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The nutritional well-being of children under five with HIV-positive parents at Bikurungu Health Center III in Rukungiri District

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ABSTRACT

Families affected by HIV/AIDS often face food insecurity and malnutrition. In impoverished nations, over a third of infectious disease-related deaths in children under five result from poor nutrition. Household food insecurity and the impact of HIV/AIDS-related illnesses can hinder the growth of young children, leading to increased malnutrition. A study involving 310 mother/infant pairs from various households was conducted using a convenient sampling method. Information was gathered through a structured questionnaire. Analysis revealed that children in households affected by HIV had a significantly higher rate of stunting (height-for-age < –2 SD) compared to those in unaffected households (25.5% vs. 9.1%, p = .002). However, the rates of wasting and underweight did not significantly differ between HIV-affected and unaffected households. Living in households affected by HIV is associated with stunted growth in children under five.
Keywords: HIV/AIDS, Children under 5 years of age, Malnutrition, Stunting

INTRODUCTION

Nutritional status is the condition of the body resulting from the nutrient content of the food consumed in relation to the body's nutritional needs and from the ability of the body to digest, absorb, and use those nutrients [1]. Technically, normal nutritional status among individuals is achieved when someone is able to consume food in a balanced form and the body utilizes the consumed nutrients normally [2, 3]. According to the United Nations (UN), adequate nutrition is one of the fundamental rights of every human being. It should be provided to everyone especially vulnerable groups like children, pregnant mothers, and the elderly. A well-nourished population repays to society in the form of high productivity, better learning capacity, and low healthcare expenditure. Good nutrition enhances body immunity which offers protection to the body against infectious diseases such as malaria and respiratory infections [4-6]. It also prevents risks of non-communicable diseases like obesity, heart disease, diabetes, cancer, and stroke [7-10]. However, when the nutrients provided in the diet are inadequate or not utilized properly, a state of imbalance results in the body [11]. Globally, poor nutrition is one of the main factors attributed to more than half of child deaths, among children under the age of five years [12]. It causes immunological dysfunction which increases the susceptibility of children under five to infections. According to the World Health Organisation (WHO), poor nutrition can also lead to impaired physical and mental development but also reduced productivity [13, 14]. The impact of malnutrition among countries globally is high, and it manifests itself in many forms: as children who do not grow and develop to their full potential, as people who are skin-and-bone or prone to infection, or as people who carry too much weight [15]. Malnutrition and diet are one of the largest risk factors responsible for the global burden of disease, with malnutrition alone accounting for about 45% of deaths of children under five [16]. In sub-Saharan Africa, the epidemiology of severe malnutrition has increased in

children requiring hospitalization composed of those who are HIV-infected or HIV exposed with case-fatality rates reaching as high as 20–50% [17]. Large percentages of HIV-positive children have an episode of severe malnutrition as their first AIDS-defining illness. Undernutrition is an important factor that might predict the disease progression of HIV-infected individuals [18, 19]. It also results in a higher risk of morbidity and mortality in both HIV-infected adults and children [20, 21]. Wasting and weight loss are common features of HIV infection, especially in resource-limited settings. It is known that children with HIV and severe malnutrition invariably have lower nutritional recovery and higher mortality rates than their HIV-negative counterparts [22-24]. In East Africa, a variety of previous studies have reported that the magnitude of undernutrition, accordingly the prevalence of under-weight, wasting, and stunting ranged from 19.4% to 77.1%, 7% to 77.1%, and 13% to 71.8% respectively. This showed pronounced discrepancies among reports of undernutrition across different geographical settings and different time periods. Moreover, there is no regionally represented pooled data on undernutrition in East Africa [25]. Although the future of human societies relies on healthy children being able to achieve their optimal physical growth and development, this optimum is far from being realized in many parts of the world. Undernutrition and HIV infection are major problems in children worldwide, especially in sub-Saharan Africa [26]. Undernutrition is well recognized as a major risk factor for morbidity and mortality contributing to just over 50% of the 10 million child deaths a year worldwide [27]. Anemia is a common feature of undernutrition [28-30]. Other co-morbidities like malaria, pneumonia, and diarrhea can increase the risk of undernutrition [31-34]. It has been observed that modern communities with higher HIV/AIDS prevalence showed lower child malnutrition and mortality rates, potentially due to the overriding influence of trade and income from wage employment. These communities, which are better off economically and have greater access to essential services, such as water and sanitation, exhibited lower child underweight prevalence. Thus, high HIV/AIDS prevalence and better nutritional outcomes can coexist under better socioeconomic conditions. While this scenario does not suggest that higher HIV/AIDS prevalence is causally associated with better nutritional outcomes, it reinforces the need to control for the underlying socioeconomic conditions in examining the association between HIV/AIDS prevalence and nutritional outcomes [35]. In Uganda, the UNICEF country report on the status of children reported that HIV/AIDS is one of the predominant common factors among parents of malnourished children [36]. However, there is limited cross-country evidence on the coexistence of HIV/AIDS and malnutrition in Uganda. Instead, Nalwoga et al. [27] suggest that a high national or community HIV/AIDS prevalence is not associated with a higher risk of child malnutrition. Previous studies are also restricted to country-level analysis involving household and community-level data, usually the Demographic and Health Surveys (DHS). Similarly, the few studies involving cross-country analysis of HIV/AIDS and malnutrition have employed individual, household, and community-level data [27, 37]. Therefore, this study seeks to assess the nutritional status of children under five years born to HIV-positive parents attending Bikurungu Health Center III in Rukungiri District.

METHODOLOGY

Study Design

A cross-sectional descriptive community Health Center survey was conducted at Bikurungu Health Center III in Rukungiri District.

Study population

The study sought to investigate the nutritional status of children under five years born to HIV-positive parents attending Bikurungu Health Center III in Rukungiri District. Therefore, the target population of the study was the infant pairs of children under five and HIV-positive parents/ caregivers

Sampling technique

Convenient non-probability sampling was used to acquire study participants who are infant pairs of children under five and HIV-positive parents/ caregivers who were attending the ART clinic of Bikurungu Health Center III. This sampling technique was deployed due to the anticipated limited time due to the prevailing circumstances in health facilities as a result of limitations of access caused by the COVID–19 Pandemic.

Inclusion criteria

- Under five years old children have an HIV-positive parent or caretaker.
- HIV-positive parents of under five years old children attending the ART clinic of Bikurungu Health Center III.

Exclusion criteria

- HIV-positive parents with under five years' children who won't be content to take part in thestudy.

Sample size determination

The sample size necessary to reach the study objective was determined using the Kish and Leslie[38] method for a single proportion.

Based on the prevalence of malnutrition under the age of five (28%, based on the stunting level in Western Uganda (UDHS, [37])) with the assumption of a 95% confidential interval and a precision of 5%, the sample size was determined as follows,

= 22,

where;

n = sample size,

z - Score corresponding to 95% confidential interval (=1.96)p – Prevalence of malnutrition of the under-five (28%).

q = 1-p = 1- 0.28 = 0.72

d - Precision of the study = 5%

$n = 1.962*0.28*0.72/0.05^2$,

n =310

Therefore, the minimum sample size taken was 310 infant/parent pairs representing households.

Data collection

Primary data was collected through interviews using a pre-tested interviewer-administered questionnaire. Information on the following independent variables was collected; sociodemographic characteristics (gender, age, educational level of the parents), knowledge, attitudes, and self-medication practices such as type of drug, source of drugs, illness being treated, how the medicines were being taken, and how the use of drugs was initiated.

Data management

At the end of each field day, the researcher checked all filled data collection tools for validity and completeness. Double data entry was done using Epi-Info entry screens prepared with logic checks. The two entries were reconciled by comparing them for each field in every questionnaire. This was done using Stata software, where entries were linked by a unique identifier number. Anydiscrepancies in the entries were corrected by referring to the source documents (questionnaires).

Data analysis

Data analysis was conducted using Statistical Package for Social Sciences (SPSS). Descriptive statistics were used to summarize data. Differences between categorical data were calculated using Pearson's Chi-square test ($\chi 2$). Data were entered into the Anthro program for the calculation of z -scores. Proportions, means, and standard deviations were used to describe the data, as appropriate. The data were analyzed with the use of the chi-square test for comparison of proportions and the independent t-test for the comparison of means for normally distributed data. Extreme z-scores, i.e., ≤ -5 or ≥ 5, were considered likely to be measurement or data errors and were therefore excluded from the data analysis.

Ethical considerations

Ethical clearance was obtained from the KIU – Western campus Faculty of Clinical Medicine & Dentistry and Bikurungu Health Center III administration. Then informed consent was sought fromall HIV positive parents who were willing to take part in the study.

RESULTS

Characteristics of eligible households (infant/parent pairs) recruited for the study

In total, 310 households in all were enrolled in the study. There were two groups created from these families. Group 1 was made up of 165 homes with HIV. 60 of the households in this group had

orphans, 26 had adults who self-identified as HIV-positive, and 49 had both orphans and HIV-positive adults. In the sample of households with HIV, there were 234 kids under the age of five. Of them, 195 lived in households with orphans, 108 in households with people who self-identified as HIV positive, and 158 in households with both HIV-positive adults and orphaned children. 145 homes in Group 2 were HIV-unaffected. There were 227 children under the age of five in all of these families. 461 young children under the age of five made comprised groups 1 and 2 in total as presented in Tables 1&2, Figures 2&3.

Table 1: Distribution of eligible subjects according to household HIV status

	Households		Children n	< 5 yrs
Household HIV status	**n**	**%**	**n**	**%**
Affected	165	53.3	234	50.7
Unaffected	145	46.7	227	49.3

Table 2: Status of HIV affected Households

	Households		Children < 5years	
HIV affected Household status	n	%	n	%
Orphan	60	44.4	195	42.2
HIV+ adult	26	19.4	108	23.5
Orphan and HIV+ adult	49	36.2	158	34.3

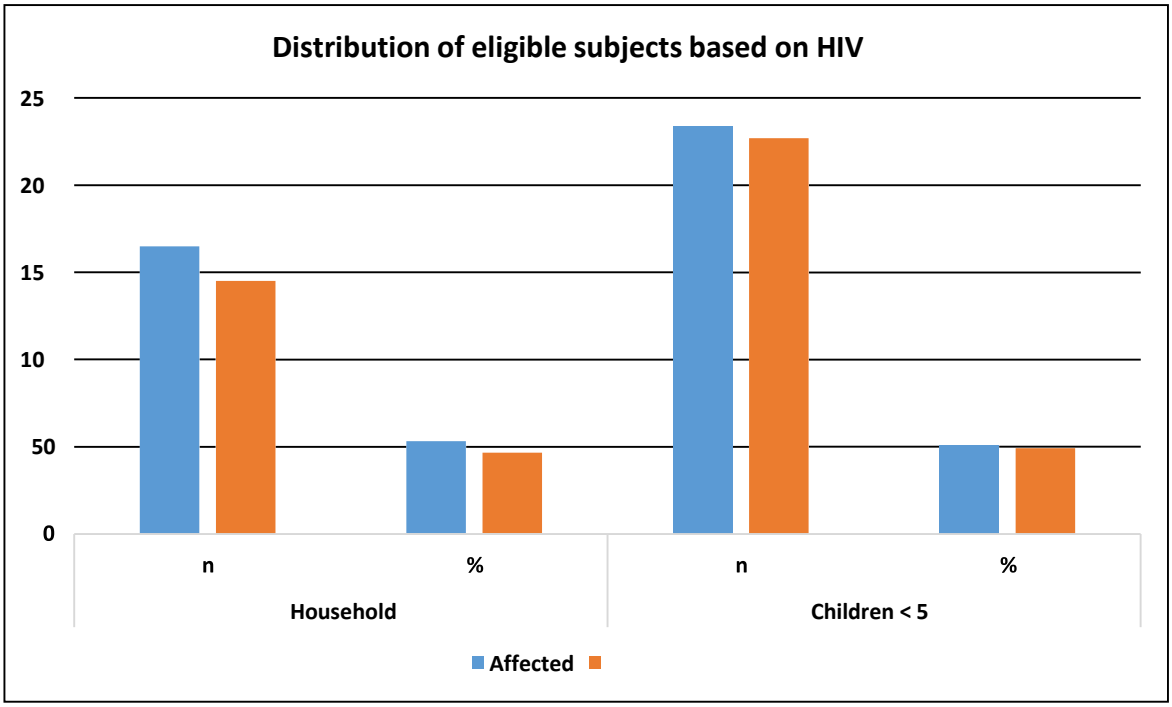

Figure 1: Column Graph showing distribution of eligible subjects based on HIV status

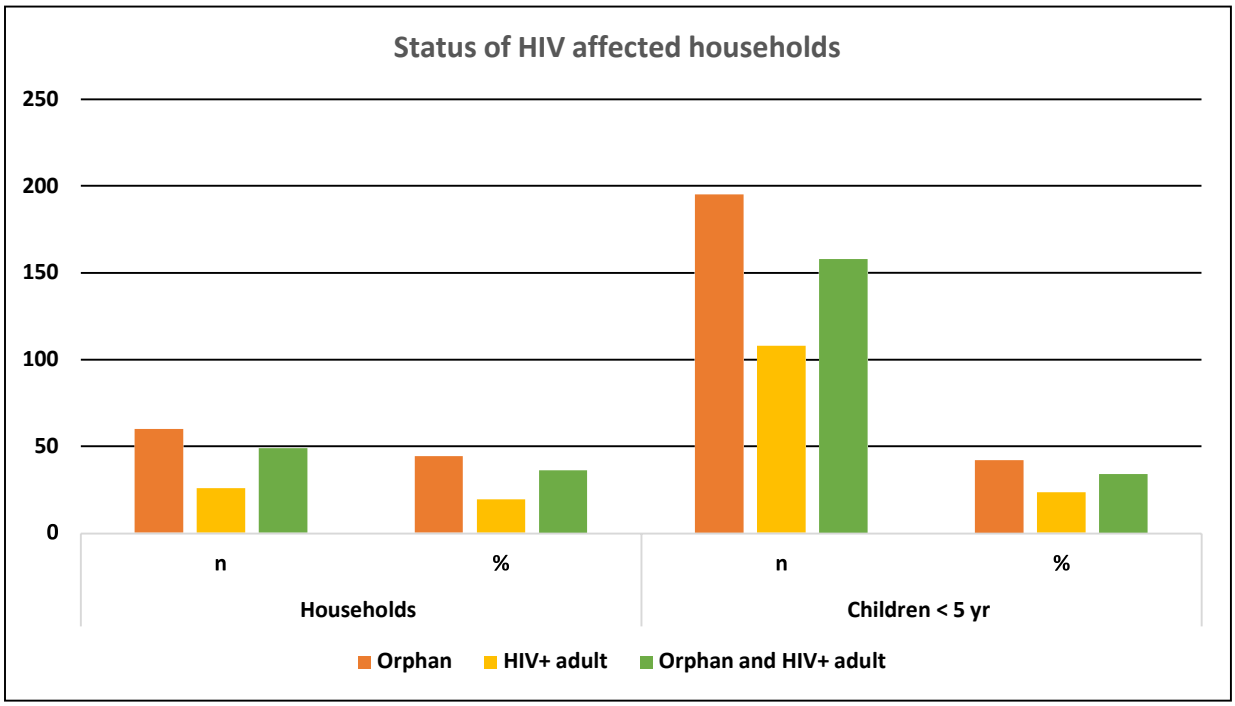

Figure 2: Column graph showing status of HIV affected house holds

Prevalence of stunting, wasting, and underweight among children according to household HIV status at Bikurungu Health Center III, Rukungiri District

Overall, the children in this study had low levels of stunting, defined as height-for-age -2 SD z- score (17.4%), underweight, defined as weight-for-age -2 SD z-score (4.5%), and wasting, definedas weight-for-height -2 SD z-score (1%), according to the WHO classification for assessing severity of malnutrition by prevalence ranges among children under the age of 5 years. Stunting was more prevalent in children living in families with HIV (25.5%) compared to children in unaffected households (9.1%) (p =.002). Children in impacted families also had more severe stunting, with 9.8% (p =.001) of them having a z-score of less than three in comparison to 0% in unaffected households. Between the two types of homes, the prevalence rates of wasting and underweight were not significantly different as shown in Table 3.

Table 3: Prevalence of stunting, wasting, and underweight among children according to household HIV status

Children from all households (n = 461)				**Children from affected households (n =234)**				**Children from unaffected households (n = 227)**		
Variable	**% <-2 SD**	**95% CI**	**n**	**% <-2 SD**	**95% CI**	**n**	**% <-2 SD**	**95% CI**	***N***	***p***
Stunting	17.4	12.6 - 23.7	80	25.5*	17.7 - 35.6	60	9.1*	2.9 - 15.3	21	.002*
Underweight	4.5	2.0 - 8.7	2	4.9	1.4 - 11.9	11	4.0	0.0 - 8.4	9	.768
Wasting	1	0.0 - 2.6	2	0.9	0.0 - 3.3	2	1	0.0 - 3.5	2	.983
***Significant**										

The size of the food-producing land, the number of household members, and the number of roomsin the houses did not significantly differ between the groups. However, the percentage of homes with a female head was higher in HIV-affected households than in HIV-affected households (41% vs. 8.3%, p = 0.00) as shown in Table 4.

Table 4: Characteristics of HIV-affected and unaffected households

Characteristic		Value	*N*	*P*
The mean area of land owned—acres				
Unaffected		1.5	131	.332
Affected		1.2	112	
Mean percentage of land cultivated				
Unaffected	81		133	.192
Affected	86		109	
Mean no. of rooms in the house				
Unaffected		2.8	138	.496
Affected		2.6	117	
Mean no. of people per room				
Unaffected		1.93	138	.231
Affected		2.14	117	
Mean no. of household members				
Unaffected		5.6	140	.840
Affected		5.7	117	
No. (%) of female-headed households				
Unaffected		19 (8.3)	166	.00*
Affected	97 (41)		102	

***Significant**

Comparing nutritional conditions based on household subcategories of subjects atBikurungu Health Center III, Rukungiri District

Four household subcategories—HIV-affected households with orphans only, HIV-affected households with HIV-positive adults only, HIV-affected households with both orphans and HIV- positive adults, and HIV-affected households—were compared for the nutritional condition of children under the age of five. Stunting severity varied greatly among the various homes. According to the WHO classification, the prevalence of stunting was extremely high in homes with HIV-positive adults (41.7%), medium in households with only orphans (20.9%), low in households with HIV-positive adults and orphans (20.0%), and not at all prevalent (9.1%). Households with HIV-positive adults compared to those with HIV-unaffected households (p=.0001) and households with HIV-positive adults compared to those with orphans (p =.013) showed substantially different stunting levels after using the Tukey post hoc test for multiple comparisons. There were no appreciable variations in the underweight status of children in these groups, despite the data showing that the prevalence of underweight was 12.5% in families with HIV-positive adults, 4.7% in households with orphans, and 4% in unaffected households. Additionally, there were no variations in wasting status among the four household subcategories as shown in Table 5.

Table 5: Prevalence of stunting, wasting, and underweight in HIV-unaffected households and households with HIV+ adults and/or orphans

	HIV+ adult			Orphans			HIV+ adult and orphans			HIV-unaffected			
Variable	**% < –2SD**	**95% CI**	***n* = 24**	**% < –2SD**	**95% CI**	***n* = 43**	**% < –2SD**	**95% CI**	***n* = 35**	**% < –2SD**	**95% CI**	***n* = 99**	***p***
Stunting	41.7	19.9, 63.5	10	20.9	10.5, 37.3	9	20	5.3, 34.7	7	9.1	2.9 - 15.3	9	.002*
Underweight	12.5	0.0, 27.8	3	4.7	0.0, 17.9	2	0	0.0, 1.4	0	4	0.0 - 8.4	4	0.151
Wasting	0	0.0, 2.1	0	2.3	0.0, 7.5	1	0	0.0, 1.4	0	1	0.0 - 3.5	1	0.714

***Significant**

Age differences and household types

Stunting was more common in children between the ages of 24 and 60 months who lived in families with HIV than in households without HIV (24.2% vs. 7%). Between the two family types, there were no appreciable changes in the prevalence of wasting and underweight among the variousage groups as shown in Table 6.

Table 6: Prevalence of stunting, wasting, and underweight according to household HIV status andage group of children

		HIV-unaffected, 0–24 months	**HIV-affected, 0–24 months**	***p***	**HIV-unaffected, > 24–60 months**	**HIV-affected, > 24–60 months**	***p***
Variable (%)							
N		42	40		57	62	
Stunting (%)	**<–2SD**	11.9	27.5	.075	7	24.2	.011*
	95% CI	2.5%, 26.1%	8.6%, 37.6%		0.0%, 14.3% *	16.0%, 39.3%*	
	n	5	11		4	15	
Underweight (%)	**<–2SD**	7.1	5.1	.604	3.4	6.2	.932
	95% CI	0.0%, 16.1%	0.0%, 13.3%		0.0%, 9.0%	0.0%, 12.8%	
	n	2	3		2	2	
Wasting (%)	**<–2SD**	2.4	0	.326	0	1.6	.336
	95% CI	0.0%, 8.2%	0.0%, 1.3%		0.0%, 0.9%	0.0%, 5.3%	
	n	1	0		0	1	

Significant

DISCUSSION

Prevalence of chronic malnutrition among children under five years born to HIV-positive parents attending Bikurungu Health Center III

According to the WHO reference standards, the children under five in this study were more stunted, underweight, and wasted, suggesting that they had likely experienced both acute and chronic food insecurity. This outcome was anticipated since Bikurungu Village, which was plagued by malnutrition and poor health and was located in a seasonal hunger hotspot as identifiedby the 2016 Uganda Demographic and Health Survey (UDHS), was chosen for inclusion in the

nutrition enhancement program [37]. The frequency of stunting among children under the age of five was shown to be greater among those who lived in HIV-affected families compared to those who did not. When compared to children in HIV-affected households, stunting indicates that the children in HIV-affected households may have had inadequate nutrition, chronic illnesses, infections like TB, or other circumstances that could have negatively impacted their growth over time [27]. Although there were no appreciable differences in the ownership of land or the size of houses between the two groups, it is important to note that more families with HIV than those without it were headed by women. Cultural customs like widow inheritance and widows' restricted power over family assets may be linked to the well-being of the children in such households [39]. Additionally, it's possible that funds that would have gone toward ensuring that children in HIV- affected households received a sufficient diet were instead used to deal with the consequences of HIV/AIDS, such as paying for the healthcare of sick family members, including the kids. It is also likely that the adults who were in charge of supporting the family were less productive as a result of their illnesses and gave the family less food. In other instances, food intended for children may have been given to a sick family member in an effort to improve that person's health, depriving the kids of the proper nourishment [40]. Because of this, it is likely that the loss of socioeconomic position brought on by HIV/AIDS led to malnutrition and food insecurity, which had a more severe impact on children under five [40, 41].

Parenteral HIV/AIDS-related factors associated with malnutrition among children under five years attending Bikurungu Health Center

Further analysis of household subgroups revealed that children with an adult who self-identified as HIV positive had the highest rates of stunting, followed by those living in homes with orphans, and then those with both an orphan and an HIV-positive adult. Children living in households with an HIV-positive person may have experienced higher food insecurity as a result of the illness's effects on adult productivity, even though the adults in HIV- affected households were not asked to disclose whether they were experiencing full-blown AIDS or were simply aware of their HIV status. However, it was likely that households that took in orphans did so because they had more resources to cover the additional costs associated with the orphaned children. Therefore, it is not unexpected that kids who lived in homes with orphans had reduced rates of stunting. The nutritional status of orphans has been the subject of a few studies, with varying results. According to several studies, families with food insecurity are more likely to have orphans who lost their parents to AIDS [25, 42, 43]. Orphans are more wasted than non-orphans, according to one study [43] more stunted than non-orphans, according to another [23] and there is no difference in nutritional status between orphans and non-orphans, according to a third [44]. Orphans were not more malnourished than non-orphans, according to an examination of 23 Multiple Indicator Cluster Surveys and Demographic and Health Surveys conducted throughout sub-Saharan Africa. More research on HIV-affected orphans that takes family variables into account is needed as a result of these contradictory findings. The discovery of decreased rates of stunting among kids living in households with both an orphan and an adult who self-reported having HIV is intriguing and unexpected, and it merits additional research [41]. The nutritional requirements of kids with HIV are age-related, much like for other kids. For babies, breastfeeding is essential, while for toddlers, supplemental meals and growth monitoring are crucial. The results showed that stunting levels among children under 2 years of age were moderately high in both categories of families when nutritional status was evaluated according to the age of the children: 27.5% in HIV-affected homes and 11.9% in unaffected households. However, stunting rates among kids between the ages of 2 and 5 years dropped quickly in homes unaffected by HIV (7%) but

somewhat increased in HIV-affected households (24.2%). These findings suggest that children who grew up in households free of the HIV virus were probably able to improve their nutritional status as they aged. Unaffected homes were probably more, able to introduce adequate complementary foods because they had better food security. However, if the situation regarding food security had worsened, putting the kids in these homes at risk of persistent hunger, this was unlikely to occur in households where HIV infection was present. Additionally, it's possible that some kids in the impacted families had HIV/AIDS themselves, which stunted their development [45, 46]. Malnutrition remained in children regardless of the effects of HIV, as this study has shown, and as would be expected in a situation of food insecurity. Future research must assess the degree to which HIV/AIDS worsens undernutrition and identify the groups of HIV-infected children who are most adversely affected. Information on the socio-behavioral aspects of undernourishment is also required. It is necessary to look into variables including feeding habits, caregiver expertise, and challenges in acquiring food that may vary between homes that are affected and those that are not. This will make it possible to create programs that describe the methods parents can employ tofeed children who are HIV-positive and deal with any obstacles to providing both affected and unaffected homes with adequate nutritional support [39, 43, 47].

CONCLUSION

Stunting among children under five was more common in households with HIV infection. This was most likely brought on by ongoing malnutrition. However, there were no variations in the levels of underweight and wasting in children from affected and unaffected households that were serviced at Bikurungu Health Center III.

Recommendations

Future longitudinal studies that can monitor the development of kids living in households with HIV are advised. Since confounding variables including seasonality, household affluence, and the number of children living there were not taken into account, the study's findings may have been skewed, thus recommending future studies accounting for these confounders.

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