

Infant and Young Child Feeding (IYCF) Practices and Nutritional Status of children under 5 years in Palorinya Refugee Settlement, Obongi District, Uganda

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Abstract

By end of 2021, Uganda was host to approximately 1.4 million refugees and asylum seekers majority from South Sudan and about 80 percent of these were children and women. 122,000 of these were living in the Palorinya refugee settlement with the highest female-headed household, emphasising vulnerabilities associated with Food Security and Livelihoods. For children aged 6-59 months, malnutrition remains a major risk factor associated with increased mortality and morbidity with IYCF and WASH linked to health and nutrition outcomes. For this study, aim was to assess the current nutrition status of children, and their household food security among refugees in Palorinya Refugee Settlement and the surrounding host community.

The study was cross-sectional in nature using both quantitative and qualitative methods of data collection in addition to desk review. A multi-stage cluster sampling design was adopted for this study. A 70:30 proportion of Refugees to Host communities was selected and the resultant sample of households in host communities was 191 making the total sample size of 647 households. Statistical Package for Social Scientists computer software, version 22 and ENA for SMART software were used to analyse the collected data. Cross-tabulations (bivariate analysis) were also made to see relationships between dependent variables and independent variables. Pearson chi squares were used to test significance of differences viewed after bivariate analysis.

The prevalence of Global Acute Malnutrition (GAM) was higher among the host community at 8.1% compared to 7.2% with stunting at 34.5% and 38.6% respectively. 33% of the children in the refugee settlement and 38.2% of those in the host communities achieved Minimum Dietary Diversity where as 16% of the breastfeeding children in the settlement and 25.7% of those in the host communities were able to achieve MAD.

Malnutrition is more prevalent in the host community than in refugee settlement and the host community with few children 6-23months meeting the minimum dietary requirements in terms of diversity, frequency and adequacy. There is need to support livelihoods and social behavioural change communication initiatives for better food security and nutritional status is required.

Background

In recent years, several major drivers have put the world off track to ending world hunger and malnutrition in all its forms by 2030 [1]. The Coronavirus Disease 2019 (COVID-19) has made this goal significantly more challenging. Before the pandemic hit, conflict, poverty, malnutrition and climate change were already driving unprecedented growth in the number of children and women in need of humanitarian assistance [2]. The number of people in the world affected by hunger continued to increase under the shadow of COVID-19. Globally, 22.0 percent (149.2 million) of children under the age of five years suffered from stunting in 2020 and 37 percent of the world's stunted children lived in sub-Saharan Africa [1]. Although reported incidents of conflict and violence declined overall in 2020 leading to a sharp down trend of about 1.5 million arrivals of new refugees and asylum-seekers in most regions than had been expected, the number of refugees worldwide rose by nearly a quarter of a million, from 20.4 million in 2019 to almost 20.7 million at the end of 2020, continuing a rising trend that began close to a decade ago [3]. By this time, Uganda was host to approximately 1.4 million refugees and asylum seekers majority (62 percent) from South Sudan and about 80 percent of these were children and Women [4]. 122,000 of these South Sudanese were living in the Palorinya refugee settlement with the highest female-headed household at 27% emphasising the

vulnerability of such households and the associated Food Security and Livelihood characterisation. Refugees often face several challenges in obtaining nutritionally diverse and adequate diets due to loss of livelihoods and productive assets, as well as reduction in income and economic opportunities [5]. The COVID-19 pandemic since March 2020 has further challenged optimal delivery of health and nutrition services to both refugees and host population in the country.

Notwithstanding the above challenges and unprecedented changes in public health events, the globe is still committed in ensuring sustainable development through the Sustainable Development Goals (SDGs). Of the 17 goals, Goal number 2 and 3 which stand for Zero hunger (end hunger, achieve food security and improved nutrition and promote sustainable agriculture; Good health and Well-being (the

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commitment to ensure healthy lives and promote well-being for all at all ages) respectively are those that highlight the efforts in Health and Nutrition. Uganda has ratified the SDGs and are in line with the national development plans. The third Uganda National Development Plan (NDP-III) highlights the country's pledges in enhancing the track of achieving Vision 2040 that aims at transforming Uganda from a peasant to a prosperous society.

The NDP-III (2020/21-2024/25) with a goal of **"Increased Household Incomes and Improved Quality of Life of Ugandans"** operating under the overall theme of **"Sustainable Industrialization for inclusive growth, employment and sustainable wealth creation"**. Under this, the government of the republic has had key achievements relevant to health i) Access to and utilization of health services has significantly increased with the population living within a 5km radius of a health facility increasing from 83% in 2012/13 to 86% in 2016/17; ii) between FY2012/13 and FY2016/17, infant mortality per 1,000 live births has gone down from 54 to 43 deaths of children, maternal mortality decreased from 438 to 336 deaths per 100,000 live births, and stunting has reduced from 33% to 29%, respectively.

Despite these significant improvements, the country still faces challenges that are obstructing the realization of the commitments the government has set forth in line with health and nutrition include; a) **High burden of disease amidst low functionality of health facilities.** Uganda, like many other low- and middle-income countries, is still grappling with a persistently high burden of common infections, maternal, child health, and nutrition complications as well as pandemics and epidemics and; b) **Undernutrition among children and women remains high.** Even though, there is a reduction in stunting from 33% to 29% and wasting is around 4%, these are still a public health challenges across the country. Close to half of the children under 5 years are anaemic (53%) while almost a third of women of reproductive age (32%) are anaemic. Achievement of the set goals requires bringing on-board key actors to fast-track attaining the commitments.

The Lutheran World Federation Uganda (LWF) Uganda Program which is part of the Lutheran World Federation Department for World Service (LWF-DWS), an international humanitarian and development agency works to reduce people's vulnerability, supporting them to; realize their full potential, build on their assets, and become more resilient. In Uganda, LWF has since 1979 been implementing Food Security, Nutrition, Health, Water and Sanitation, Protection, Environment and Energy interventions and is currently operating in the Districts of Pader, Kitgum, Lamwo, Adjumani, Moyo, Obongi Luuka, Kamwenge, Kikuube and Kampala. LWF has been implementing in Obongi since 2016 responding to South Sudanese refugees' livelihoods, Water and Sanitation, Protection, Psychosocial and Reproductive Health needs.

Purpose and objectives of the study

The overall aim of this study was to assess the nutritional status of children, and their household food security among refugees in Palorinya Refugee Settlement and the surrounding host community. The specific objectives included;

- Assessing the nutritional status (stunting, wasting and underweight) among children 6-59 months.

- Assessing the infant and young child feeding practices through (exclusive breastfeeding Minimum Dietary Diversity (MDD), Minimum Meal Frequency (MMF) and Minimum Adequate Diet (MAD) among children 6-23 months
- Assessing the Water, Sanitation and Hygiene status among households with children 6-23months

Problem statement and Justification

Malnutrition is a major risk factor associated greatly with increased mortality and morbidity for children aged 6-59 months [6]. Statistics from the 2016 Uganda Demographic and Health Survey indicate that of every 100 children under 5 years of age, about 33% are chronically malnourished (stunted or low height for age), 5% are acutely malnourished (wasted, or low weight for height), and 14% are underweight (low weight for age).

Malnutrition affects human capital development and productivity [7]. Poor nutrition during the first 1,000 days from pregnancy through a child's second birthday causes life-long and irreversible damage, with consequences at individual, community and national levels [8]. Malnutrition is the cause of as many as 15% of childhood deaths in Uganda [9]. Undernourished children are more prone to health problems especially acute diarrhoeal diseases, acute respiratory infections, fever/malaria and are at a higher risk of death [10].

Malnutrition weakens Uganda's economy through losses in productivity due to poor physical status, low school performance, attainment of low levels of education or low grades as a result of impaired cognitive development [11]. In 2013, the total cost of undernutrition was estimated at about 5.6% of Uganda's gross domestic product (GDP), consisting of 4% of the GDP lost in labour productivity, 1.6% in health, and 0.05% in education [11].

It is estimated that 54% of adults in Uganda suffered from stunting as children, meaning that more than 8 million people of working age are unable to achieve their potential because of childhood malnutrition. Undernutrition in childhood is associated with prevalence of adult diseases such as overweight, diabetes, heart disease and some cancers, which affect Uganda's human capital. Moreover, the effects of malnutrition can be passed from one generation to another [12]

Therefore, this study aims to assess the current nutritional status of children, their household food security among refugees in Palorinya Refugee Settlement and the surrounding host community. The information generated from this study may be used in the sensitization of communities on the relevance of fighting malnutrition among the children. It also has the potential for public health benefit as the information may also be used by stakeholders such as policy makers, United Nations Agencies, health workers as well as other partners in addressing malnutrition in refugee hosting communities.

Methods

Study area including social striation

The study was carried out in Palorinya refugee settlement and its surrounding host communities. Palorinya is located in the new district of Obongi that was carved out of Moyo in west Nile region of Uganda. It occupies two sub counties of Palorinya and Itula with an approximate population of 122,244 refugees and 43,140 nationals.

Obongi is bordered by Moyo in the north, Adjumani District in the east, Yumbe in the west and Madi-okollo in the south. The ethnic diversity of Obongi is Madi, Reli, Gimara, Alur, Aliba, Lugbara, Arabic, Kakwa, Kuku, and Bari [13]. The geographical area of Obongi is approximately 1,010 km² and has one of the highest anaemia rates in the country.

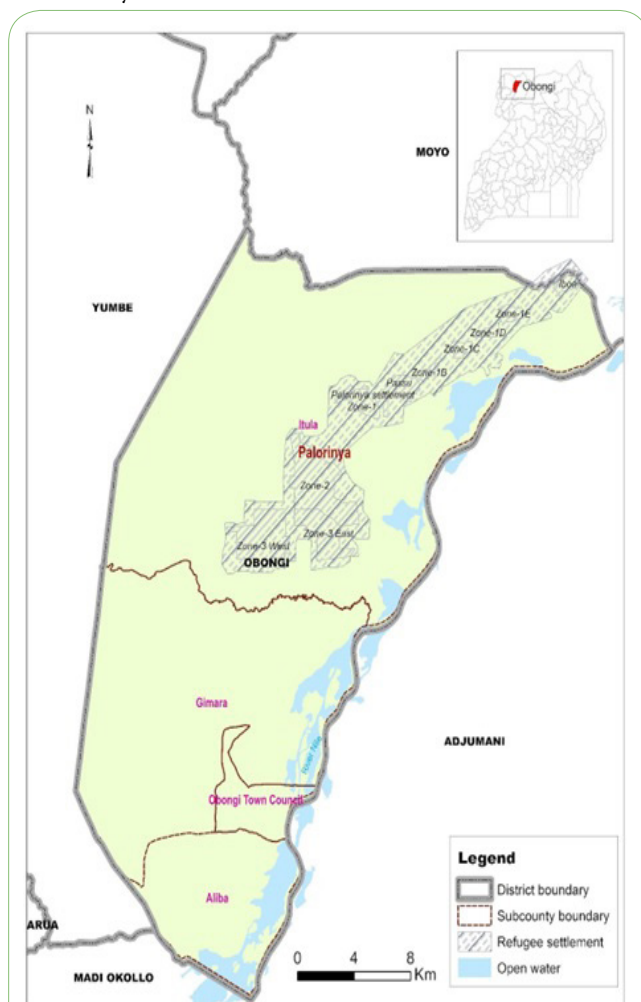


Figure 1: Map showing Palorinya Refugee Settlement in Obongi District.

Study design and data collection target population

The study was cross-sectional in nature using both quantitative and qualitative methods of data collection in addition to desk review. The study adopted a participatory approach to carrying out activities. Quantitative data was collected through household surveys using mobile data collection methods. Anthropometric data was captured from household members fitting the study's eligibility criteria for anthropometry.

Qualitative methods used included Focus Group Discussions (FGDs), Key Informant Interviews (KIIs) and observations. These were critical in generating in-depth descriptions and detailed information from the selected key stakeholders to better document best practices as well as explain the motivations behind practices and attitudes. The selection of participants for the qualitative study was purposive as these were taken to be the most informed to provide rich information about issues being assessed in the areas of interest.

The Qualitative and quantitative methods of data collection were used concurrently and targeted children aged 0-59 months old and their primary caregivers.

Sample size determination

The sample of households visited was determined using the ENA for SMART software. The following assumptions were considered:

- Design effect of 1.5 (a multi-stage cluster sampling method was employed)
- Prevalence of Moderate Acute Malnutrition in Palorinya Refugee settlement among children 6-59 months was 10.7%
- Average Household size of 4 members
- Desired precision of 5%
- Proportion of children under 0-59 months at 16%
- A non-response rate of 5%

The resultant sample size for the sample in Palorinya Settlement was 647 households. A 70:30 proportion of Refugees to Host communities was selected and the resultant sample of households in host communities was 191 making the total sample size of 647 households.

Selection criteria to participate in the study

A multi-stage cluster sampling design was adopted for this study. The first stage involved selection of Enumeration areas (EAs) within the refugee settlement and host communities. A total of 27 EAs (19 EAs in the refugee settlement and 8 EAs in host communities) were selected. The EAs were selected using systematic probability proportionate to size (SPPS) method. The second stage involved selection of households within the selected EAs. A list of all households in the EA was generated and those with children 0-59 months. It is from this that the 24 households were selected using a simple random sampling method. In each of these households, data was captured from one index child and/or one PLW. In cases where more than one child under 5 years was identified, preference was given to children 6-23 months.

Ethical approval

Ethical approval was received from the Institutional Review Board of Clarke International University, reference number CLARKE-2020-59 on January 6th 2021. In line with the Ugandan government regulations, the approved protocol was then submitted to the Uganda National Council for Science and Technology (UNCST) for approval. This was approved with a research registration number: HS1241ES. During data collection, written consent was received from all respondents after reviewing an Informed Consent Form (ICF) that was approved by the various research ethics committees with them. The respondents were assured confidentiality and anonymity.

Data management and interpretation of selected study variables for this particular paper

Quantitative data was collected using Kobo Toolbox on smart phones which was uploaded onto the main server daily to avoid data loss. The data analysts downloaded the uploaded data for storage and

checks. Qualitative data involved analyzing documents, key informant interviews, group discussions and focus groups notes to identify emerging common trends, themes and patterns for each objective. Content analysis was also used to highlight diverging views and opposing trends. Information from primary sources was triangulated with that from desk review.

Data analysis

Statistical Package for Social Scientists (SPSS) computer software, version 22 and ENA for SMART software were used to analyse the collected data. The Microsoft Excel software was also used for drawing interactive graphs. Relevant comparisons were made between the different groups of informants in consonance with the objectives of the action research. Cross-tabulations (bivariate analysis) were also made to see relationships between dependent variables and independent variables. Pearson chi squares were used to test significance of differences viewed after bivariate analysis.

Results

Social demographic characteristics of the study population

Table 1 shows the demographic characteristics of the survey participants. Majority of the respondents, 69.1% in both host communities and 67.1% in the refugee settlement, were married. A larger percentage (96.5%) of the respondents in the refugee settlement were born in South Sudan whereas most of those in the host communities (54.5%) had been born in Uganda.

In addition, 99.1% of the households in the refugee settlement were refugee households in comparison to only 5.8% in the host communities. The members of the sampled households were mainly between 15-49 years of age in both areas (40.2% in the refugee settlement and 41.8% in the host communities) and were female.

Nutritional status of under 5 years both refugees and host nationals

Prevalence of stunting

Table 2 shows the prevalence of stunting by gender in the surveyed population. The prevalence of stunting was 34.5% in the host communities while that in the refugee settlement was 38.6%, both higher than the national prevalence that stands at 29% and the West Nile prevalence which stands at 33.9%. Severe stunting was more prevalent among the males (26.4%) than the females (17.1%) in the host communities. Similarly, the prevalence was higher among males (26.9%) than females (25.7%) in the refugee settlement.

The prevalence of severe stunting was highest among older children (30-41 months) followed by younger children (6-17 months) in the host communities while in the refugee settlement, the prevalence of stunting was highest in much older children (54-59 months).

		Palorinya Settlement	Host community
Marital status	Married	67.1%	69.1%
	Cohabitation	14.3%	13.1%
	Divorced	.4%	.5%
	Separated	13.6%	14.7%
	Widowed	4.2%	2.6%
	Never married	.4%	.0%
Country in which HH was born	Uganda	3.5%	54.5%
	South Sudan	96.5%	45.5%
Nationality of HH head	Uganda	.9%	45.5%
	South Sudan	99.1%	54.5%
Possession of birth certificate	Yes, given by GOU	4.4%	32.5%
	Yes, given by country of origin	20.0%	5.2%
	Yes, left it in country of origin	4.2%	2.1%
	No	53.5%	36.1%
	Not available	9.9%	12.6%
	Don't Know	8.1%	11.5%
Refugee households	Yes	99.1%	5.8%
	No	.9%	94.2%
Gender	Male	45.7%	49.1%
	Female	54.3%	50.9%
Age category of HH members	<5yrs	23.8%	22.7%
	5-14 years	32.9%	31.6%
	15-49 years	40.2%	41.8%
	50-64 years	2.1%	3.0%
	65 years and above	1.0%	1.0%

Table 1: Social demographic characteristics of the study population.

	Host community			Refugee settlement		
	All (n=223)	Boys (n=106)	Girls (n=117)	All (n=471)	Boys (n=249)	Girls (n=222)
Stunting	(77) 34.5 %	(44) 41.5 %	(33) 28.2 %	(182) 38.6 %	(100) 40.2 %	(82) 36.9 %
Moderate stunting	(29) 13.0 %	(16) 15.1 %	(13) 11.1 %	(58) 12.3 %	(33) 13.3 %	(25) 11.3 %
Severe stunting	(48) 21.5 %	(28) 26.4 %	(20) 17.1 %	(124) 26.3 %	(67) 26.9 %	(57) 25.7 %

Table 2: Prevalence of stunting by gender.

Age (mo)	Host community			Refugee camp		
	Severe	Moderate	Normal	Severe	Moderate	Normal
6-17	11(22.4%)	8(16.3%)	30(61.2%)	31(27.9%)	9(8.1%)	71(64.0%)
18-29	9(19.6%)	2(4.3%)	35(76.1%)	31(25.4%)	12(9.8%)	79(64.8%)
30-41	16(30.8%)	6(11.5%)	30(57.7%)	29(24.8%)	19(16.2%)	69(59.0%)
42-53	9(15.5%)	10(17.2%)	39(67.2%)	21(24.4%)	13(15.1%)	52(60.5%)
54-59	3(16.7%)	3(16.7%)	12(66.7%)	12(34.3%)	5(14.3%)	18(51.4%)
Total	48(21.5%)	29(13.0%)	146(65.5%)	124(26.3%)	58(12.3%)	289(61.4%)

Table 3: Prevalence of stunting by age category.

Prevalence of wasting

Wasting in children is classified as severe or moderate, according to the WHO growth reference for weight-for-height [14]. Table 4 shows the prevalence of wasting among the sampled children under 5. The prevalence of Global Acute Malnutrition (GAM) was at 8.1% of the sampled children in the host communities and 7.2% of those in the refugee settlement. Similarly, there was a higher prevalence of severe wasting in the host communities at 2.3% in comparison to the refugee settlement (1.1%). There were more wasted males than females (13.3% vs 3.4%) in the host communities; whereas it was a reverse in the refugee settlement with more wasted females (8.6%) than males (6.0%).

Severe wasting was highest among children 6-17 months (6.1%) in the host communities whereas among 42-53 months old children (12.3%) were moderately wasted within the same community. In the refugee settlement, there were more severely wasted children (2.9%) in the 54-59 months category compared to other age categories; this was followed by moderately wasted children (2.6%) in the 30-41 months category in comparison to other age categories.

Prevalence of underweight among the children

Table 6 shows the prevalence of underweight among the sampled children. As shown, the prevalence in host communities was 14.8%, higher than that in refugee settlements (13.3%). This may be attributed to the fact that children in refugee settlements receive and this reduces their risk to acute malnutrition. Severe underweight was more prevalent among boys (4.7%) than girls (2.6%) in the host communities whereas there were more severely underweight girls (4.5%) in the refugee settlement in comparison to boys (2.0%).

Table 7 shows the prevalence of underweight by age category, severe underweight (6.1%) was more prevalent among 6-17 months old children in the host communities whereas in the refugee settlement, the highest prevalence of severe underweight (8.6%) was seen in the 54-59 months category followed by the 18-29 months old category.

	Host community			Refugee settlement		
	All (n=222)	Boys (n=105)	Girls (n=117)	All (n=470)	Boys (n=248)	Girls (n=222)
Global malnutrition	(18) 8.1 %	(14) 13.3 %	(4) 3.4 %	(34) 7.2 %	(15) 6.0 %	(19) 8.6 %
Moderate malnutrition	(13) 5.8 %	(11) 10.5 %	(2) 1.7 %	(29) 6.1 %	(13) 5.2 %	(16) 7.2 %
Severe malnutrition	(5) 2.3 %	(3) 2.9 %	(2) 1.7 %	(5) 1.1 %	(2) 0.8 %	(3) 1.4 %

Table 4: Prevalence of wasting by gender.

Age (mo)	Host community			Refugee settlement		
	Severe	Moderate	Normal	Severe	Moderate	Normal
6-17	3 (6.1%)	2 (4.1%)	44(89.8%)	1(0.9%)	7(6.3%)	103(92.8%)
18-29	0 (0.0%)	2 (4.3%)	44(95.7%)	0 (0.0%)	6(4.9%)	116(95.1%)
30-41	0 (0.0%)	2(3.8%)	50(96.2%)	3(2.6%)	11(9.4%)	103(88.0%)
42-53	2 (3.5%)	7(12.3%)	48(84.2%)	0 (0.0%)	2(2.3%)	84(97.7%)
54-59	0 (0.0%)	0 (0.0%)	18(100%)	1 (2.9%)	3(8.8%)	30(88.2%)
Total	5 (2.3%)	13 (5.0%)	204(91.9%)	5(1.1%)	29(6.2%)	436(92.8%)

Table 5: Prevalence of wasting by age category.

	Host community			Refugee settlement		
	All (n=223)	Boys (n=106)	Girls (n=117)	All (n=471)	Boys (n=249)	Girls (n=222)
Underweight	(33) 14.8 %	(22) 20.8 %	(11) 9.4 %	(59) 12.5 %	(33) 13.3 %	(26) 11.7 %
Moderate underweight	(25) 11.2 %	(17) 16.0 %	(8) 6.8 %	(44) 9.3 %	(28) 11.2 %	(16) 7.2 %
Severe underweight	(8) 3.6 %	(5) 4.7 %	(3) 2.6 %	(15) 3.2 %	(5) 2.0 %	(10) 4.5 %

Table 6: Prevalence of underweight by gender.

Age (mo)	Host community			Refugee settlement		
	Severe	Moderate	Normal	Severe	Moderate	Normal
6-17	3(6.1%)	7(14.3%)	39(79.6%)	1(0.9%)	8(7.2%)	102(91.9%)
18-29	1(2.2%)	5(10.9%)	40(87.0%)	3(2.5%)	10(8.2%)	109(89.3%)
30-41	1(1.9%)	6(11.5%)	45(86.5%)	5(4.3%)	20(17.1%)	92(78.6%)
42-53	3(5.2%)	7(12.1%)	48(82.8%)	3(3.5%)	3(3.5%)	80(93.0%)
54-59	0(0.0%)	0(0.0%)	18(100.0%)	3(8.6%)	3(8.6%)	29(82.9%)
Total	8(3.6%)	25(11.2%)	190(85.2%)	15(3.2%)	44(9.3%)	412(87.5%)

Table 7: Prevalence of underweight by age category.

Infant and Young Child Feeding (IYCF) practices for children

Breastfeeding history for the children

Table 8 shows the birth and breastfeeding history of children 6-59 months. Most of the mothers (48.8% in both the settlement and the host community) reported that they had delivered from a government health facility and that their children had been weighed at birth (97.5% in the settlement and 96.3% in the host community). Over 90% of the mothers in both settlement and host communities reported that they had breastfed their children, indicating adherence to Ministry of Health guidelines on Infant and Young Child Feeding. Asked whether the children had been given anything other than breastmilk in the first three days after delivery, only 18.7% of the mothers in the settlement and 6.3% in the host communities reported this practice.

Table 9 shows the liquid foods that were consumed by the sampled children in the 24 hours prior to data collection. As shown, only 34% of the mothers in the settlement and 25% in the host communities reported that they had fed their child on the bottle in the previous 24 hours. The most commonly consumed liquid was water with 89.7% of the mothers in the settlement and 97.5% in the host communities reporting that they had given their children water in the 24 hours prior to data collection. Milk and infant formula were the least consumed fluids in both the refugee settlement and the host communities.

Minimum Dietary Diversity (MDD), Minimum Meal Frequency (MMF) and Minimum Acceptable Diet (MAD) of children.

Table 10 shows results of the MDD of the sampled children under 23 months. As shown, only 33% of the children in the settlement and

		Palorinya Settlement	Host community
Place of delivery	Home	2.0%	2.5%
	Government Hospital	40.9%	46.3%
	Government Health Facility	48.8%	48.8%
	Private Hospital	.0%	1.3%
	NGO Hospital	8.4%	1.3%
Child weighed at birth	Yes	97.5%	96.3%
	No	2.0%	3.8%
	Don't know	.5%	.0%
Breastfed child	Yes	99.5%	98.8%
	No	.5%	1.3%
Child given anything other than breast milk in first three days	Yes	18.7%	6.3%
	No	81.3%	93.8%
Child still breastfeeding	Yes	92.6%	87.5%
	No	7.4%	12.5%

Table 8: Breastfeeding practices.

		Palorinya Settlement	Host community
Drank anything from a bottle yesterday	Yes	34.0%	25.0%
	No	65.5%	75.0%
	Don't know	.5%	.0%
ORS	Yes	10.8%	12.5%
	No	89.2%	87.5%
Mineral/ vitamin supplements or medicine	Yes	24.1%	17.5%
	No	75.9%	82.5%
Any Water	Yes	89.7%	97.5%
	No	10.3%	2.5%
Fresh juice/ concentrate	Yes	28.1%	22.8%
	No	71.9%	66.2%
Clear broth/ soup	Yes	59.1%	82.5%
	No	40.9%	17.5%
Milk	Yes	3.0%	17.5%
	No	97.0%	82.5%
Infant formula	Yes	4.9%	2.4%
	No	85.7%	93.8%
	Don't know	9.4%	3.8%
Other liquids such as tea	Yes	32.0%	41.3%
	No	66.0%	58.7%
	Don't know	2.0%	.0%

Table 9: Liquid food consumed in the past 24 hours.

	Palorinya Settlement	Host community	6-11 months	12-23 months
Consumed less than 5 food groups	67.0%	61.3%	66.7%	63.6%
Consumed 5 or more food groups	33.0%	38.2%	33.3%	36.4%

Table 10: Minimum Dietary Diversity for Children in Population.

38.2% of those in the host communities achieved MDD. By age, 33.3% of the children 6-11 months and 36.4% of those in the 12-23 months category were able to achieve MDD i.e. consuming food from more than 5 of the recommended 8 food groups. It is important to note that poor or inadequate dietary diversity among children is an underlying factor for under nutrition. This prevailing low DDS among these children in both refugee settlement and host communities is a major causative factor for the high prevalence of stunting and underweight among these children.

Figure 2 shows the different food groups consumed by the sampled children 6-23 months. Only 2% of the children in the refugee settlement and 8.8% of those in the host communities reported to have consumed eggs in the 24 hours prior to data collection. Consumption of dairy was also reported among only 11.8% of the children in the refugee settlement and 21.3% of those in the host communities; however, most of the children were seen to have breastfed in the 24 hours prior to data collection. The most commonly consumed foods in both host communities and refugee settlement were from the starchy staples and meat and fish food groups. Qualitative findings showed that consumption of silverfish (mukene) was common in both study areas, thus the high consumption rates of the fish and meat food group.

Minimum Meal Frequency (MMF)

Minimum meal frequency is defined: 2 times for breastfed infants 6–8 months. 3 times for breastfed children 9–23 months. 4 times for non-breastfed children 6–23 months. MMF results in table 11 indicate that 48.9% of the breastfeeding children in the refugee settlement and 58.6% of those in the host communities were able to achieve the Minimum Meal Frequency (MMF). On the other hand, only 13.3% of the non-breastfeeding children in the settlement and no one in the host community achieved MMF.

A child is considered to have reached MAD threshold if they were fed the minimum times and above (depending on their age group) and ate food from at least four food groups in the last twenty four hours preceding the survey. Table 12, shows 16% of the breastfeeding children in the settlement and 25.7% of those in the host communities were able to achieve MAD. On the other hand, 13.3% of the non-breastfeeding children in the settlement and none of those in the host communities achieved MAD.

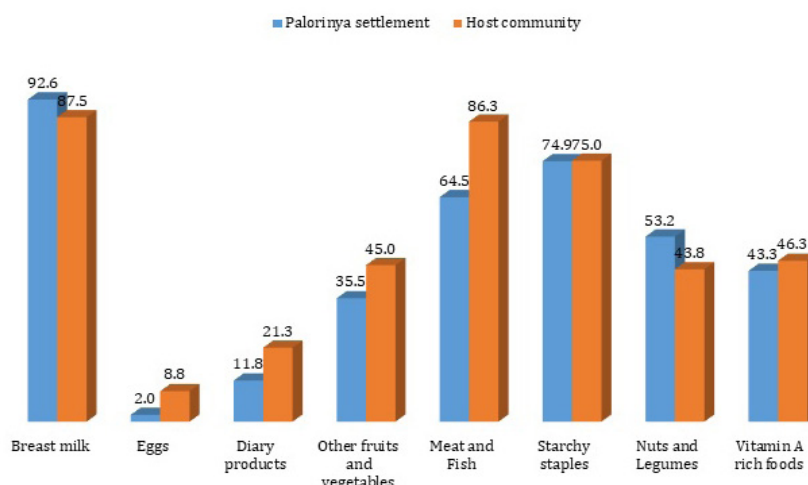


Figure 2: Food groups consumed by the sampled children 6-23 months.

	Breastfeeding		Non-breastfeeding	
	Palorinya Settlement	Host community	Palorinya Settlement	Host community
No meal	9.6%	10.0%	13.3%	10.0%
One meal	41.5%	31.4%	26.7%	30.0%
2-3 meals	45.2%	54.3%	46.7%	60.0%
More than four meals	3.7%	4.3%	13.3%	0.0%

Table 11: Minimum Meal Frequency by breastfeeding status.

	Breastfeeding		Non-breastfeeding	
	Palorinya Settlement	Host community	Palorinya Settlement	Host community
MAD Achieved	16.0%	25.7%	13.3%	0.0%
MAD not achieved	84.0%	74.3%	86.7%	100.0%

Table 12: Minimum Acceptable Diet by breastfeeding status.

Water, Sanitation and Hygiene (WASH)

Water sources and treatment

Table 13 shows the water sources and treatment methods in the survey households. As shown, most of the households in the refugee settlement (50.9%) get their water from public/ stand pipes whereas those in the host communities (67.5%) mainly get their water from tube wells and boreholes. Only 0.2% and 0.9% of the households in the refugee settlement and none in the host communities reported piped water and their main source of water. When asked about water treatment, only 11.8% in the refugee settlement and 7.3% in the host communities reported that they treated their water before drinking and of these, 66.7% in the settlement and 85.7% in the host communities reported that they boiled water to make it safe for drinking.

Hand washing facilities and practises

Hand washing facilities were observed in only 48.5% of the sampled settlement households and 43.5% of those in the host communities. In addition, water for hand washing was only available in 29.4% of the households in the settlement and 41% of those in the host communities. Of the households that had hand washing facilities, only 23.1% in the settlement and 32.5% in the host community had a washing agent (mainly soap) at the hand washing point.

Looking at the toilet facilities within the households, the main type of toilet used within the surveyed households was a pit latrine with a slab and this was seen in 59.9% of the settlement households and 59.7% of the host community households. Some households (26.3% in the settlement and 27.2% in the host communities) reported using

		Palorinya Settlement	Host community
Water sources	Piped into dwelling	.2%	.0%
	Piped to neighbor	.9%	.0%
	Public pipe/ stand pipe	50.9%	28.3%
	Tube well/ borehole	38.2%	67.5%
	Protected well	.2%	.0%
	Tanker truck	.4%	.0%
	UNHCR tanker	3.7%	.0%
	Others	5.5%	4.2%
Location of water source	In own dwelling	5.3%	3.1%
	In own yard/ plot	2.1%	3.1%
	Elsewhere	92.6%	93.7%
Treatment of water for drinking	Yes	11.8%	7.3%
	No	86.8%	92.7%
	Don't Know	1.4%	.0%
Treatment method	Boil	66.7%	85.7%
	Add bleach	0%	.0%
	Strain through cloth	18.0%	14.3%
	Use water filter	.0%	.0%
	Solar disinfection	.0%	.0%
	Let it stand and settle	15.3%	.0%
Lack of sufficient water in previous month	Yes	44.7%	34.6%
	No	55.3%	65.4%

Table 13: Water sources and treatment.

		Palorinya Settlement	Host community
Hand washing facilities	Observed	48.5%	43.5%
	Not observed	51.5%	56.5%
Presence of water in household	Available	29.4%	41.0%
	Unavailable	70.6%	59.0%
Distance of hand washing facilities from toilet	Less than 10 paces	48.0%	43.4%
	More than 10 paces	44.3%	56.6%
	Toilet not in dwelling	7.7%	.0%
Washing agent present at hand washing point	Yes, present	23.1%	32.5%
	No, not present	76.9%	67.5%
Type of hand washing agent	Bar soap	82.4%	88.9%
	Detergent	.0%	.0%
	Liquid soap	13.7%	3.7%
	Ash/ Mud/ Sand	3.9%	7.4%

Table 14: Hand washing facilities and practises.

		Palorinya Settlement	Host community
Type of toilet facility	Flush to septic tank	.2%	.0%
	Flush to septic tank	.2%	2.1%
	Flush to somewhere else	.2%	.0%
	VIP improved pit latrine	4.8%	4.2%
	Pit latrine with slab	59.9%	59.7%
	Pit latrine without slab	26.3%	27.2%
	Composting toilet	.0%	.5%
	Hanging toilet	.2%	.5%
	No facility	7.7%	4.8%
	Others	.5%	1.0%
Sharing toilet facility with others	Yes	26.6%	30.8%
	No	73.4%	69.2%
Location of toilet facilities	In own dwelling	18.8%	15.4%
	In own yard	69.4%	64.8%
	Elsewhere	11.9%	19.8%

Table 15: Toilet facilities used by households.

pit latrines without a slab, a practice that is not usually recommended. Further, 7.7% of the sampled households in the refugee settlement and 4.7% of those in the host communities reported that they did not have any toilet facilities, which may lead them into using nearby bushes, a practice that increases chances of disease transmission through the oral faecal route.

Discussion

Prevalence of malnutrition

Stunting

Stunting is the impaired growth and development that children experience from poor nutrition, repeated infection, and inadequate psychosocial stimulation. Children are defined as stunted if their height-for-age is more than two standard deviations below the WHO Child Growth Standards median [15]. The prevalence of stunting was higher in refugee settlements (38.6%) than in host community (34.5%). The Uganda Demographic Health Survey (2016) found that the National stunting rate was 29% West Nile stunting rate was 34% which is higher than the National, and that in both host community and refugee settlement for the current study. It is noteworthy that the tall stature in South Sudanese children is likely to suppress the adverse effect of stunting even though it were present. This could be because of the availability of land within the host community to allow for food production and animal rearing creating a more stable supply of food items than in the settlement where it is mostly reliant on food aid. It is also important to note that the study was conducted when the COVID-19 pandemic was at its highest which affected the food security of a number of households including those in the refugee context.

A breakdown of the stunting rates by age category shows that the prevalence of severe stunting was highest among older children (30-41 months) followed by younger children (6-17 months) in the host communities while in the refugee settlement, the prevalence of stunting was highest in much older children (54-59 months) followed by younger children (6-17 months). Presence of severe stunting in the 6-17months age category could be due to sub-optimal Infant and Young Child Feeding (IYCF) practices during complementary feeding whereas in the older categories, it re-enforces the thinking that there are long-standing sub-optimal feeding practices in both communities.

The variances of high stunting rates among the host community and the settlements shows that there is wide spread food insecurity which can have cross-cutting issues due to the differences exhibited in the age categories.

Wasting

A child below two standard deviations (-2SD) from the reference median for weight-for-height is classified as too thin for his or her height, or wasted, and this is a state that reflects acute or recent nutritional deficiencies. Wasting is indicated by two forms severe and moderate acute malnutrition which the sum of both forms the Global Acute Malnutrition indicator. This study found that the prevalence of GAM was 8.1% and 7.2% in the host community and settlement respectively. Compared to the UDHS conducted in 2016, the National GAM is 5% and West Nile stands at 10%. The regional GAM is two times higher than the National showing the criticality of nutrition in the region. The FSNA conducted in 2020, only focussing in the refugee settlement found a 2% GAM rate in Palorinya settlement well within the normal limits which was the second highest followed by the Integrated Settlements of Adjumani at 5.2%. The effects of the COVID-19 pandemic are underscored and can explain the increased wasting in the settlement and the host community. The study notes the higher rates in host communities and this is because the hosting

community has fewer interventions to improve food security meaning reduced safety nets. The settlement is also supported by General Food Assistance that creates a significant safety net over the host community.

Underweight

Underweight is defined as weight for age less than two standard deviations (SD) according to the WHO Child Growth Standards median [14]. Weight for age is the index used to measure this indicator and it is a composite index for the above two and as such does not differentiate acute malnutrition (in the form of wasting) and chronic malnutrition (in the form of stunting). It is noteworthy that children are likely to be underweight for a given age due to either being stunted, wasted or even both. This study found that the prevalence in host communities was higher than that in the refugee settlement. The Uganda Demographic Health Survey reports the National underweight rate with one in every ten children. The 2020 FSNA focusing on the refugee settlements reports at least one child in every ten children is underweight Palorinya settlement. This may be attributed to the fact that children in refugee settlements receive food aid from different agencies and this reduces their risk to acute malnutrition. The prevalence of underweight by age category, severe underweight was more prevalent among 6-17 months old children in the host communities which further affirms the long-standing belief of insufficient complementary feeding among the hosting community it is low in the settlement because social behaviour communication change interventions are most in the refugee settlement. whereas in the refugee settlement, the highest prevalence of severe underweight was seen in the 54-59 months' category followed by the 18-29 months old category which shows a continued struggle of homesteads to sustain their nutrition needs as this is the stage with the highest nutrient demands in the under-five age category.

Infant and Young Child Feeding practices and Food security

Infant and Young Child Feeding Practices

Infant and Young Child Feeding Practices include feeding patterns in quality, quantity and frequency right from during birth, the first six months up to 2 years and continued up to 5 years of age. These practices are protected through the first Infant and Young Feeding Practices of 2010 that have been revised to also include maternal and adolescent nutrition – Maternal Infant Young Child and Adolescent Nutrition guidelines (MIYCAN guidelines) published in 2021. These guidelines include a) early initiation of breastfeeding within the first hour of life b) exclusive breastfeeding for the first six months of life c) optimal complementary with continued breastfeeding up to two years and even beyond and d) optimal feeding 24-59 months. Essentially, the guidelines focus, among other objectives, on safeguarding the first 1000 days so as to break the inter-generational vicious cycle of malnutrition.

This study examined IYCF practices in Palorinya Settlement and the hosting community of Obongi district which found that a majority of the mothers (both the settlement and the host community) reported that they had delivered from a government health facility and that a significant number among their children had been weighed at birth. The increased access to health facilities has allowed for the sustained increase of woman seeking maternity services. Nine in every ten mothers had breastfed their child, indicating adherence to the IYCF

Ministry of Health guidelines. Further probing on whether the children had been given anything other than breastmilk in the first three days after delivery informed that only about 1 in every ten mothers in the settlement and almost half of these in the host communities reported this practice. This indicates improved feeding practices in the hosting community than in the settlement which highlights the fact that there are more influencing factors in the settlements compared to the host community of Palorinya settlement.

Exclusive breastfeeding in the first six months of an infant's life has been proven to be the most optimum nutrition an infant can receive. Providing other feeds has been known to increase morbidity and eventual mortality. Three in ten mothers in the settlement and about two mothers the host communities reported that they had fed their child on the bottle in the previous 24 hours. This can be explained through the relatively intensified health and education in the settlement and the hosting against the use of bottle feeding, these efforts however, are yet to be improved to ensure complete elimination of bottle feeding in both communities. Water was the most consumed liquid with close to 9 in every 10 mothers in the settlement and almost all mothers in the host communities reporting that they had given their children water in the 24 hours prior to data collection. Milk and infant formula were the least consumed fluids in both the refugee settlement and the host communities and this can be explained by the increased de-campaign of formula milk through the protection and supporting of breastfeeding under the Baby-Friendly Health Facility Initiative (BFHI) which has requirement one as compliance to the code of marketing of breast milk substitutes. Influencing factors in the reduction of timely breastfeeding initiation are due to the decreased community engagement on MIYCAN activities that spanned the COVID-19 pandemic lockdown exercise aiding the increase in sub-optimal childcare practices.

MDD, MMF and MAD of children

Dietary diversity is a qualitative measure of food consumption that reflects household access to a variety of foods, and is also a proxy for nutrient adequacy of the diet of individuals. Dietary Diversity is the score obtained when a food item is consumed from the 8 recognised food groups. Minimum Dietary Diversity on the other hand is a cut-off the measures the quality of food eaten by specifically children 6-23 months of age. This study found that only three in ten children achieved MDD which is consumption of 5 or more food groups in the settlement compared to almost four in the host community. In the 2020 FSNA, Palorinya was found to have the least number of children with a MDD at 7.8%, which is about one in every ten children. This could be because the refugees receive a predetermined list of food basket items as compared to nationals that have more access to land that allows for more diverse crop production and animal rearing.

By age category, about three in every 10 children 6-11 months were about to achieve MDD as compared to close to four in ten children among 12-23 months category. The age differences show that older children (12-23 months) have more exposure to diverse food items as compared to younger children (6-11 months). It is important to note that poor or inadequate dietary diversity among children is an underlying factor for under nutrition. This prevailing low DDS among these children in both refugee settlement and host communities is a major causative factor for the high prevalence of stunting and underweight among these children.

This study also found that children in the refugee settlement consume less eggs than those in the host community in the 24 hours prior to data collection. Diary consumption was found at one in every ten children in the refugee settlements as compared to about 2 children in the host community among 6-23 months. These results reinforce the thinking that children in the hosting community have a more diverse consumption of food groups because of more access to land for animal rearing and crop production as compared to those in Palorinya settlement. However, it was also found that most of the children were seen to have been breastfed in the 24 hours prior to data collection with more children in the refugee settlement compared to the hosting community and this is because social behaviour change messages are more intensified at settlement.

The most commonly consumed foods in both host communities and refugee settlement were from the starchy staples and meat and fish food groups. Qualitative findings showed that consumption of silverfish (mukene) was common in both study areas, thus the high consumption rates of the fish and meat food group. This high consumption of fish groups can be explained by the presence of the river Nile that increases access to fish and meat food groups. The low consumption of eggs and dairy products between both the host community and refugee settlement can be explained by the fact that continued purchased is costly to sustain meaning poor economic food items. These items are also known not to be found in the food basket offered to the refugees hence low consumption

Minimum Meal Frequency by breastfeeding status (MMF) is defined as 2 times for breastfed infants 6–8 months; 3 times for breastfed children 9–23 months and 4 times for non-breastfed children 6–23 months. The study shows that close to 5 children achieved MMF in the refugee settlement compared to about 6 in the host community. On the other hand, only one child in ten of the non-breastfeeding children in the settlement and no child in the host community achieved MMF. The meal frequency shows the food security differences between hosting community and the refugee settlement. More children in the settlement achieve MMF as compared to those in the host community and this can be due to the fact that refugee settlements are food secure with the continued food aid on a bimonthly arrangement at the time of the study.

A child is considered to have reached MAD threshold if they were fed the minimum times and above (depending on their age group) and ate food from at least four food groups in the last 24 hours preceding the survey. For this study, it was found that one in every ten children achieves a MAD compare to about two children from the hosting community are about to achieve the minimum acceptable diet. In the UDHS, 2016 it was found that only 14% of children 6-23 months achieve the Minimum Acceptable Diet, that is at least one in every ten children. This can be due to the fact hosting communities have more access to food through more access to land as compared to the refugee settlements. Additionally, hosting communities have more land per household member as compared to the refugee settlement.

Water, Sanitation and Hygiene (WASH)

WASH is directly related to outcomes of health and nutrition: numerous diseases are caused by micro-organisms that are ingested through drinking water. These circulate because of insufficient modes of water treatment, excreta and waste management which are then

propagated by inadequate handwashing and lack of good hygiene practices. Diarrhoeal diseases and skin infections are the typical public health events that follow these modes of transmissions. As such, it is critical to bear in mind the elaborate relationship between nutrition and WASH has on a community and the public health implications. The component of WASH was studied to understand the implications imposed on nutritional status and IYCF practices within Palorinya refugee settlement and the hosting community.

Firstly, it was established that a majority of the households in the settlement have access to water from public/ stand pipes whereas a majority in the host communities mainly get their water from tube wells and boreholes. Less than one percent households in the settlement and none in the host community used piped water. The FSNA findings of 2020 are consistent as a majority of households utilize standpipes. This is because public/stand pipes are well established and erected in numerous locations within the settlement. On water treatment methods, about only one person in the refugee settlement and less than one person in the host communities reported that they treated their water before drinking. About 6 in 10 in the settlement and about 8 persons in the host communities reported that they boiled water to make it safe for drinking. The FSNA (2020), reports that about 5 in every 10 households in Palorinya does not use any method to treat water before drinking which is inconsistent with the current study's findings.

Hand washing facilities are used in ensuring proper hygiene through washing of hands at critical moments. An observed hand washing facilities is a requirement for a hygienic household. More hand washing facilities (48.5%) were observed in the settlement compared to those (43.5%) in the hosting community. Additionally, water in hand washing facilities was mostly observed in host communities as compared to Palorinya settlement. Of the households observed to have hand washing facilities, only two in ten households in the settlement compared to about three in the hosting community had a washing agent at the hand washing point. The FSNA (2020), Palorinya was found to be the only settlement with less than 50% of soap availability. Even though the COVID-19 pandemic evidently increased the use of hand washing facilities, this study's results show that there was little or no impact to this issue however, it is noteworthy that the study was conducted in the early bouts of the pandemic. Overall, between the two communities there is minimal observed hand washing facilities which can influence infections among children 6-59 months as observed on the conceptual framework of malnutrition.

An examination of the faecal disposal methods found that within the households, the main type of toilet used within the surveyed households was a pit latrine with a slab and this was seen in at about six in every ten households for both the settlement and host community. Some households (about two in every ten observed households) reported using pit latrines without a slab, a practice that is not usually recommended. Few households were reported to have no toilet facilities in both the host and refugee communities, which may lead them into using nearby bushes, a practice that increases chances of disease transmission through the oral faecal route. The FSNA found that Palorinya refugee settlement coverage of toilets and latrines was 98.3% which was the highest in all the settlements. Proper excreta disposal significantly reduces occurrences of diarrheal diseases and infections and thus easier to achieve and maintain ideal nutritional status.

Recommendations

There is need for mixed approaches to behavioural change on optimal health and nutrition practices that emphasise integration of WASH; SBCC components should be conducted greatly at Parish/ community/ Household level and health facilities in collaboration with existing community structures; positive deviance models should be adopted for already proven/ sustainable solutions to SBCC; increase men involvement in child protection & safeguarding activities; Integrate Income generating activities in nutrition programs as a strategy; Adopt Optimised Land Use Management (OLUM) models and backyard gardening to promote growing OFSP amongst households especially in the host community; Interest and support women groups to participate in enterprises outside the farm, like trading in agricultural produce of high value like soya, sunflower & sesame or processing using value addition equipment like sparky driers, grinding mills for product development; There is need to for programmes designed to target the host communities where refugees have increased pressure on the already scarce resources such as health care

Study Limitations

- Limited time to thoroughly conduct the study
- Financial constraints
- No information of previous studies conducted within Palorinya to be used as a benchmark

Conclusion

This study generated resourceful information on the overall nutrition, WASH KAP situation in Palorinya refugee settlement. The study has shown need to sensitise mothers on complementary feeding to improve the feeding of their children as majority were not fed on demand, did not meet the MAD, MDD & MMF. Mothers knowledge on care practises was still inadequate, and this which could have greatly impacted on nutritional status of the children and their complementary feeding practises. The prevalence of malnutrition is still high in health facilities communities within host population which is a public health concern due to its implications and consequences. Malnutrition weakens productivity therefore to improve the nutritional status of the children, health education and trainings concerning MIYCAN practises can be strengthened. Use of locally available and cheap food materials like fresh fruits and vegetables makes it even more acceptable, reproducible & sustainable for home-based setting in host and refugee settings.

Competing Interests

The authors declare that they have no competing interests. The authors declare that there is no competing interests regarding the publication of this article.

Authors contribution

Grace Rukanda: Conception and design, data analysis and interpretation, manuscript writing, final approval of manuscript.

Paul Orikushaba: Administrative support, manuscript writing, final approval of manuscript.; Henry Turinawe: Manuscript writing, final approval of manuscript.

Paul Bubolo: collection and assembly of data and interpretation, manuscript writing, final approval of manuscript.

Mark David Edimu: Manuscript writing, final approval of manuscript.

Tumwine Muzamiru: Data analysis, interpretation, manuscript writing, final approval of manuscript.

Ivan Mujoku: Collection and assembly of data, data analysis and interpretation, manuscript writing, final approval of manuscript.

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