Prevalence of food insecurity and associated factors among refugee households in Rhino Camp Refugee Settlement, Arua District, Uganda

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ABSTRACT

Introduction: Food insecurity is a big challenge in protracted refugee situations. We assessed food insecurity and the associated factors, as well as the coping strategies of the refugee households in a protracted situation in the Rhino camp settlement, to document the complexities of enhancing food security in a protracted refugee situation, and to inform the humanitarian stakeholders on how to tailor food security interventions at the local level to enhance the sustainability of refugee households in a long-time crisis. **Methods:** We conducted a cross-sectional study using the concurrent mixed methods study among 432 household heads. In addition, four key informant interviews on food insecurity were conducted with humanitarian workers. STATA version14 was used to analyse quantitative data and ATLAS ti.8 software supported the qualitative data analysis. **Results:** Majority (82.4%) of the refugee households in protracted crisis were food insecure, of which over half (50.7%) were severely food insecure. The factors that were significantly associated with food insecurity were; geographical location [Adjusted Odds Ratio (AOR) 3.48; 95%CI: 1.23–9.17), age of household heads (AOR: 3.06, 95%CI: 1.11–8.49), education (AOR: 2.68, 95%CI: 1.31–5.47), monthly incomes (AOR: 2.14, 95%CI: 1.14–4.03), tribe (AOR: 0.33, 95%CI: 0.15–0.75), and the emergence of households that were not on initial humanitarian aid plan as shown in the qualitative results. Major food insecurity coping strategies included reducing the quantity of food cooked (54.9%), reducing the number of meals per day (28%), and selling domestic assets to buy food (21.7%). **Conclusion:** Food insecurity is high among households in a protracted refugee situation in the Rhino camp settlement despite the long-existing interventions for enhancing the sustainability of the refugee households. There is a need to improve on the identified modifiable factors such as relocation of some of the refugee households into areas that can support crop production, improving education status and the monthly incomes of refugees, and also to recognize the emerging households that are not on the initial humanitarian aid plan.

Introduction

Despite the international commitment to end hunger and malnutrition by 2030 [1], food insecurity remains an increasing challenge in the world. Nearly 690 million people went hungry in 2019, an increase of 10 million over 2018. Africa has the highest number of undernourished people with over 250 million people, and food insecurity is growing faster in Africa than in any other region of the world [2,3]. Undernourishment is especially high in Central and Eastern Africa due to widespread violence in some of the countries such as the Central African Republic, Somalia, and South Sudan [2].

In Uganda, the 2018 Global Hunger Index classified the levels of food insecurity as 'serious' with 12% of the total population being chronically food insecure. The most food-stressed sub-regions were Karamoja and West Nile [4]. In Northern Uganda, 16.4% of the population was food insecure [5]. The increase in food insecurity was attributed to conflicts and civil wars, exacerbated by climatic hazards [6]. Conflicts and civil wars have led to an increase in the global refugee population by nearly 50% in the last decade (from 15.2 million in 2011 to 26.6 million in -mid-2021) [7,8]. Uganda is a major refugee-hosting country in Africa and third in the world after Turkey and Colombia, with over 1.5 million refugees [9]. Nearly one million (65.3%) of the refugee population in Uganda are South Sudanese, and these are majorly settled in refugee settlements in the northern part of the country [10].

A recent study indicates that the prevalence of food insecurity in the general refugee population in Uganda is estimated to be high at 90% irrespective of their duration of stay in the settlement [6]. Moreover, the literature indicates that food insecurity majorly affects those in the protracted refuge situation [11]. Refuge households across Ugandan refugee settlements receive assorted humanitarian support, through interventions from government and humanitarian agencies, and this is targeted to enhance the self-sustainability of the refugees in the long run [11], for example, through the allocation of land portions to refugee households and the provision of farm inputs and tools. As a result, the majority (74%) of the refuge households are engaged in smallholder farming [11]. Other livelihood options have also been set up in the settlement, such as the establishment of market centres, financial support to different refuge action groups, as well as giving employment opportunities for some refugees by the humanitarian organizations operating in the settlement [12].

Ideally, such foregoing assistance would enable long-time refugee households to establish sustainable sources of food to supplement the monthly rations and enhance their livelihood. However, this is not the case especially in the Rhino camp settlement despite being one of the settlements with the long-stayed refugees in Uganda [11]. Estimates indicate that 58% of the general refugee households in Rhino camp still depend on humanitarian monthly rations [13], although it is not known whether the new or old refugee caseloads are the most affected. The factors interacting with refugees´ failure to enhance self-sustainability in the long run and continued dependency on food rations -despite the existing tailored interventions -have not yet been documented. Moreover monthly household rations in Rhino camp last for an average of 22 days, and do not meet the caloric and dietary requirements of the household members [14].

Persistent lack of adequate dietary food intake could cause serious health consequences, especially among children and pregnant women [15]. It is not surprising that there is a high prevalence of anaemia (10.3%) and malnutrition (46.0%) among children below 5 years in Rhino camp, as per the classifications from the WHO Public Health Significance [14]. Therefore, we documented the current prevalence of food insecurity and the possible factors for persistent food insecurity among refugee households in protracted situations, that have long been receiving humanitarian support for enhancing sustainability.

Methods

Study setting

The study was conducted in the Rhino Camp refugee settlement, Arua District, West Nile, Uganda. Arua district borders the DRC to the west and is also close to the border with South Sudan on the north side of Yumbe District. Rhino camp was originally opened as a small refugee settlement in 1980 and later expanded to host the influx of South Sudanese refugees following the wake of a civil war in South Sudan in 2013 [14]. The current population of refugees in Rhino camp is estimated at 102,577 persons [16]. Refugees in Rhino camps live along with the host communities whose population account for only 17% of the overall population in the settlement. The majority of the refugees have lived for five or more years (since December 2014) [14]. The total surface area of the settlement covers 85 square kilometres which are characterised by farmland, although it has been experiencing environmental pressures such as low rainfall and infertile soils in some zones [17]. Rhino camp settlement is currently divided into seven (7) zones as follows: Zone I-Ocea, Zone II-Siripi, Zone III-Eden, Zone IV-Tika, Zone V-Odobu, Zone VI-Ofua, and Zone VII-Omugo [14]. Since 2014, the average land size allocated to refugee households in Rhino camps reduced from 50x50Metres to 20x30 meters due to the growing population of refugees in the settlement [18].

Study Design

We conducted a concurrent mixed methods study design to collect data among South Sudanese refugee households.

Study population and participants

This study was conducted among South Sudanese refugees who were considered to be trapped in a protracted refugee situation. This refers to a situation where refugees of the same nationality have lived in the settlement for at least five consecutive years [19]. In the present study, this definition considered only the refugee households of South Sudanese origin who have lived in Rhino camp settlement for five consecutive years or more, counting for the years before 2015. Presently, the South Sudanese population forms the majority of the refugees in Uganda, and their presence dates far back from the 1980s following the conflicts in Southern Sudan [11]. Therefore, it is one of the protracted (long-term) refugee populations, and their numbers highly increased following the recent resumption of the conflict in South Sudan [20]. Despite the South Sudanese´s long presence in large numbers in Uganda, their food security status has not been reported previously, whilst being the biggest population of refugees in protracted crisis makes them more vulnerable to unceasing food insecurity. Therefore, an assessment of the food insecurity status among South Sudanese refugee households in a protracted crisis is essential because of the potential consequences on the public health status of this vulnerable population, and the implications on policy and food aid decisions.

We included refugee households who had lived in the Rhino camp settlement for five or more years. A refugee household was identified as a family unit that is registered with the Office of the Prime Minister and UNHCR as an independent home composition. Study participants were the household heads who included either males or females [21]. In each household, one respondent was selected for the interviews. Where the household head was absent, an adult member (i.e., 18 and above years old) who influences decision-making in the household was interviewed. In the case of child-headed households, the adolescents who were perceived to be the household heads were interviewed as emancipated minors (i.e. individuals below the age of majority (I.e., ≮ years), who are married, have a child, or cater for their livelihood, and can independently provide informed consent to participate in research [22].

Sample size consideration

We calculated the sample size (n) using a single population proportion formula by Kish, Leslie [13] We considered a margin of error (d) of 5% , a standard normal deviation (Z =1.96) at a 95% confidence level. Previous studies showed an estimated prevalence (P) of food insecurity among refugee households in the Rhino camp of 58% [14]. We adjusted the calculated sample size to 432 households, to account for an assumed nonresponse rate of 5% and a migration rate of refugees of 10%.

Selection of key informants

Key informants (KIs) were purposively selected and interviewed. These included; the WFP field coordinator, the settlement commandant, and two officers from the Pentecostal Assemblies of God (PAG). A Key informant interview guide was developed in consideration of two key thematic areas, (i.e; the existing interventions for enhancing food security in the refugee crisis, and the predictors of food security in protracted refugee situations) to guide an in-depth understanding of the contextual issues interacting with food security and the food insecurity situation in protracted refugee settings.

Data collection procedure

Data were collected in July 2019. Eight trained research assistants (RAs) were recruited within the settlement, with a minimum of a secondary school certificate. The RAs were proficient in English and the local languages of the South Sudanese refugees (i.e., Arabic, Dinka, and Kakwa).

Study variables

The dependent variable was household food security status. This was analyzed as a binary outcome, such that, each household was categorized as either food secure or food insecure.

Independent variables included Accessibility of natural and economic resources (i.e., land, markets) for food production and income generation; Utilization of natural and economic resources (i.e., land, markets and labour force) to support household food production/acquisition; Characteristics of individual households (i.e., health and wellness status in the households, -looking at the presence of chronic illness or physical disability among members, and post-harvest handling practices of households.

Outcome measurement plan

The outcome variable (household food insecurity status) was measured using the Household Food Insecurity Access Scale (HFIAS) score. The HFIAS score is a continuous measure of the degree of food insecurity (access) in the household in the past four weeks [2]. The HFIAS tool has nine indicator/occurrence questions. Each question is followed by a corresponding frequency-of-occurrence question, thus making 18 questions. Each indicator question would attract binary answers which

were coded as 0=No for a negative response or 1=Yes for an affirmative response. Each corresponding frequency-of-occurrence question would attract three alternate answers from participants who responded affirmatively to the preceding indicator question. The responses on each frequency-of-occurrence question were coded as; 1=Rarely, 2=Sometimes, and 3=Often, then an HFIAS score variable was calculated for each household by summing the codes for each frequency-of-occurrence question.

The frequency-of-occurrence was coded as 0 for all cases where the answer to the corresponding occurrence/indicator question was "no" (i.e., if Q1=0 then Q1a=0, if Q2=0 then Q2a=0, etc.). The scores on all the 9 frequency of occurrence questions for each household were then summed up. A household´s score ranged from 0 (minimum score for households that were coded with 0 to all the frequency of occurrence questions) to 27 (maximum score for households that were coded with 3 to all the 9 frequency of occurrence questions). The higher the score, the more food insecure the household was. A cut-off of 10 points score was assumed following the standard coding procedure given in the HFIAS tool [2], such that any household whose total score was between 0-10 points was regarded as food secure, while those which scored between 11-27 points were considered food insecure respectively.

We used the precursors of the Household Food Insecurity Access (HFIA) prevalence indicator tool to obtain the range of severity of food insecurity on the underlying scale (i.e., 1=food secure: 2=mild food insecure: 3=moderaterly food insecure and: 4= severely food insecure). In the analysis of the food insecurity coping strategies, four different themes were adopted from the USAID´s Coping Strategy Index (CSI). These included dietary change; increasing short-term household food availability; rationing strategy and decreasing the number of people.

Data analysis

We analyzed quantitative data using STATA version 14. We performed descriptive analysis and summarised the general understanding of the data using tables, frequencies, and percentages. We performed bivariate analysis to determine the association between independent and dependent variables using odds ratios (OR) at a 95% confidence interval (CI). Significant factors in bivariate analysis were adjusted further with multivariate analysis. The level of significance at multivariate analysis was set at 0.02, such that all variables with a p-value less than 0.02 were considered as the overriding factors which were independently associated with food insecurity among refugees in protracted situations. Qualitative data was thematically analysed using ATLAS ti.6 software. Audio-recorded interviews were first transcribed into readable texts, and interview transcripts were logged into the software for coding and analysis.

Ethical considerations

Ethical approval to conduct this study was obtained from the Makerere University School of Public Health Higher Degrees Research and Ethics Committee (REC No 306). Approval to collect data in refugee settlements was obtained from the Office of the Prime Minister (OPM), Department of Refugees, Kampala. Consent was sought from all the respondents before they agreed to participate in this study.

Results

A total of 432 households were assessed. About 69% (298) were headed by males. About 36.3% (157) of the household heads were aged between 30-39 years. Forty-six (10.7%) of the households were headed by adolescents (i.e., 14-19 years old). Nearly half, 48.4% (209) of the households were composed of six or more members. Nearly half, 48.6% (210) of the households had at least six children. About 40% (171) of the household heads did not attain any formal education and, 78.9% (341) of the household heads engaged in crop production as their main occupation **Table 1**.

Most households, 82.4% (356) were food insecure. Half, 50.7% (219) of the households were severely food insecure. About 66.5% (287) of the households relied on land as a major resource to obtain food. About 67.6% (292) of the households cultivated a land size of less than 20X30 meters. Over half, 54.4% (235) of the households relied on humanitarian food aid for their livelihood. Half, 50.7% (219) of the household heads earned less than USD15 per month. The majority, 94% (406) of the households spent their monthly earnings on the purchase of food items. More than half, 54.2 %(234) of participants travelled for more than 2 km to reach the market centre. Monthly food rations lasted between 15-21 days for 58.5% (128) of the households **Table 2**.

The qualitative results also concur that the major interventions for enhancing food security in the settlement were; the provision of monthly food rations to the refugee households-mainly by WFP, allocating a piece of land to each household by the Uganda government through the OPM, and provision of agricultural tools and inputs to the households by various humanitarian agencies.

With regards to the monthly rations, the KII from WFP explained that the rationing strategy followed two modalities, that is, each household receives a ration card of either cash or in-kind food as part of their monthly relief aid. Refugees on cash modality receive thirty-one

thousand Uganda shillings 31,000 (USD 9) per person per month, while those on in-kind modality receive 11kgs of maize corn or sorghum and 6kgs of beans each. *"…of course, WFP provides humanitarian assistance, and currently we have two modalities, that is cash and in-kind food. So that is the relief part for saving lives. What I have on the head currently is, for the cash we give 31000 per head, and for food, I will share with you the rations."* (KII4) The key informants explained that the monthly rations and other humanitarian and government interventions did not have special provisions for the households in the protracted refugee crisis, therefore they provide similar services to the refugee communities irrespective of their duration of stay. They highlighted that, all refugees were equally vulnerable in terms of food security, therefore priority was to provide blanket livelihood interventions for all the refugees.

"…WFP has no specific provision for those who have stayed long. It is the same ration for all. Originally, those who have stayed above five years would actually be phased off from the rations, with expectation that these should be self-reliant after a long time. Those of 3-5years stay would be given half the ration, and those who have stayed less than three years would be on 100% ration. However, there is a study that was conducted and it indicated that all refugees were equally vulnerable. The period that someone has stayed in Uganda does not qualify him or her to be more food secure than the other. So, we had to go back to 100% ration for everyone." (KII4)

"…we treat refugees as refugees irrespective of how long they have stayed in the camp. Therefore, all our services cut across because the refugee problems also cut across" (KII3)

"All refugees are refugees regardless of their time of arrival, and there is no specific provision for those that have stayed long. As OPM, we provide land to each household only once, and we partner with other agencies such as UNHCR, DRC and World Vision to provide farm tools and other livelihood assistance to the refugee households." (KII1)

Concerning land as a major resource for enhancing refugee livelihood, the OPM official recognized that the size of land given to the refugee households is generally too small to enhance agriculture, and this is one of the major challenges affecting agricultural interventions for sustainable livelihood in the settlement. The latter contextualizes the quantitative result, which states that 67.6% of the refugee households who engaged in crop farming in the previous season cultivated less than 20x30 meters of land. An official who is a government representative from the Office of the Prime Minister (OPM) explained that:

"In 2014, a refugee household would be allocated about 50x100 meters of land. However, the soaring number of refugees prompted the government to reduce land given to each household. Currently we give them 20x30M, and 30X30M to some of the households, depending on the size of the household, and also on the availability of land in the zone where these refugees' households have been settled. Of course, this land is really so small for a household to survive, especially in Uganda where agriculture is the major source of livelihood." (KII1)

The OPM official highlighted the need to maintain the ongoing humanitarian efforts to enhance good relationships between refugees and the host community, such that the hosts can willingly offer or rent-out more cultivatable land to the refugees. On the contrary, one key informant from the WFP explained that, the refugees in Rhino camp and other settlements in Uganda were getting sufficient support to enable them enhance self-sustainability. The WFP official narrated that:

"…look, the government gives every refugee household a piece of land to support them in resettlement and food production. We give them a monthly ration, the UNHCR provides a tool kit-known as Non-Food Items (NFI kit) to every refugee household, which contains domestic support equipment including agricultural tools. Other partners such as World Vision, DRC, and NRC also provide refugees with farm tools and inputs as well as various agricultural extension services. Really what more can we help with these refugees to enhance own food production?" (KII4)

Factors Associated with Food Insecurity

The multivariate analysis indicated that households residing in the Siripi zone were more likely to be food secure compared to those located in Odubu (AOR: 3.48, 95%CI:1.23-9.17). Households whose heads were aged 30-39 years old were more likely to be food secure compared to those headed by adolescents (14-19 years old) (AOR: 3.06, 95%CI: 1.11–8.49). Households of other South Sudanese tribes such as the Kukus, Pojulus, and Acholis were less likely to be food secure compared to those of the Dinka tribe (AOR 0.33,95%CI {0.15-0.75}). Households whose heads had attained at least primary level education were more likely to be food secure compared to those whose heads did not have formal education (AOR 2.68,95%CI {1.31-5.47}). Households with a monthly income of between USD 15 to USD 45 were more likely to be food secure compared to those whose income is less than USD 15 (AOR 2.14,95%CI {1.14-4.03}) **Table 3**.

The location of refugee households was also pointed out in the qualitative findings as a potential determinant of food insecurity status. The KIIs pointed out that, agricultural performance was not similar across the zones in the settlement, probably due to differences in soil fertility and weather patterns, as highlighted in the following narratives;

"Rhino camp is a bit tricky especially with building livelihood and resilience. Its bigger part is located in the rain shadow, so agriculture is not the best throughout the settlement. Even the

soils in some parts of the settlement are rocky and cannot support crop production." (KII4)

"Rhino camp is such a big land which covers an area of approximately 85 square kilometres. So there is a possibility that the soil quality is not similar across the settlement, and therefore crop production may not yield similar results across the settlement unless appropriate agriculture practices are used to meet the fertility demands of soils in particular zones." (KII1)

The age of the refugee household heads was also reiterated in the qualitative results as a significant issue in food security situation. Households headed by the youths were said to be more food insecure compared to those headed by the adults. This was partially attributed to the formation of new households in the settlement which are not on the initial humanitarian aid plan. It was identified that in the protracted refugee crisis, new households tended to emerge in the settlement especially by the youth who normally broke -off from their main households due to various social circumstances, such as the desire to marry and form their own families. The commandant mentioned that those new households usually did not get land allocation from the OPM because they were not on the initial OPM´s humanitarian aid plan, and this poses a challenge to the newly formed households as compared to those that received a piece of land.

With regards to tribe, the qualitative results indicated that, some of the south Sudanese refugees such as the Dinkas were historical cattle keepers, and therefore had not fully embraced food crop production, albeit it is the main approach for self sustainability in the settlement setting in Uganda. The official from Pentecostal Assemblies of God (PAG) shared that, crop production was the main approach used to build self reliance in Rhino camp settlement, but most of the refugees in the settlement were formely cattle keepers, so they had not fully embraced agriculture as a viable option for food production, as depicted in the following narrative;

"Many south Sudanese refugees give little attention to crop farming. That is why you see, especially the youths concentrated in trading centers doing nothing but gambling. Sometimes it is not because they don´t have where to cultivate, but because they are not accustomed to cultivation. If you move in some households, don´t be surprised to find that even part of the small piece of land given to them is just bushy." (KII2)

The education level of the refugees was also highlighted in the qualitative results as an important attribute for enhancing food and income security in the refugee households. Refugees with good qualifications were given a chance to work with several humanitarian organizations, for example as interpreters, extension workers, research assistants, food distributors, and teachers among others. However, those who qualified were only a small proportion, as the majority could not even read and write. In an interview with the OPM official, he explained that:

"…at least each and every organization that is currently operating in this settlement employs at least two refugees. Either as cleaners, field extension workers, community resource persons or even in management positions, but at least some educated refugees are earning an income to help their households in this settlement." (KII1)

Food insecurity coping strategies adopted by households in a protracted refugee crisis

We found that there were four basic strategies adopted by the refugee households to cope with food shortage. First, households devised strategies to change the diet by: selling part of their monthly rations to buy preferred food (38.9%), borrowing food or money to buy an alternative food (34.4%), and relying on less preferred food (25.5%). Second, households devised strategies to increase short-term food availability through; buying food on credit (32%), liquidating home assets to buy food (21.7%), seeking food aid from friends/relatives (21.7%), and harvesting immature crops (5.9%). Third, households devised rationing strategies, by reducing the quantity of food cooked per day (54.9%), reducing the number of meals per day (28%), restricting food consumption by adults to feed children (10%), and skipping some days without cooking/eating (7.2%). Fourth, during food shortages households decreased the number of members, by sending some member(s) to eat elsewhere in the neighbourhood (39.6%), sending some member(s) to stay with relatives elsewhere (34.4%) and other strategies, for instance, some of the adolescents go to nearby towns including Madi Okolo, Arua, Yumbe and Koboko towns to look for casual work and consequently become street children, while some girls leave home for marriage **Table 4**.

Discussion

The findings indicate that the prevalence of food insecurity among South Sudanese households in protracted crises in the Rhino camp settlement (82.4%) was much higher than that (58%) estimated in the general refugee population in the Rhino camp [14]. Unfortunately, there is paucity of similar studies in protracted refugee settings that could provide a clear comparison to the later findings. One study that was done among long-time Palestinian refugees in Lebanon also reported that nearly half of the refugees were severely food insecure [23]. This is an interesting finding because one would ideally think that, the refugees who have stayed in the settlement for a long time often find ways of coping,- such as engaging in trade and agriculture, and can acquire some employment to make their livelihood better off

compared to the new refugee caseloads. The severe food insecurity in a refugee crisis that has no clear end in sight exposes the affected refugees to unceasing health risks such as malnutrition.

From the geographical point of view, we found that households which were located in the Siripi zone were more likely to be food secure compared to those in the Odobu zone. Earlier studies also reported the influence of the geographical location of refugee households on food production capacity [19]. The latter situation could be linked to the qualitative findings which indicated some parts of the Rhino camp are characterised by rocky and poor soils, exacerbated by low precipitation which can not sufficiently support crop production. Similar results were also found in the Rhino camp in the earlier study done by OPM and UNHCR [24]. A similar finding was also reported among Burundian refugees in Rwanda [22] and the Somalis in Ethiopia [25]. Owing to the foregoing shortfall, consistent low crop production could render the existing agricultural interventions less effective in improving food security in the protracted refugee crisis. This implies that there is a need to revise the existing agricultural approaches in a manner that will fit within the climate and environmental settings of Rhino camp settlement, to improve agricultural productivity in the refugee communities.

It is also important to note that the geographical difference in food production in Rhino camps could also be facilitated by the existing refugee settlement strategy which compels South Sudanese refugees to be settled in different zones according to their tribes. This is especially true with the Dinkas and Nuels due to fear of tribal tensions. Different tribes present with differences in socio-economic backgrounds, as some tribes- such as the Kakwas and Acholis were originally more peasantry while others-especially the Nuels were cattle keepers prior to their displacement. This implies that those who were originally peasants can easily adapt to crop production which is the major approach for enhancing self-reliance in Rhino camp.

We found that the age of the household head significantly predicts the household´s food security. Households which were headed by older people were found to be better off compared to those headed by adolescents. A report by UNDP [11] presents a similar challenge as being a serious driver for food insecurity among child-headed households in Uganda. The reason for this shortfall could be due to the multiplicity of members among refugee households, and other social challenges which may put pressure on the adolescents to break off from their main households and form their own family units that are not on the initial humanitarian aid plan. This was made clear during key informant interviews that, these newly formed households-usually by the adolescents are often not able to access assistance for self-sustainability, such as land for cultivation, agricultural tools and home utensils. The latter implies that interventions for refugee self-sustainability ought to recognize the formation of new child and adolescent-headed households in the refugee crisis.

The education status of household heads has a significant bearing on the household´s food security. We found that most of the refugees who had formal education were employed by various humanitarian organisations, especially as research assistants, language interpreters, and community health promoters. Several studies also report that refugees who acquired education have better chances of being employed either with the host government or the humanitarian organizations [6,26]. Therefore, improving education and employability of the refugees can potentially improve their incomes which is a potential safety net for food security in the households. In times of food scarcity in a protracted refugee crisis, the coping strategies adopted by food insecure households include reliance on less preferred and insufficient foods, mainly the rations of pulses provided by WFP. Even when the food rations were sufficient, previous studies have found that refugee households cannot feed on rations of pulses for the whole month [27], so they are often desperate to change their diet. This explains the reason for borrowing money/food items, and liquidation of rations and non-food items given to them by humanitarian agencies, such as utensils, tarpaulins, and cooking oil whenever they needed to buy food, as well as harvesting immature crops. These strategies not only increase on household´s poverty and continuous vulnerability but also lead to a perpetual lack of food in the household. Moreover, borrowing money for non-economic use increases the economic vulnerability and dependency of the household [11].

Reducing the number of meals eaten per day, and/or cooking less quantities of food could culminate in reduced food intake which could potentially cause irreversible negative effects, such as the increased risk of malnutrition, especially among refugee children. Earlier studies found similar coping strategies and a high prevalence of malnutrition among refugee children in Uganda [27], Ethiopia [26], Lebanon [8], and in the Osire refugee settlement of Namibia [25].

Study limitations

We acknowledge two methodological limitations in this study. First, we could have obtained a more detailed understanding of food insecurity coping strategies if we used an in-depth interview technique to capture the lived experiences of the household heads rather than the key informants. However, this limitation did not significantly affect the results of this study since the semi-structured questionnaire that we used to interview household heads was nested with a standard coping strategy index score

which allowed for examination of household coping strategies. Second, our failure to translate the data collection tools into the local languages of the research participants could have introduced response errors. It became difficult for us to decide on the most appropriate language for the interview, since South Sudanese refugees speak several languages according to various tribes, although some of them understand Arabic but not eloquently. Therefore, we left the questionnaire in English, and purposely recruited our research assistants from within the same localities of particular refugee groups and were trained to read questions in English but ask the respondents in a translated version of their respective local language.

The "one month" recall period on food security-related questions posed a challenge to some respondents, as they would not recall the number of times a particular food insecurity event occurred in their household in the "last one month." This may have led to a recall bias. However, after the first day of data collection, it was discovered that respondents understood better if they were asked about the "past four weeks" other than the "last one month." Therefore the use of the recall period of "four weeks" was emphasized in the subsequent days of data collection to minimize the potential recall bias.

During household listing, some respondents would not easily remember their arrival time (month and year) at the settlement. Thus, there was a possibility of including households in the study that do not qualify to be in a protracted crisis. However, we worked with the local guides, to develop an events calendar that helped participants to recall their resettlement time.

Conclusion

There is a high prevalence of food insecurity among households in a protracted refugee situation in the Rhino camp settlement, with over half (50.7%) of the refugee households being severely food insecure despite the long-existing interventions for enhancing sustainability of the refugee households. The most at-risk households are those headed by adolescents (≤19 years). Moreover, the food insecurity coping strategies adopted by households are characterized by a reduction in food intake, which can potentially result in a damaging irreversible effect of chronic malnutrition. There is need to improve on the identified modifiable factors such as the location of some of the refugee households, the education status and the monthly incomes of refugees, as well as recognizing the emerging households that are not on the initial humanitarian aid plan as expressed in the qualitative results.

We recommend that, efforts should be made by the Office of the Prime Minister to relocate some of the refugee households to areas that can support food production, or ensuring that the refugee households have access to cultivatable land to enable them produce adequate food and enhance food security. This could be achieved through negotiating with the local communities (who are the landowners) to provide more cultivatable land for allocating to the refugees. Alternatively, efforts should be made by the government and humanitarian agencies to encourage the use of organic fertilizers by the refugee farmers so as to improve soil fertility and productivity in some geographical locations of refugee residences. Providing fertilizers to the refugee farmers and sensitizing them on their proper application can help to enhance good crop yields. Arrangements could be made to attract and/or support Agro-input dealers to provide fertilizers to the refugees on credit such that they can pay back after harvesting. More importantly, practical training about the production of organic compost manure using the decomposable domestic wastes would help refugees to not only minimize on the cost of buying fertilizers but also limit on the possible environmental impact of chemical fertilizers.

There is a need to consider the households headed by young refugees in the humanitarian aid programs, - especially the households that are formed by adolescents because these were found to be more food insecure than the households headed by adults. This requires keeping track of the newly formed adolescent and/or child-headed households. It may necessitate the establishment of a special service desk that can gather information on each newly formed household in the settlement and support them with a Non-Food Items (NFI) kit. These, in addition to monthly rations, could support the start-up of households with reasonable living standards.

The government and humanitarian organizations whose interventions target to improve on the literacy of refugees should focus on establishing adult learning programs in the settlement whilst maintaining the existing child education programs. This can potentially increase the employability of the refugees and enhance their utilization of the existing employment opportunities and self-sustainability vis-à-vis the continued dependency on humanitarian aid.

What is known about this topic

- The prevalence of food insecurity in the general refugee populations in Uganda is known and is estimated to be at 90%.
- Recommendations from existing literature on food security interventions are twisted towards providing relief assistance, such as continuous monthly rations to both new and old refugee caseloads.

What this study adds

- This study highlights the current status of foo
- security in the protracted refugee crisis other than the general refugee population.
- The study also highlights the complexity of coping with food insecurity among refugee households that are caught up in protracted situations.
- The study draws recommendations on how populations that live in longtime refugee crises can be assisted to enhance their food acquisition other than continuously depending on humanitarian rations which are often not sufficient to meet their dietary and caloric needs

Competing interests

The authors declare no competing interests.

Authors' contributions

FK developed the concept, and research tools, supervised the data collection exercise, data analysis, and writing the first draft of the manuscript. HK and JB provided technical guidance in the conceptualization, proposal development, editing, and arranging of the research tools, and reviewed the different versions of the manuscript. AK is the AFENET scientific writer. She provided technical guidance in writing and reviewed the different versions of this work.

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Table 1: Demographic characteristics of the households		
Demographics	**Frequency (n=432)**	**Percentage (%)**
Sex of household head		
Male	298	69.0
Female	134	31.0
Age of household head (Years)		
14–19	46	10.7
20-29	125	28.9
30-39	157	36.3
40+	104	24.1
Marital status of household head		
Married	341	78.9
Single	91	21.1
Education level of household head		
No formal education	171	39.6
Primary level	202	46.7
Secondary and Tertiary	59	13.7
Zone/location of household		
Odubu	172	39.8
Tika	64	14.8
Ocea	81	18.8
Siripi	115	26.6
Tribe of household		
Dinka	112	25.9
Nuel	151	35.0
Kakwa	74	17.1
Other	95	22.0
Main Occupation of household head		
Crop farming	341	78.9
Trade & Other	91	21.1
Household size		
1-2 people	48	11.1
3-5 people	175	40.5
6 and above	209	48.4
Number of children(<18Years)		
0-2	46	10.7
3-5	176	40.7
6 and above	210	48.6
Chronically ill member in household		
Yes	59	13.7
No	373	86.3
Disabled member in household		
Yes	61	14.1
No	371	85.9

Table 2: Descriptive Proportions of Food Security		
Factor	**Frequency (N=432)**	**Percent**
Households' food security status		
Food secure	76	17.6
Food insecure	356	82.4
Households' food security status categories		
Food secure	01	0.2
Mildly food insecure	75	17.4
Moderately food insecure	137	31.7
Severely food insecure	219	50.7
Major resource used to obtain food		
Land	287	66.5
Transfers from friends/relatives	96	22.2
Other***	49	11.3
Size of land for cultivation		
Less than 20x30 meters	292	67.6
20X30 to 59x59 meters	92	21.3
1 acre and above	48	11.1
Major livelihood		
Agriculture	137	31.7
Entirely depending on aid	235	54.4
Other ***	60	13.9
Monthly income of household		
Less than USD 15	219	50.7
USD 15–45	147	34.0
More than USD 45	66	15.3
Monthly expense on food β		
Less than USD 15	201	49.5
USD 15–45	160	39.4
More than USD 45	45	11.1
Distance to market		
Less than 1Km	93	21.5
1-2Km	105	24.3
More than 2Km	234	54.2
Duration of food in stock β		
7days and below	22	10.1
8-14 days	45	20.5
15-21 days	128	58.5
22-30 days	24	10.9
****- other, –multiple responses recorded. β- N<432, due to non-response*		

Table 3: Multivariate Analysis of Factors Associated with Food Security				
	Food Security Status			
Factor	**Food secure (%)**	**Food insecure (%)**	**COR**	**AOR**
Age of household head				
≤19 years	6 (13.0)	40 (87.0)	1.00	
20-29 years	19 (15.2)	106 (84.8)	1.19 (0.45–3.21)	1.43 (0.47–4.34)
30-39 years	45 (28.7)	112 (71.3)	2.68 (1.06–6.76)	3.06 (1.11–8.49)
40+ years	6 (5.8)	98 (94.2)	0.41 (0.12–1.34)	0.65 (0.18–2.32)
Tribe of household head				
Dinka	35 (31.2)	77 (68.8)	1.00	
Nuel	8 (5.3)	143 (94.7)	0.12 (0.05–0.28)	1.36 (0.13–0.99)
Kakwa	16 (21.6)	58 (78.4)	0.61 (0.31–1.20)	0.65 (0.30–1.43)
Other ***	17 (17.9)	78 (82.1)	0.48 (0.25–0.93)	0.33 (0.15–0.75)
Education of household head				
No formal education	18 (10.5)	153 (89.5)	1.00	
Primary level	44 (21.8)	158 (78.2)	2.37 (1.31–4.28)	2.68 (1.31–5.47)
Secondary & Tertiary	14 (23.7)	45 (76.3)	2.64 (1.22–5.73)	2.52 (1.01–6.33)
Zone/Location				
Odubu	10 (5.8)	162 (94.2)	1.00	
Tika	13 (20.3)	51 (79.7)	4.13 (1.71–9.98)	3.10 (1.13–8.47)
Ocea	19 (23.5)	62 (76.6)	4.96 (2.19–11.27)	2.82 (1.06–7.46)
Siripi	34 (29.6)	81 (70.4)	6.80 (3.19–14.45)	3.48 (1.23–9.17)
Size of the household				
1-2 people	14 (29.2)	34 (70.8)	1.00	
3-5 people	38 (21.7)	137 (78.3)	0.67 (0.33–1.38)	0.50 (0.20–1.27)
6 and above	24 (11.5)	185 (88.5)	0.32 (0.15–0.67)	0.49 (0.20–1.22)
Major resource for food				
Land	59 (20.6)	228 (79.4)	1.00	
Transfers	9 (9.4)	87 (90.6)	0.40 (0.19–0.84)	0.78 (0.31–0.96)
Other***	8 (16.3)	41 (83.7)	0.75 (0.33–1.69)	0.84 (0.32–2.16)
Size of cultivatable land				
Less than 20x30 meter	41(14.0)	251 (86.0)	1.00	
20X30 to 59x59Meters	19 (20.7)	73 (79.3)	0.67 (0.33–1.38)	0.93 (0.45–1.94)
1Acre and above	16 (33.3)	32 (66.7)	0.32 (0.15–0.67)	2.14 (0.86–5.31)
Monthly income of household				
Less than USD 15	29 (12.2)	190 (87.8)	1.00	
USD15–45	38 (25.9)	109 (74.1)	2.28 (1.33–3.91)	2.14 (1.14–4.03)
More than USD 45	9 (13.6)	57 (86.4)	1.03 (0.46–2.31)	1.25 (0.49–3.20)
*Variable significant (P-value<0.02) ***-Other tribes, other resources for food. Several responses*				

Table 4: Food Insecurity coping strategies adopted by the refugee households		
A. Strategies to change the diet	**Freq (N=419)**	**Percent**
Selling part of the available ration to buy desired food	163	38.9
Borrowing food/ money to buy the desired food	144	34.4
Continue to rely on less preferred available food	107	25.5
Other*	5	1.2
B. Strategies for increasing short-term food availability	N=388	92.6%
Borrow food/money from friends/money lenders	69	17.8
Buying food on credit	124	32.0
Harvesting immature crops	23	5.9
Liquidation of home assets to buy food	84	21.7
Non-earning member start to work	4	1.0
Seeking food aid from friends/relatives	84	21.7
C. Rationing strategies adopted by households	N =415	99.0%
Reduce the quantity of food cooked per day	228	54.9
Reduce number of meals cooked per day	116	28.0
Restrict food consumption by adults to feed children	41	9.9
Skip some days without cooking/eating	30	7.2
D. Decreasing the Number of People	N=96	22.2%
Sending household member(s) to eat at the neighborhood	38	39.6
Sending household member to stay at relative's place	33	34.4
Other*	25	26.0
*other strategies, such as; *sending adolescent boys to look for casual work in towns, and girls get married*		