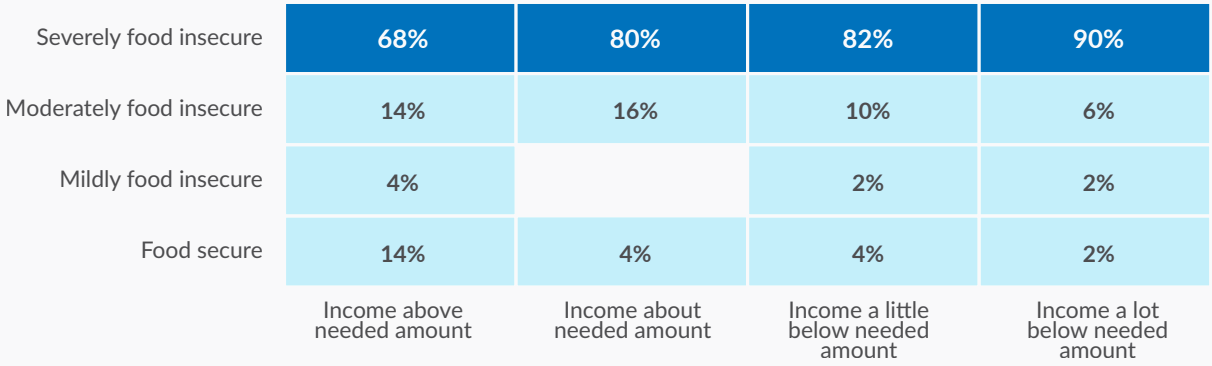
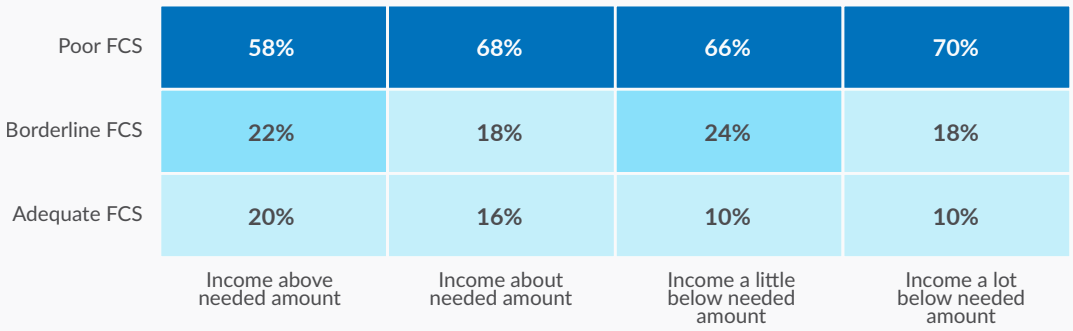


FIGURE 7. Share of households by FCS category and measure of subjective poverty



Social assistance

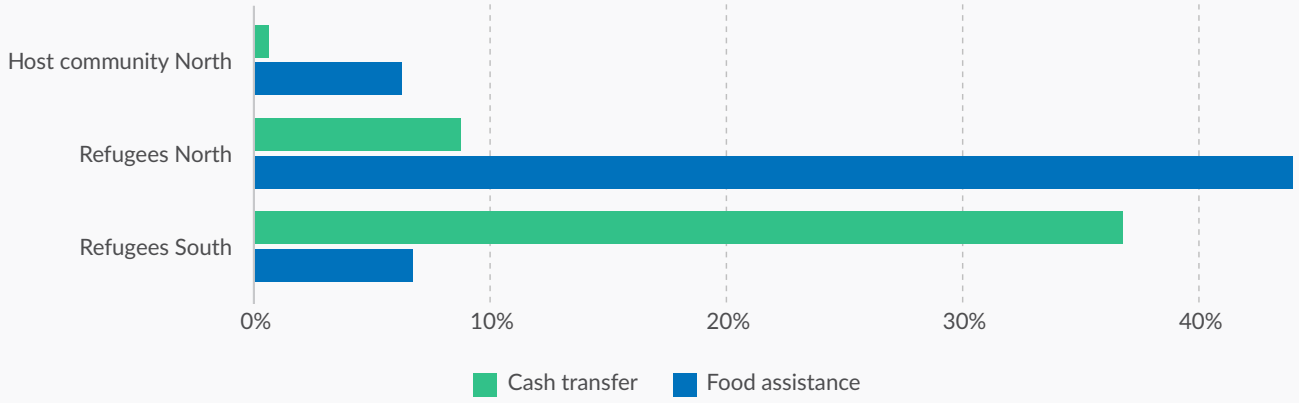
Food assistance is concentrated among refugees in the North,[7] while beneficiaries of non-food cash transfer programmes are mainly refugees in the South (Figure 8).[8] It is important to emphasize that WFP food distribution only targets populations in camps. In the South, most of the sampled refugees live out of camps, and only two locations – Gorom and Makpandu – were benefiting from WFP food distribution at the time of the FDS survey[9].

7 According to WFP, food distribution in the North was generalized at the time of the FDS survey. We therefore observe an under-reporting of food assistance. The timing of the data collection could have influenced the results, as it coincided with community consultations on food targeting, which might have biased responses.

8 Food assistance is largely a mix of in-kind and cash-transfers (Figure 11). Almost half of recipients of food assistance receive a mix of in-kind and cash assistance for food (48 per cent). This is followed by solely in-kind (21 per cent) and then food vouchers (13 per cent).

9 Very few cases of food assistance were reported in the South, and they are almost all located in Gorom.

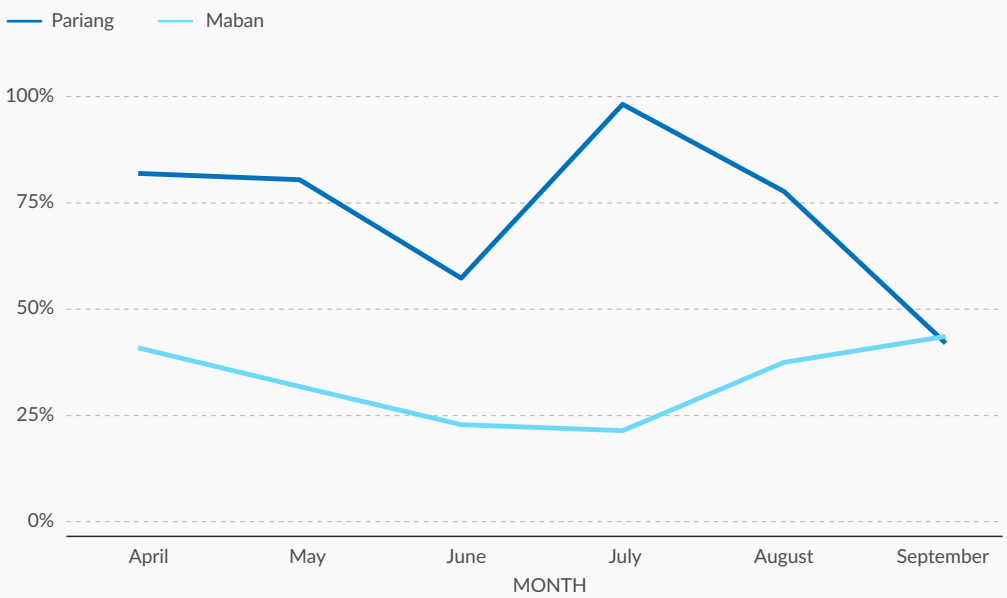
FIGURE 8. Social assistance by population group



Refugee households in the North that received in-kind food assistance reported that although distribution was frequent, they did not receive assistance every month. On average, they received assistance for 8 to 9 months out of the previous 12 months[10].

A considerably higher share of refugees in camps in Pariang report receiving food assistance than in Maban (Figure 9). However, in both regions, there is some fluctuation, reflecting disruptions to distribution. For example, in June, just over half of respondents in Pariang reported receiving assistance in the previous 12 months, compared to over three-quarter in May. The share jumps to almost 100 per cent in July[11].

FIGURE 9. Proportion of households receiving food assistance by month



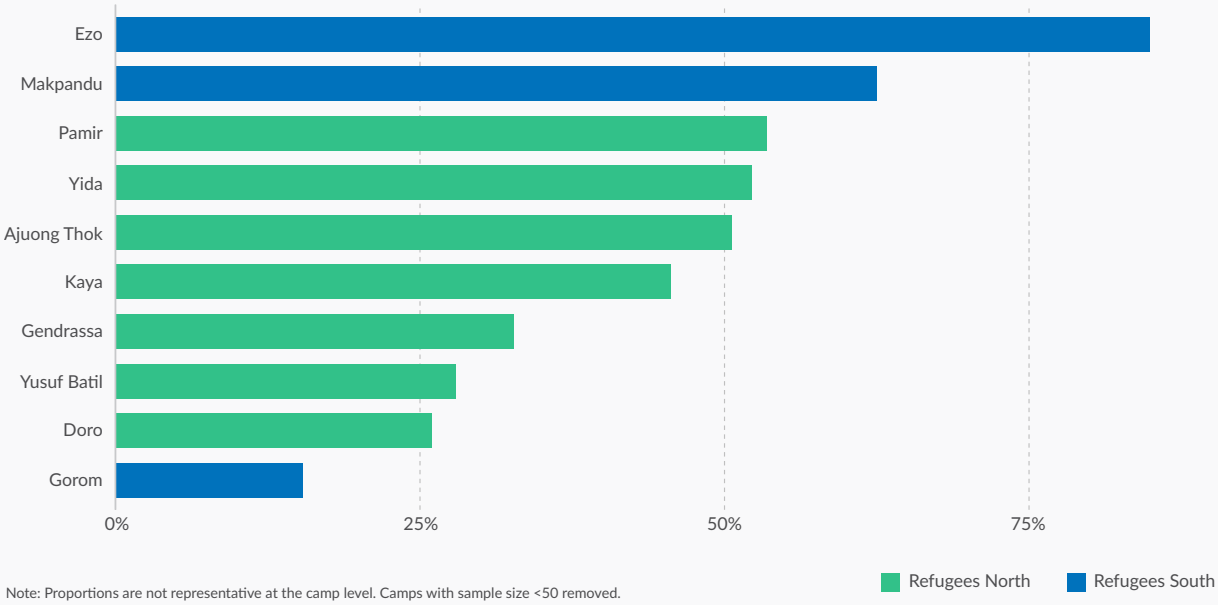
10 This distribution pattern is similar for households that received cash grants or a combination of both types of assistance.

11 We suspect that disruptions and delays in food distribution may explain the fact that it was underreported during the FDS data collection. As a matter of fact, even if in 2023 food distribution was generalized in theory, only a proportion of respondents reported food assistance.

Access to agricultural land

Over half of refugee households in the South have access to land used for agricultural production (56 per cent), while the share is lower among refugees (39 per cent) and the host community in the North (45 per cent)[12]. However, there is significant variation within regions and between counties. The same is true for camps (Figure 10).

FIGURE 10. Proportion of refugee households with access to land, by camp



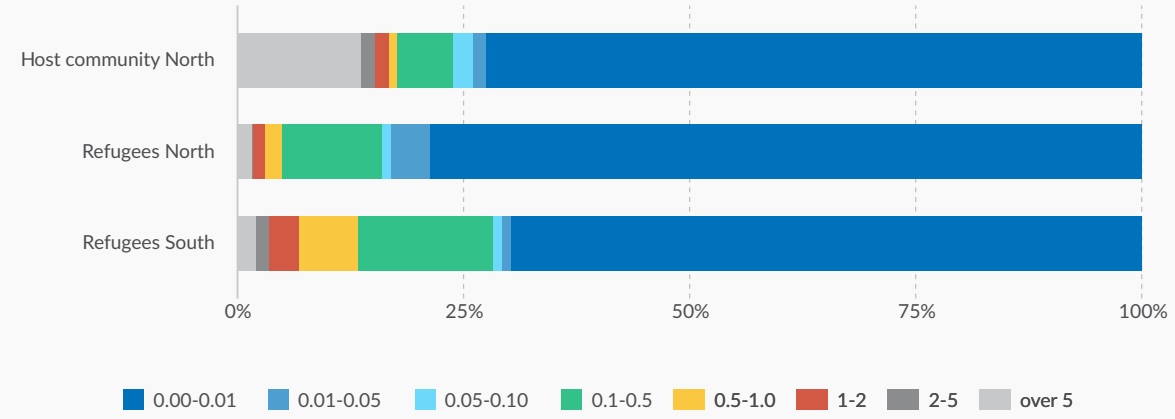
Note: Proportions are not representative at the camp level. Camps with sample size <50 removed.

In comparison with host communities, refugees in the North engage in agriculture less intensively on smaller plots. Land for agriculture in the North among refugees is usually very small with over half on plots less than 100 square meters (Figure 11)[13]. Further, over 90 per cent of household with plot sizes less than 100 square meters have plots smaller than 50 square meters. This may indicate that refugees in the North are relying on agriculture for subsistence with small home gardens and with few barnyard animals, while hosts are more likely to engage in more commercial agriculture. Refugees in the South are more likely to have larger plots.

12 Note that household are classified as having land for agricultural production when they either state that the primary use of a plot of land is for agriculture or if they report having consumed food groups from own production that would require land, such as cereals or vegetables.

13 Empirical evidence (Carletto et al., 2016) shows that small plots tend to be overestimated (degree of overestimation decreases with plot size) and large plots underestimated which results in an underestimation of land inequality. Also land tenure security is one of the factors that can explain the bias.

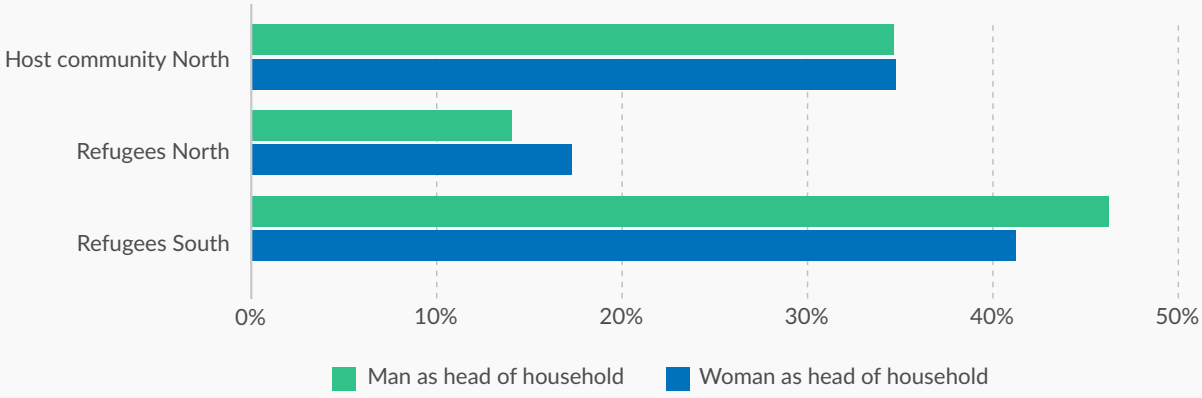
FIGURE 11. Distribution of plot sizes (in hectares) for agricultural use[14].



Subsistence and cash crop agriculture

While 43 per cent of refugees in the South receive an income from farming, livestock or fishing, the share is around 15 per cent among refugees in the North. This is consistent with the finding that plots are very small and more consistent with home gardens for refugees in the North. Although the host community in the North has larger agricultural plots and herd sizes (Figures 11 and 16) on average, the share of households receiving an income from agricultural production is lower than for refugees in the South at just over one-third (34 per cent).

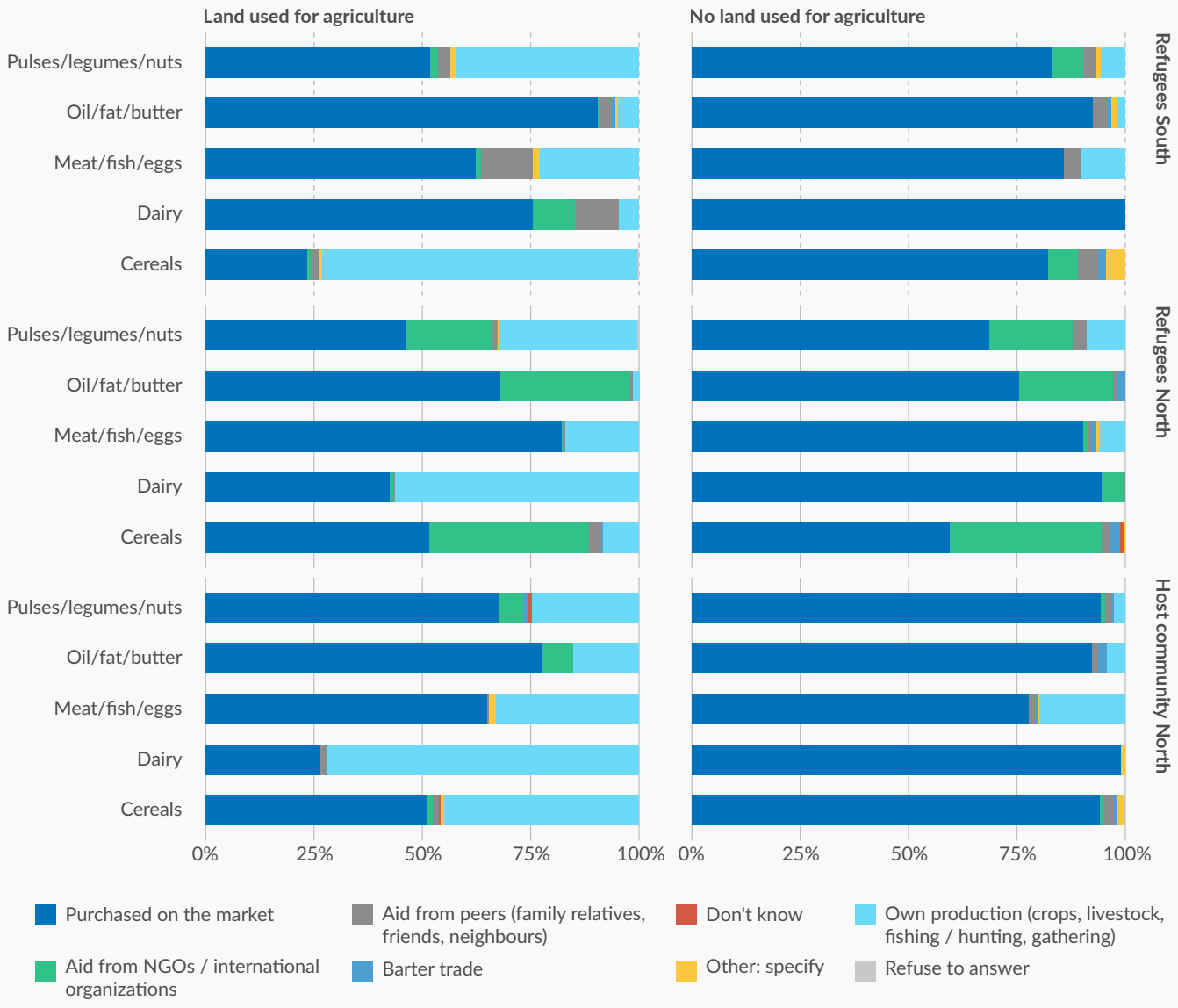
FIGURE 12. Proportion of households with income or other pay from family farming, livestock or fishing



14 Note that this information is reported only for a subset of the households with access to agricultural land because we only have the information for households who reported having access to at least one plot of land used for agriculture (82 per cent of household with access to agricultural land) but we do not have the information for the households who only reported consuming food items from their own production (18 per cent of household with access to agricultural land).

Access to land significantly influences the reliance on own production versus external sources. Those with land access are considerably more self-sufficient in food production.

FIGURE 13. Proportion of households depending on specific sources for their food consumption among the households who consume the food item.



Regression analysis: Identification of key factors for food security

In this section, we estimate models that aim to uncover the relationships between access to agricultural land and food insecurity/food consumption diversity in South Sudan.

Model specification

Dependent variable

We conduct three versions of the analysis, each with a different dependent variable: (1) the household food insecurity access scale (HFIAS), which measures food insecurity; (2) the household hunger scale (HHS), which measures hunger; and (3) the food consumption scale (FCS), which is a measurement of food consumption diversity (see Appendix 2 for further information on these indicators).

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Independent variables

The key independent variable is access to agricultural land. This binary variable is set to one if the household has access to at least one plot of land used for agriculture or if the household consumed food from its own production in the previous seven days; otherwise, it is set to zero.

We control for factors that may attenuate or accentuate the association between land access and food security and food consumption diversity, including seasonal variation, agriculture-related shocks, and social assistance.

To account for seasonality, we added monthly dummy variables. The monthly dummy variable takes the value one if the household was interviewed during that month, otherwise zero.

Regarding agriculture-related shocks, the most frequent include flooding, pests, destruction of crops by animals, livestock diseases, and droughts. Two-thirds of refugee households in the North (67 per cent) and just under half of host community households (44 per cent) experienced flooding. Refugees in the South were more likely to report experiencing shocks such as pests, diseases to crops, or destruction of crops by animals (11 per cent). A similar share of host community households in the North reported shocks to crops or livestock, while almost no refugees in the North did so. In both the North and South, few households reported experiencing droughts.

Regarding social assistance, we consider both food assistance and non-food cash transfers.

We also examine the interaction between access to agricultural land and forms of social assistance, as well as the experience of shocks. With the interaction with social assistance, we assess if substitution or complementarity effects exist for household with access to land. With the interaction with experience of shocks, we want to test if experiencing shocks that may affect agricultural outcomes may cancel out the potential correlation between access to agricultural land and food security/food consumption diversity.

Furthermore, we control for various household characteristics, including the gender of the head of household, the highest level of education in the household, household size, livestock ownership, state, and experience of non-agricultural shocks (such as loss of employment or death of a family member) that may correlate with livelihood outcomes. One such shock is rising food prices. Around 15 per cent of refugee households in the South reported being affected, which is considerably more than among refugees or the host community in the North.

Analysis disaggregated by region: North and South

We model the relationship between access to agricultural land and food security and food diversity separately for the North and South go the country. The main reason for this is that they are characterized by different harvest seasons and agro-ecology. The South experiences two distinct agricultural and longer harvest seasons while the North's refugee hosting areas have lower agricultural potential on average and a longer lean season. We control for seasonality by introducing monthly dummy variables in our models, and these periods have different meaning depending on the area of the country (South vs North). By keeping all data together, identification of seasonality effects would be unlikely as the respective effects in the Northern and the Southern parts of the country are likely to cancel each other out.

Main findings

1 Does access to agricultural land improve food security and consumption diversity?

Land access correlates with greater food consumption diversity in the North and the South ($p<0.01$) and less hunger in the South ($p<0.05$).

However, access to agricultural land is not significantly correlated with food insecurity both in the North and the South, and it is not significantly correlated with hunger in the North.

Less hunger among refugees who have access to agricultural land in the South is aligned with the fact that refugees in the South cultivate larger plots of land and the South have higher potential for rain-fed agriculture and longer harvest seasons.

2 Does livestock ownership reduce food insecurity?

In the North, possessing livestock is negatively correlated with food insecurity ($p<0.05$), negatively correlated with hunger ($p<0.10$) and positively correlated with food consumption diversity ($p<0.05$).

The results confirm observations made in the literature. In a review of livestock development interventions, Collishaw et al. (2023) explain that livestock assets transfers have positive impacts on dietary diversity and mixed impacts on food security.

Livestock can be used as a smoothing consumption mechanism. Livestock can make a difference not only by selling and slaughtering the animals, but also by eating and selling by-products. Several impact evaluation studies (see for instance Muema et al., (2023), for dietary diversity enhancing effects) showed that even small number of livestock can make a difference.

3 Do shocks affect food security outcomes?

In the North, crop related shocks are associated with higher food insecurity ($p<0.01$), and they cancel out the positive effect of having access to agricultural land on food consumption diversity (i.e. no significant correlation between access to land and food consumption diversity for the households who experienced the shock). Moreover, most of the other reported shocks are negatively correlated with food consumption diversity in both regions.

We observe two other results that are at first glance puzzling.

First, in the North, flooding is positively ($p<0.01$) correlated with food consumption diversity for those who have access to agricultural land. It is important to emphasize that shocks were reported for a period of 12 months prior to the interview, while the use of agricultural land describes the situation of the household at the time of the interview. One can suspect that those who experienced flooding and still have agricultural activities are the most resilient agricultural households, and this may correlate with their capacity to diversify their food basket.

Second, in the South, higher food prices are positively correlated with food consumption diversity (even thoughthe relationship is not statistically significant). Two potential explanations are: (1) when prices are higher for the preferred goods (for instance meat), households may decrease their consumption of the good that became more expensive and substitute it with a few other cheaper goods that can offer similar nutrients; (2) a third unobservable factor, for instance income, might explain both why the households report higher prices and have higher food consumption diversity. Indeed, households with higher income can afford more diversity in their food consumption and might be characterized by a consumption basket that includes goods that are also more susceptible to higher price increase.

4 What is the role of social assistance in food security?

In the North, households with food assistance have a more diverse food consumption but this does not prevent them from being food insecure.

In fact, in the North, food assistance is positively correlated with food consumption diversity and the correlation is highly significant for those who do agriculture ($p<0.05$ vs $p<0.10$ for non-agricultural households).

Furthermore, in the North, food assistance is positively correlated with food insecurity for both households with or without agricultural land. In 2023, when data was collected, food assistance was generalized in the North, but only about 45 per cent of households reported receiving food assistance. We therefore suspect an under-reporting of food assistance. The positive correlation between food assistance and food insecurity might indicate that those who reported food assistance are systematically worse off in terms of food security.

In the South, non-food cash transfers are positively correlated with food consumption diversity for those without access to agricultural land ($p<0.10$) but not for those doing agriculture. It therefore seems that there is no additional effect of cash transfers for agricultural households as agriculture already increases diversity. Mastrorillo et al. (2024) show that cash transfers are more effective for impacts on food security for only people with sufficient agricultural land. The sampled refugee population is characterized by quite small areas of land (Figure 11).

5 Do household characteristics influence food security?

In the North, households with at least one educated member are better off in terms of food security ($p<0.10$) and are characterized by lower levels of hunger ($p<0.05$). In both regions, food consumption diversity is also higher in households with at least one educated member ($p<0.01$). The highest level of education in the household is used as a proxy for the capacity of the household to navigate society and make a living.

In the South, we observe lower food consumption diversity in larger households ($p<0.05$) and in the North, more diverse food consumption in male headed households ($p<0.05$).

Discussion of findings

1 Why access to agricultural land is not sufficient alone?

Several factors may explain why accessing agricultural land is not sufficient to be protected against food insecurity in the context of South Sudan. Some are exposed in this brief and documented by the FDS data: refugees report very small plots of land and the shocks likely to affect agricultural outcomes are quite prevalent. Some other factors were mentioned during focus group discussions organized before data collection, in March 2023: the poor quality of land allocated to refugees, the insecurity – primarily for women, yield theft on land that is located far from the camps, and more importantly the limited access to inputs such as seeds and fertilizers. As highlighted by the FAO and the World Bank report, productivity in South Sudan is very low and this can also be explained by the lack of mechanization of the production processes. Finally, the agro-ecological systems with only one harvest season in the North and a long lean season without proper storage capacity are likely to undermine any effort to smooth food consumption over time.

2 Why livestock and education matter?

Livestock can be used as a coping strategy by selling and slaughtering the animals, but it can also have an impact on food consumption by eating and selling by-products (milk, cheese, etc). Several impact evaluation studies (for instance, see Muema et al., (2023), for dietary diversity enhancing effects) showed that even small number of livestock can make a difference. Furthermore, in a review of livestock development interventions, Collishaw et al. (2023) show that livestock assets transfers have positive impacts on dietary diversity and mixed impacts on food security.

Education can increase labour-market opportunities and improve an individual's capacity to navigate society and secure livelihoods. In a context with limited sources of livelihood, transferable skills can be leveraged to take advantage of the few opportunities. We use the household's highest level of education as a proxy for this capacity. A large body of literature indicates that education within a household is associated with improved livelihoods and economic outcomes, with higher education generally leading to better economic outcomes and increased access to opportunities (Tran et al., 2020). Also, education is a key component of human capital, which directly influences a household's ability to diversify its income sources and improve overall living standards (Stifel, 2010; Neudert et al., 2015).

3 Why can food assistance not solve food insecurity issues alone?

The WFP food ration includes a limited number of food items: cereals, pulses, vegetable oil and salt. Due to limited resources, WFP had to cut the food ration to 50 per cent of a full basket in April 2021. This means that by the time of the FDS survey, the food assistance quantity had already been significantly reduced. Moreover, as reported in this brief, the de facto food assistance did not systematically happen every month as planned by WFP. Field visits in South Sudan in December 2022 and discussions with refugees through cognitive interviewing exercises revealed delays in food distribution. These delays were confirmed by UNHCR field colleagues. As a matter of fact, besides the reduction in quantity, the frequency of food assistance was also reduced in South Sudan, and this is confirmed by the recipients in the survey (Figure 9).

4 Are the findings aligned with observations in other contexts?

Similar effects of accessing agricultural land were emphasized in previous studies on displaced populations.

Betts et al. (2019) show in a study on Congolese and Somali refugees in Uganda that refugees who have access to land are better off than those who do not, and more land is associated with better food security outcomes. However, the same study questions the sustainability of the Ugandan policy of land allocation to refugees. In fact, in Uganda the number of refugees is high relative to the limited resources available to be allocated to them. The study emphasizes that the number of plots as well as the area of the plots allocated to refugees decreased over time. Moreover, the type of subsistence agriculture practiced by refugees is inherently limited as a pathway to high income levels. So, in the context of Uganda, the practice of subsistence agriculture was sufficient augment food security outcomes, but the land allocation policy is not necessarily a durable solution, at least in the Nakivale settlement where the study took place. The agricultural potential of South Sudan may offer a more sustainable solution to refugees but only if, among others, access to inputs, access to more fertile land and mechanization are improved.

Regarding self-sufficiency of agricultural households in Sub-Saharan African, it appears that reliance on markets even for rural smallholders is much higher than typically assumed (Sibhatu & Qaim, 2017). Market development and subsistence agriculture are complementary for increasing nutrition and food security. For durable solutions for refugees, this means that pushing subsistence agriculture must be accompanied by interventions on the rest of the food system.

Conclusion

According to the UNHCR-WFP Joint Targeting Hub, agriculture serves as the main food source beside food assistance for refugees in South Sudan who are predominately small-scale farmers by tradition. According to their survey conducted at the beginning of 2023, for 27 per cent of refugee households, agriculture provided their main income during the three months preceding the survey, and more than four in ten households across all locations (44 per cent) indicated to have cultivated crops, including cereals, leguminous, cash crops or fruit trees during six months preceding the survey. However, small size of land allocated to refugee households coupled with poor soil fertility and lack of modern inputs generally results in exceptionally low yields (kg/ha). Furthermore, they emphasized that farming activities are less common among highly vulnerable households[15].

Our analysis reached conclusions that are aligned with these findings. It shows that access to agricultural land mitigates hunger and is associated to higher food consumption diversity. The mitigating effect of agricultural activities on hunger and food consumption diversity is observed in a context characterized by high occurrence of shocks the years preceding the survey and low productivity of agricultural activities in South Sudan. Access to land therefore appears as a necessary but insufficient condition to mitigate optimally food insecurity. Improvement of infrastructure, improved risk management, access to inputs, mechanization and access to markets are other complementary conditions to improve the potential of land. Programmes that facilitate access to agricultural inputs and mechanization could trigger more positive agricultural outcomes and therefore help in fighting food insecurity. Support to famers cooperatives could be an option; some of these cooperatives count as members both hosts and refugees and could therefore also play a role in enhancing social cohesion between communities.

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Finally, livestock ownership is positively correlated with improved food security. Livestock can be used as a smoothing consumption mechanism. Livestock ownership by refugees is less frequent than in the host population. Livestock asset transfers may enhance food diversity and potentially represent a source of livelihood. It is however important that such an intervention adopt a comprehensive approach and consider the risk that refugees may appear as competitors to members of the host community, which may undermine social cohesion between communities.

15 Household vulnerability is a composite indicator measured by combining three outcome indicators, including household food consumption (FCS), livelihood coping strategies (LCS) and refugees´ economic capacity to meet essential needs (ECMEN).

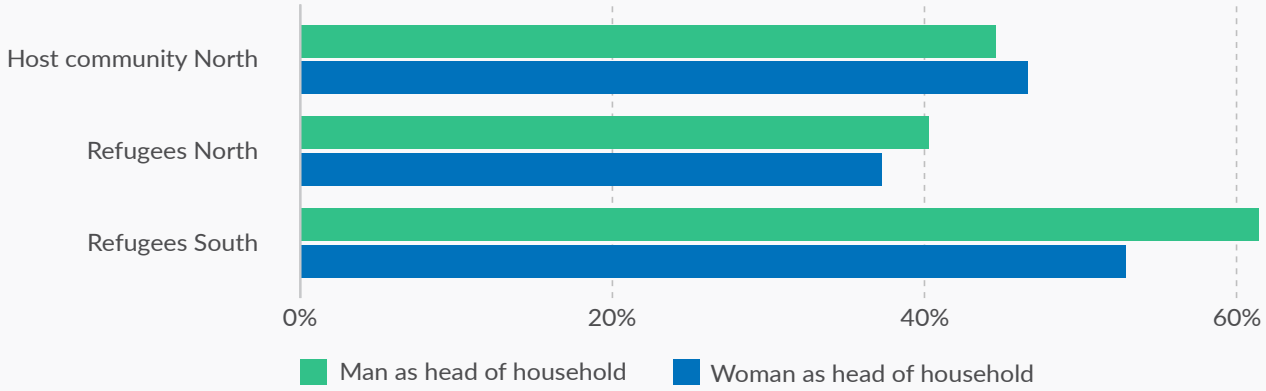
Appendix

1 Additional descriptive results

a Access to land by gender of the head of household

In the North, female and male headed households have a similar propensity to own agricultural land (Figure 14). In the South, female headed households are slightly less likely to access land, own livestock, and engage in agricultural activities (61 per cent vs. 53 per cent).

FIGURE 14. Proportion of households with access to land, by sex of household head



b Proportion of household with livestock and Tropical Livestock Units

FIGURE 15. Proportion of households with livestock, by sex of household head

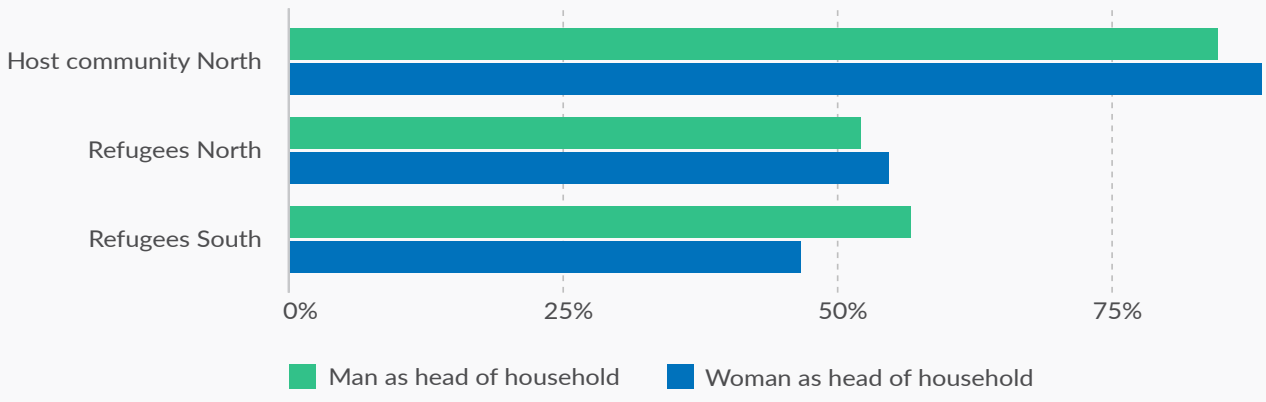


TABLE 1. Tropical Livestock Units

		REFUGEES NORTH	REFUGEES SOUTH	HOST COMMUNITY NORTH	TOTAL
0<tlu<=0.1	p	29.2%	40.3%	14.8%	25.2%
	n	217	27	54	298
0.1<tlu<0.5	p	27.8%	43.0%	20.2%	26.3%
	n	164	29	68	261
0.5<tlu<1	p	11.0%	10.4%	9.4%	10.4%
	n	79	7	28	114
1<tlu<=2	p	17.2%	4.5%	16.2%	16.0%
	n	79	3	54	136
2<tlu<=5	p	11.4%	1.8%	13.4%	11.4%
	n	55	1	46	102
5<tlu<=1	p	1.7%	0.0%	16.0%	6.2%
	n	8	0	47	55
tlu>10	p	1.8%	0.0%	9.9%	4.3%
	n	8	0	33	41
Total	p	100.0%	100.0%	100.0%	100.0%
	n	610	67	330	1,007

Note: Tropical livestock units calculate herd size based on relative weight of animals. The following were used cattle=0.5; horse=0.5; mule=0.6; donkey=0.5; goat=0.1; sheep=0.1; chicken=0.01; pig=0.2.

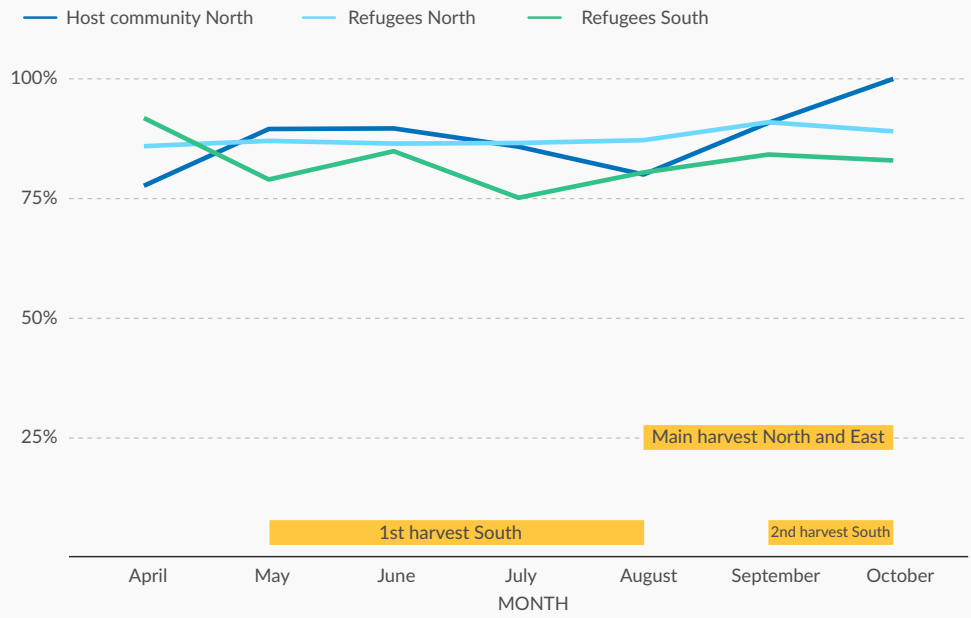
c Seasonality

Food consumption diversity is lower from April to July among refugees in the South, improving somewhat at the end and after the first harvest season and stabilizing during the second harvest season in September and October. Refugee households in the South interviewed outside the second harvest season are around half as likely to have an adequate FCS (9 per cent compared to 20 per cent) (Figure 17).[16] However, there does not appear to be a similar improvement in food security in the second harvest season. Data collection in the North mainly took place outside the harvest season in that region, making it difficult to evaluate the relationship between the seasonality and food security for households there.

16 To test if refugee households in the South interviewed from August to November systematically different from those interviewed during the first part of data collection from April to July, we compared subjective poverty and education levels between the two groups to determine if there are significant socio-economic differences.

Our analysis suggests some differences in the distributions, although they are not particularly large. A chi-squared test on subjective poverty measures indicates a significant difference between the two groups, with the "later" group reporting higher levels of subjective poverty than the "earlier" group. However, when it comes to the highest education level in the household, the difference between the two groups is not significant.

FIGURE 17. Proportion of households with a poor FCS by month



Data for November and December omitted due to small sample size. The main harvest in the North and second harvest in the South continue until January.

2 Measures of food security and food diversity

Food Consumption Score

The FCS is calculated by asking how often households consume food items from the 8 different food groups during a 7-day reference period. Methodology provided by WFP-VAM.

$$FCS = \sum_{i=1}^{n} (f_i \cdot w_i)$$

Food groups f_i and corresponding weights w_i

Main staples: 2, Pulses: 3, Milk: 4, Meat/Fish: 4, Vegetables: 1, Fruit: 1, Oil: 0.5, Sugar: 0.5

Three categories are calculated based on the 21/35 thresholds:

- **Poor:** $0 \leq FCS \leq 21$
- **Borderline:** $21.5 \leq FCS \leq 35$
- **Acceptable:** FCS $>$ than 35

Alternatively, 28/42 thresholds can be used if daily consumption of sugar and/or oil is frequent.

Household Food Insecurity Access Scale

The HFIAS provides two measures of food insecurity, following USAID FANTA guidance.

The HFIAS score is a continuous measure of the degree of food insecurity (access) in the household in the past 30 days. It is calculated for each household as the sum of nine frequency-of-occurrence questions. The frequencies range between 0 and 3, meaning the final HFIAS score is between 0 and 27.

The HFIAS Category is calculated for each household based on specific conditions in the nine food insecurity questions. Households are assigned to one of four categories: 1. Food Secure, 2. Mildly Food Insecure, 3. Moderately Food Insecure, 4. Severely Food Insecure. If households fulfil the conditions for multiple insecurity categories, the maximum category is selected.

Household Hunger Scale

The HHS measures food insecurity and is specifically designed for cross-cultural use. Methodology provided by WFP-VAM & USAID FANTA. Across three dimensions, households receive a value between 0 and 2, meaning the summed HHS ranges between 0 and 6.

Households are grouped into the following categories:

- $0 \leq \text{HHS} \leq 1$: Little to no hunger in the household
- $2 \leq \text{HHS} \leq 3$: Moderate hunger in the household
- $4 \leq \text{HHS} \leq 6$: Severe hunger in the household

3 Regression analysis tables

HFIAS - Higher values imply greater food insecurity

TABLE 2. Regression results: HFIAS with land access on which food was grown as the main explanatory variable, North

	BASELINE			INTERACTION ASSISTANCE			INTERACTION SHOCKS		
	ESTIMATE	S.E.	P-VALUE	ESTIMATE	S.E.	P-VALUE	ESTIMATE	S.E.	P-VALUE
(Intercept)	11.09***	0.90	<0.001	11.32***	0.90	<0.001	10.94***	0.91	<0.001
Land used for agriculture	0.48	0.35	0.168	-0.04	0.42	0.920	0.81	0.42	0.052
Non-governmental cash transfer programme	-0.10	0.63	0.868	0.22	0.83	0.796	-0.14	0.63	0.827
Non-governmental food assistance	2.41***	0.41	<0.001	1.54**	0.48	0.001	2.39***	0.41	<0.001
Man as head of household	-0.30	0.34	0.375	-0.30	0.34	0.383	-0.30	0.34	0.376
Primary education	-0.56	0.47	0.229	-0.55	0.47	0.240	-0.58	0.46	0.210
Lower secondary education or above	-0.86*	0.37	0.019	-0.91*	0.37	0.014	-0.87*	0.37	0.017
Flooding	-0.13	0.34	0.707	-0.07	0.34	0.848	0.47	0.43	0.281
Crop pests/destruction of crops by animals	4.60***	0.96	<0.001	4.72***	0.96	<0.001	3.73	2.00	0.062
Unusually high prices for food/other essential items	0.01	1.18	0.995	-0.07	1.18	0.951	0.00	1.16	0.999
Other household shock	0.53	0.47	0.251	0.51	0.46	0.265	0.56	0.47	0.228
Maban	2.58***	0.39	<0.001	2.57***	0.39	<0.001	2.56***	0.39	<0.001
Host community North	0.34	0.39	0.382	0.44	0.40	0.270	0.40	0.39	0.310
May	1.53*	0.74	0.040	1.48*	0.74	0.046	1.45*	0.74	0.050
June	1.03	0.73	0.156	0.93	0.73	0.204	0.99	0.73	0.174
July	0.70	0.74	0.342	0.62	0.74	0.408	0.67	0.74	0.369
August	0.74	0.75	0.323	0.65	0.75	0.391	0.66	0.75	0.378
September	3.39***	0.92	<0.001	3.16***	0.92	<0.001	3.32***	0.92	<0.001
October	-1.26	1.33	0.343	-1.17	1.30	0.367	-1.39	1.35	0.305
Tropical livestock units	-0.19**	0.06	0.001	-0.19**	0.06	0.001	-0.19**	0.06	0.001
Household size	-0.01	0.06	0.910	-0.01	0.06	0.900	0.00	0.06	0.993
Land used for agriculture* Non-governmental cash transfer programme				-0.58	1.13	0.605			
Land used for agriculture* Non-governmental food assistance				1.97**	0.74	0.008			

	BASELINE			INTERACTION ASSISTANCE			INTERACTION SHOCKS		
	ESTIMATE	S.E.	P-VALUE	ESTIMATE	S.E.	P-VALUE	ESTIMATE	S.E.	P-VALUE
Land used for agriculture* Flooding							-1.35*	0.67	0.044
Land used for agriculture* Crop pests/destruction of crops by animals							1.27	2.14	0.551
									n = 2,101

TABLE 3. Regression results: HFIAS with land access on which food was grown as the main explanatory variable, South

	BASELINE			INTERACTION ASSISTANCE		
	ESTIMATE	S.E.	P-VALUE	ESTIMATE	S.E.	P-VALUE
(Intercept)	15.22***	2.15	<0.001	15.09***	2.13	<0.001
Land used for agriculture	-1.16	0.68	0.089	-0.74	0.89	0.407
Non-governmental cash transfer programme	-1.06	1.00	0.288	-0.66	1.08	0.545
Man as head of household	-0.37	0.58	0.521	-0.38	0.58	0.512
Primary education	0.63	0.78	0.422	0.63	0.78	0.423
Lower secondary education or above	0.94	0.72	0.192	0.93	0.72	0.194
Unusually high prices for food/other essential items	0.99	0.85	0.243	1.00	0.85	0.240
Other household shock	0.48	0.65	0.461	0.49	0.65	0.452
Jonglei	-2.43	2.34	0.301	-2.39	2.32	0.305
Western Equatoria	-0.44	1.25	0.723	-0.61	1.26	0.625
May	-2.42	2.18	0.267	-2.14	2.23	0.339
June	-3.10	2.22	0.164	-2.96	2.22	0.184
July	-2.52	2.78	0.365	-2.30	2.82	0.415
August	-4.06	2.13	0.057	-4.10	2.10	0.052
September	-2.10	2.14	0.329	-2.11	2.11	0.319
October	-1.93	2.00	0.333	-2.01	1.97	0.308
November	0.84	1.95	0.666	0.91	1.94	0.639
Tropical livestock units	0.56	0.51	0.266	0.55	0.51	0.281
Household size	0.06	0.07	0.420	0.06	0.07	0.410
Land used for agriculture* Non-governmental cash transfer programme				-0.93	1.32	0.480
						n = 412

HHS - Higher values imply greater hunger

TABLE 4. Regression results: HHS with land access on which food was grown as the main explanatory variable, North

	BASELINE			INTERACTION ASSISTANCE			INTERACTION SHOCKS		
	ESTIMATE	S.E.	P-VALUE	ESTIMATE	S.E.	P-VALUE	ESTIMATE	S.E.	P-VALUE
(Intercept)	2.20***	0.21	<0.001	2.24***	0.20	<0.001	2.18***	0.21	<0.001
Land used for agriculture	-0.08	0.08	0.320	-0.16	0.10	0.092	-0.02	0.10	0.820
Non-governmental cash transfer programme	-0.05	0.15	0.714	0.03	0.19	0.878	-0.06	0.15	0.695
Non-governmental food assistance	0.02	0.09	0.809	-0.13	0.11	0.256	0.02	0.09	0.864
Man as head of household	-0.03	0.08	0.694	-0.03	0.08	0.702	-0.03	0.08	0.694
Primary education	-0.16	0.12	0.172	-0.16	0.12	0.179	-0.16	0.11	0.159
Lower secondary education or above	-0.24**	0.08	0.004	-0.25**	0.08	0.003	-0.25**	0.08	0.003
Flooding	0.11	0.08	0.169	0.12	0.08	0.136	0.19	0.10	0.053
Crop pests/destruction of crops by animals	0.53*	0.21	0.012	0.55**	0.21	0.008	0.91**	0.32	0.005
Unusually high prices for food/other essential items	-0.44	0.31	0.154	-0.46	0.31	0.143	-0.44	0.31	0.152
Other household shock	0.15	0.10	0.132	0.15	0.10	0.141	0.15	0.10	0.134
Maban	0.48***	0.09	<0.001	0.48***	0.09	<0.001	0.48***	0.09	<0.001
Host community North	0.08	0.09	0.344	0.10	0.09	0.262	0.09	0.09	0.312
May	0.24	0.18	0.168	0.23	0.18	0.183	0.23	0.18	0.186
June	0.20	0.17	0.230	0.19	0.17	0.271	0.19	0.17	0.250
July	-0.03	0.17	0.840	-0.05	0.17	0.771	-0.04	0.17	0.815
August	0.01	0.17	0.939	0.00	0.17	0.984	0.00	0.17	0.998
September	0.52*	0.20	0.011	0.48*	0.20	0.018	0.51*	0.20	0.013
October	0.02	0.24	0.934	0.03	0.24	0.893	-0.01	0.24	0.983
Tropical livestock units	-0.03*	0.01	0.012	-0.03*	0.01	0.013	-0.03*	0.01	0.012
Household size	0.01	0.01	0.543	0.01	0.01	0.548	0.01	0.01	0.493
Land used for agriculture* Non-governmental cash transfer programme				-0.18	0.31	0.556			
Land used for agriculture* Non-governmental food assistance				0.34	0.17	0.051			
Land used for agriculture* Flooding							-0.19	0.15	0.215
Land used for agriculture* Crop pests/destruction of crops by animals							-0.57	0.39	0.141
(Intercept)	2.20***	0.21	<0.001	2.24***	0.20	<0.001	2.18***	0.21	<0.001
									n = 2,105

TABLE 5. Regression results: HHS with land access on which food was grown as the main explanatory variable, South

	BASELINE			INTERACTION ASSISTANCE		
	ESTIMATE	S.E.	P-VALUE	ESTIMATE	S.E.	P-VALUE
(Intercept)	2.61***	0.43	<0.001	2.64***	0.43	<0.001
Land used for agriculture	-0.53**	0.16	0.001	-0.62**	0.20	0.002
Non-governmental cash transfer programme	-0.21	0.30	0.477	-0.30	0.33	0.358
Man as head of household	-0.14	0.14	0.337	-0.13	0.14	0.345
Primary education	0.31	0.19	0.096	0.31	0.19	0.095
Lower secondary education or above	0.06	0.17	0.706	0.06	0.17	0.702
Unusually high prices for food/other essential items	-0.07	0.21	0.745	-0.07	0.21	0.739
Other household shock	0.07	0.16	0.652	0.07	0.16	0.664
Jonglei	0.21	0.48	0.662	0.20	0.48	0.675
Western Equatoria	0.13	0.26	0.628	0.16	0.27	0.544
May	-0.58	0.46	0.212	-0.63	0.47	0.181
June	-0.46	0.47	0.321	-0.49	0.47	0.293
July	-0.81	0.69	0.244	-0.85	0.69	0.216
August	-0.87*	0.42	0.040	-0.86*	0.42	0.041
September	-0.48	0.40	0.236	-0.47	0.40	0.237
October	-0.68	0.39	0.081	-0.66	0.38	0.086
November	-0.99*	0.42	0.020	-1.00*	0.42	0.018
Tropical livestock units	0.11	0.11	0.337	0.11	0.11	0.326
Household size	0.01	0.02	0.532	0.01	0.02	0.543
Land used for agriculture* Non-governmental cash transfer programme				0.20	0.31	0.526
						n = 413

FCS - Higher values imply greater food consumption/diversity

TABLE 6. Regression results: FCS with land access on which food was grown as the main explanatory variable, North

	BASELINE			INTERACTION ASSISTANCE			INTERACTION SHOCKS		
	ESTIMATE	S.E.	P-VALUE	ESTIMATE	S.E.	P-VALUE	ESTIMATE	S.E.3	P-VALUE
(Intercept)	6.9***	1.48	<0.001	7.18***	1.46	<0.001	7.87***	1.48	<0.001
Land used for agriculture	5.18***	0.82	<0.001	4.43***	1.03	<0.001	3.33***	0.95	<0.001
Non-governmental cash transfer programme	-3.28*	1.67	0.050	-4.30*	1.84	0.019	-2.89	1.66	0.082
Non-governmental food assistance	3.07***	0.90	<0.001	2.31*	0.93	0.013	3.15***	0.90	<0.001
Man as head of household	2.32**	0.74	0.002	2.33**	0.74	0.002	2.34**	0.74	0.001
Primary education	1.34	0.88	0.130	1.36	0.88	0.122	1.40	0.88	0.111
Lower secondary education or above	5.27***	0.83	<0.001	5.20***	0.84	<0.001	5.36***	0.82	<0.001
Flooding	0.01	0.78	0.991	0.12	0.78	0.876	-3.26***	0.89	<0.001
Crop pests/destruction of crops by animals	-7.4***	1.65	<0.001	-7.32***	1.64	<0.001	-3.17	2.74	0.248
Unusually high prices for food/other essential items	-5.22**	1.95	0.007	-5.10**	1.93	0.008	-5.26**	1.85	0.004
Other household shock	-2.37*	0.98	0.015	-2.35*	0.98	0.017	-2.47*	0.98	0.012
Maban	0.24	0.87	0.779	0.17	0.88	0.842	0.25	0.87	0.776
Host community North	2.13**	0.80	0.008	2.21**	0.81	0.007	1.79*	0.80	0.024
May	1.73	1.20	0.149	1.80	1.21	0.138	2.09	1.20	0.082
June	0.06	1.14	0.958	0.01	1.15	0.990	0.25	1.15	0.827
July	2.03	1.27	0.111	2.03	1.29	0.116	2.19	1.27	0.085
August	0.38	1.27	0.766	0.38	1.27	0.764	0.71	1.27	0.575
September	-0.74	1.61	0.646	-0.89	1.60	0.578	-0.49	1.61	0.760
October	-5.42*	2.55	0.033	-5.16*	2.51	0.040	-4.81	2.50	0.055
Tropical livestock units	0.49**	0.16	0.002	0.49**	0.16	0.002	0.47**	0.16	0.003
Household size	0.00	0.11	0.993	0.00	0.10	0.982	-0.05	0.11	0.665
Land used for agriculture* Non-governmental cash transfer programme				3.45	3.87	0.372			
Land used for agriculture* Non-governmental food assistance				1.78	1.65	0.279			
Land used for agriculture* Flooding							7.72***	1.54	<0.001
Land used for agriculture* Crop pests/destruction of crops by animals							-6.42*	3.16	0.042
									n = 2,576

TABLE 7. Regression results: FCS with land access on which food was grown as the main explanatory variable, South

	BASELINE			INTERACTION ASSISTANCE		
	ESTIMATE	S.E.	P-VALUE	ESTIMATE	S.E.	P-VALUE
(Intercept)	17.25***	3.34	<0.001	16.75***	3.37	<0.001
Land used for agriculture	5.26***	1.29	<0.001	7.70***	1.74	<0.001
Non-governmental cash transfer programme	3.59	2.84	0.207	6.11	3.17	0.055
Man as head of household	1.84	1.23	0.136	1.79	1.23	0.145
Primary education	2.54	1.71	0.139	2.56	1.70	0.134
Lower secondary education or above	4.63***	1.37	<0.001	4.62***	1.37	<0.001
Unusually high prices for food/other essential items	2.76	1.47	0.061	2.83	1.46	0.053
Other household shock	-3.08*	1.29	0.017	-3.14*	1.29	0.015
Jonglei	-11.74***	2.67	<0.001	-11.68***	2.66	<0.001
Western Equatoria	-6.86**	2.36	0.004	-7.68**	2.35	0.001
May	2.44	3.24	0.453	3.54	3.13	0.258
June	2.42	3.30	0.464	2.77	3.20	0.387
July	1.01	5.93	0.864	1.85	5.96	0.756
August	2.34	3.17	0.461	1.79	3.13	0.567
September	7.34*	3.16	0.021	7.02*	3.14	0.026
October	8.25*	3.20	0.010	7.57*	3.19	0.018
November	10.64**	3.75	0.005	10.81**	3.75	0.004
Tropical livestock units	1.48	0.88	0.094	1.38	0.89	0.124
Household size	-0.41**	0.15	0.007	-0.41**	0.15	0.007
Land used for agriculture: Non-governmental cash transfer programme				-5.32*	2.47	0.032
						n = 476

References

1. Betts, A., Chaara, I., Omata, N., & Sterck, O. (2019). *Refugee Economies in Uganda: What Difference Does the Self-Reliance Model Make?*. University of Oxford: Refugee Study Centre (RSC).

2. Borgomeo, E., Chase, C., Salazar Godoy, N., & Osei Kwadwo, V. (2023). *Rising from the Depths: Water Security and Fragility in South Sudan*. Washington D.C.: World Bank. https://doi.org/10.1596/978-1-4648-1943-8

3. Carletto, C., Gourlay, S., Murray, S., & Zezza, A. (2016). *Land Area Measurement in Household Surveys: Empirical Evidence and Practical Guidance for Effective Data Collection (English)*. LSMS Guidebook. Washington DC: World Bank Group. http://documents.worldbank.org/curated/en/606691587036985925

4. Collishaw, A., Janzen, S., Mullaly C., & Camilli, H. (2023). A review of livestock interventions' impacts on household welfare on household welfare in low- and middle-income countries. *Global Food Security*, 30, 100704. https://doi.org/10.1016/j.gfs.2023.100704

5. Eliste, P., Forget, V. Veillerette, B., Rothe, A., Camara, Y., Cherrou, Y., Ugo, E., & Deng, S. (2022). *Transforming Agriculture in South Sudan: From Humanitarian Aid to a Development Oriented Growth Path.* Country Investment Highlights; No.14. FAO; World Bank. http://hdl.handle.net/10986/37951

6. FAO. (2023). *Land Cover Atlas of the Republic of South Sudan*. Second edition. Rome. https://doi.org/10.4060/cc6216en

7. Mawejje, J. (2022). *Directions for Reform: A Country Economic Memorandum for Recovery and Resilience in South Sudan (English)*. Washington, D.C.: World Bank Group. http://documents.worldbank.org/curated/en/099040006102286710

8. Mastrorillo. M., Scognamillo, A. Ginet C., Petrelli, R., D'Errico M., & Ignaciuk, A. (2024). Is the self-reliance strategy sustainable? Evidence from assistance programmes to refugees in Uganda. *Food Security*, 16(7). DOI:10.1007/s12571-024-01467-8

9. Muema J., Mutono N., Kisaka S., Ogoti B., Oyugi J., Bukania Z., Daniel T., Njuguna J., Kimani I., Makori A., Omulo S., Boyd E., Osman A.M., Gwenaelle L., Jost C., & Thumbi S.M. (2023). The impact of livestock interventions on nutritional outcomes of children younger than 5 years old and women in Africa: a systematic review and meta-analysis. *Frontiers in Nutrition* 10:1166495. doi: 10.3389/fnut.2023.1166495

10. Neudert, R., Goetter, J.F., Andriamparany, J.N., & Rakotoarisoa, M. (2015). Income diversification, wealth, education and well-being in rural south-western Madagascar: Results from the Mahafaly region. *Development Southern Africa, 32*(6): 758–784. https://doi.org/10.1080/0376835X.2015.1063982

11. Sibhatu, K.T., & Qaim, M. (2017). Rural food security, subsistence agriculture, and seasonality. *PLoS ONE,* 12(10): e0186406. https://doi.org/10.1371/journal.pone.0186406

12. Stifel, D. (2010). The rural non-farm economy, livelihood strategies, and household welfare. *African Journal of Agricultural and Resource Economics,* 4(1): 82-109. https://ideas.repec.org/a/ags/afjare/93887.html

13. Tran, T.A., Tran, Q.T., Tran, T.N., & Nguyen, H.T. (2020). The role of education in the livelihood of households in the Northwest region, Vietnam. *Educational Research for Policy and Practice* 19, 63–88.

14. UNHCR and WFP. (2023). *UNHCR/WFP Joint Post Distribution Monitoring: Profiling analysis to inform targeting and prioritization of assistance to refugees in South Sudan*. UNHCR-WFP Joint Targeting Hub, September 2023.

15. Von der Goltz, J., & Harborne, B. (2021). *Jobs, Recovery, and Peacebuilding in Urban South Sudan.* Job Series No. 25. World Bank. http://hdl.handle.net/10986/35785.

16. WFP and UNICEF. (2024). *WFP EVALUATION Resilience Learning in South Sudan. Impact evaluation endline report of a resilience programme jointly implemented by UNICEF and WFP*. Report number: OEV/2022/027. August 2024

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