

Why the Prevalence of Chronic Malnutrition Remained Persistently High in Children 6-59 Months of Age in a Region Known to be Highly Food Productive in Uganda: A Cross-Sectional Descriptive Study of Mothers and Their Children

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Abstract

Introduction: Despite being referred to as one of the country's food baskets, 41% of children 6-59 months of age in the Rwenzori sub-region, western Uganda are stunted. Stunting is a form of chronic malnutrition in which children are short for their age. In this study, we established the prevalence and determinants of stunting in one of the sub-counties in this region.

Methods: This was a cross-sectional descriptive study conducted in Nombe sub-county in Rwenzori sub-region, Western Uganda from May 26th to June 26th, 2018. A total of 372 mothers and their children were recruited using simple random sampling. Data was collected using a questionnaire. Stunting was determined by taking a child's height or length and comparing it with the child's age. A child whose height or length for age index was less than -2 Standard Deviations (SD) was considered stunted. We used descriptive statistics to understand the characteristics of mothers and multivariable logistic regression models to obtain determinants of stunting. Data were analyzed using SPSS version 20.

Results: A total of 372 mothers and their children were included in this study, majority 307 (83.0%) were 6-24 months old and nearly half, 167 (44.9%) were stunted. We found that reserving food stock for use in the dry season (aOR= 0.23, CI= 0.08-0.62, p= 0.004), de-worming children (aOR = 0.32, CI= 0.18-0.54, p = 0.001) and family earning at least 10,000 Ushs (2.7USD) at the end of the month (aOR = 0.36, CI= 0.22- 0.58, P=0.001) were associated with no stunting.

Conclusion: We found a high prevalence of stunting among children 6-59 months of age. We recommend enforcing ownership of food granary by households especially during the dry season, support to de-worming programs targeting children below five years of age, and establishing community-based income-generating livelihood projects.

INTRODUCTION

Worldwide, malnutrition is responsible for over 35% of deaths among children 6-59 months of age. Stunting, a form of chronic malnutrition and severe wasting, a form of acute malnutrition are the major contributors to childhood mortality. More than 90% and 70% of the world's stunted and wasted children are found in Africa and Asia with a stunting prevalence of 36% in Africa and 27% in Asia. Stunting is the impaired growth and development that children experience from poor nutrition, repeated infection, and inadequate psy-

chosocial stimulation. Children are defined as **stunted** if their height-for-age index is more than two Standard Deviations (2 SD) below the WHO child growth standards median [1]. An analysis of African Demographic and Health Surveys (DHS) found that stunting was more prevalent in countries in East and West Africa [2]. The prevalence of stunting was higher in Burundi at 57.7% [2], Tanzania at 35.5% [3], and Uganda at 29% [4]. Although stunting seemed less prevalent in Uganda compared to Burundi and Tanzania, it largely re-

mains a hidden problem due to challenges in its assessment, detection, and reporting in communities [5]. There is an observed regional variation of stunting in Uganda that shows that stunting is more prevalent in the Rwenzori sub-region (41%) compared to other regions in Western Uganda [4]. Similarly, findings of earlier studies conducted in Rwenzori sub-region found a prevalence of 43.0%, 44.8%, and 49.8% in Kabarole, Bundibugyo, and Kasese districts respectively in 2010 [6]. These findings are similar to those of previously conducted Uganda Demographic and Health Surveys (UDHS); which found prevalence rates of 42.8% in 1995, 40% in 2002, and 49.6% in 2006 in Rwenzori sub-region [4] and as well as similar to findings of studies conducted in other East African countries [7, 8]. A study that was conducted in the central region of Tanzania and another national cross-sectional study conducted in Burundi found about half (49.7%) and slightly more than half (53%) of children 6-59 months of age stunted respectively. These studies associated stunting to the young age of fathers and mothers of children, small babies for age at birth, being male child, mothers having no formal education, delivering at home, having more than 2 children below five years of age in a household and low wealth status [7, 8]. Earlier studies in western Uganda have associated stunting to low wealth status as well, poor health of caregivers of children, a residence located at a long distance from a health unit, and the use of contaminated water [6].

Stunting impacts negatively on the cognitive and reproductive functions of both girls and boys [2]; Menarche for stunted girls occurs 1.3 years later, an indication of delay in sexual maturity. Stunted maternal height increases the risk of delivering Low Birth Weight (LBW) babies. Pregnant women who are less than 145cm in height have an increased risk of developing obstetric complications during childbirth and consequently increasing maternal morbidity and mortality [2]. The intellectual ability for stunted boys and girls is low contributing to low school performance and poverty through impeding people's ability to live productive lives. Economic growth and human development require non-stunted populations who can learn new skills, think critically, and contribute to the development of their communities [2]. Western Uganda has persistently had the highest levels of childhood stunting despite being referred to as "the food basket" of the country [9]. Due to this, we sought to establish the prevalence and determinants of stunting among children 6-59 months of age in one of the highest food productive rural sub-counties in the Rwenzori sub-region, Western Uganda.

METHODS

Study Area, Population and Design

This study employed a cross sectional descriptive study design. It was carried out from May 26th to June 26th, 2018 in one rural sub-county in Rwenzori sub-region, Western Uganda. It was carried out among mothers and their children 6-59 months of age who were present at the household during data collection and had consented to participate. The study area has a total population of 10,617 people, about 1,177 of whom are children 6-59 months of age [4]. The participants live along the foothills of the Rwenzori ranges where a variety of food crops are grown and animals are reared. Small

scale businesses at the trading centers are one of the key income-generating activities.

Sample Size Determination and Participant Selection

The sample size of this study was determined using the Leslie Kish survey sampling formula [10]. Z (the value from a standard normal distribution) corresponding to the desired confidence level of 95%, was 1.96, p (proportion of children 6-59 months of age who are stunted in the Rwenzori sub-region), estimated at 41% (0.41) [4], e (the desired level of precision), set at 5% (0.05) to arrive at N (the actual sample size) of 372 respondents.

Prior to data collection, a household survey was conducted by Village Health Teams (VHTs) to register households with children 6-59 months of age in the entire sub-county. A total of 1,136 children found in 865 households were registered as eligible and were given numbers. We used systematic sampling and sampling interval of 3 to select children 6 - 59 months of age and their mothers. We moved to each registered household with an eligible child and interviewed a child's mother or legal caregiver. When the child and the mother in a household declined to participate in the study, we moved to the next eligible household.

Data Collection

Data was collected using a questionnaire. To determine the prevalence of stunting, data on a child's height or length was obtained by measuring height or length using a height board. The length was measured for children young than 24 months while lying on a height board. Height was taken for older children when the child was standing. Questions on socio-demographic characteristics, diet, food security, hygiene, and child determinants of stunting were asked. A Household was categorized as hygienic if the compound was clean, possessed a latrine and waste disposal pit. Child's de-worming status was confirmed from the child's health card, distances to the water source and nearby health facility were estimated by walking to respective destinations with a family member, a water source was categorized as safe if it was piped water, rainwater, protected wells, bore holes, and springs. Unprotected sources such as rivers and wells were considered unsafe.

Data Analysis

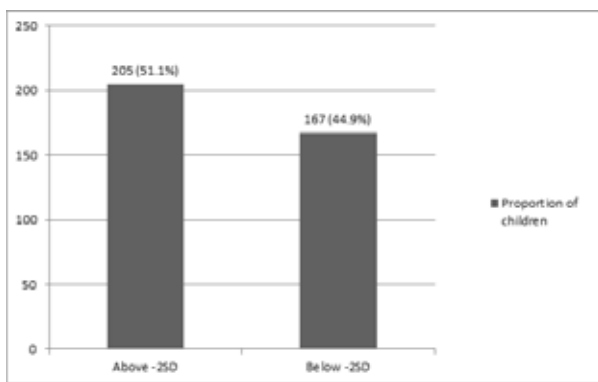
Data were analyzed using SPSS version 20. Participant demographic characteristics were summarized using descriptive statistics. The height for age index for every child 6-59 months of age was expressed as a Standard Deviation (SD) unit or Z-score. A Child whose height for age Z-index (Z-score) was below -2 SD was categorized as stunted. We used multivariable logistic regression to establish determinants of stunting. Statistical significance was determined at $p \leq 0.05$.

Ethical Considerations and Protection of Study Participants

Approval from an ethics committee at the Faculty of Health Sciences (FHS), Uganda Martyrs University was obtained. Written consent was sought from mothers and legal caretakers of children assessed for stunting in this study.

Table 1: Socio-demographic Characteristics of Mothers and Their Children 6-59 Months of Age in a Rural Sub-County in Rwenzori Sub-Region in Western Uganda

Variable	Frequency (N=372)	Percentage
Number of children in a home		
years 2 ≥	307	83.0
years < 2	65	17.0
Distance to the health unit		
km 5 ≥	156	41.9
Skms <	216	58.1
Household hygiene		
Hygienic	297	79.8
Not Hygienic	75	20.2
Availability of latrine		
Available	319	85.8
Not available	53	14.2
Source of water for drinking		
Safe source	143	38.4
Unsafe source	229	61.6
Distance to the water source		
km 1.5 ≥	166	44.6
km 1.5 <	206	55.4
Preparation of water for drinking		
Boil or use safeguard	59	15.9
Does not boil or use safeguard	371	83.9

**Figure 1:** Level of Stunting Among Children below Five Years of Age in Rural Western Uganda

RESULTS

Socio-demographic Characteristics of Respondents

In this study, a total of 372 mothers were interviewed and 372 children 6-59 months of age were assessed for stunting. The majority of the children 307 (83.0%) were less than 2 years old. Most 297 (79.8%) of the households had hygienic environments, with 319 (85.8%) possessing a latrine. Most 216 (58.2%) of the households were located more than

5kms away from the nearest health facility and 206 (55.4%) of the households were located more than 1.5kms away from a water source. Most 229 (61.6%) of the households fetched their water for domestic use from unsafe sources. Majority 371 (83.9%) of the households used un-boiled and untreated water for drinking (Table 1).

Prevalence of stunting among children 6-59 months age in a rural sub-county in Rwenzori sub-region in western Uganda. Nearly half of 167 (44.9%) of children below five years of age were stunted (Fig. 1).

Socio-economic, Dietary and Child Determinants of Stunting in Children 6-59 Months of Age in a Rural Sub-county in Rwenzori Sub-region in Western Uganda

Reserving food stock for use in the dry season (aOR= 0.23, CI= 0.08-0.62, p= 0.004), de-worming children (aOR = 0.32, CI= 0.18-0.54, p = 0.001) and family earning at least 10,000 Ushs (2.7 USD) at the end of the month (aOR = 0.36, CI= 0.22- 0.58, p = 0.001) were associated with no stunting in children 6 - 59 months of age (Table 2).

DISCUSSIONS

In a rural sub-county in Rwenzori sub-region in western Uganda, 44.9% of children 6-59 months of age are stunted. These findings are similar to those of earlier studies conducted around the region [4, 6]. One wonders why there are constantly high trends of stunting in a region known to be one of the country's food baskets [9]. It is also hardly thought that nutritional deficits among children can be a public health concern in such a region. Nutritional deficits in children if not corrected result in intergenerational malnutrition and affects their cognitive and reproductive functions impacting negatively on the quality of future citizens, as well as their productivity levels [2].

In this study, we found homesteads that reserve food stock for use in dry seasons less likely to have stunted children. Homesteads without food reserved for the dry season were more likely to survive on nutrient-deficient foods. Children being a vulnerable group are more likely to be affected compared to the other family members. Lack of or inadequate food in a household leads to restricted child growth and development. The availability of nutrient-dense foods can be ensured by storing food at home throughout seasons, a practice that is ceasing to exist in many Ugandan households [11-13]. Similarly, homesteads that were earning at least 10,000 Ugandan shillings (2.7USD) at the end of the month were less likely to have stunted children. Food security in a household is defined by either the physical presence of food or money to buy food or both [14]. The wealth status of a household determines whether the family is in a position to buy a variety of foodstuffs to meet nutritional requirements for enhanced child growth and development [14, 15]. In this study, children whose de-worming status was up-to-date were less likely to be stunted. Conversely, children who were not fully de-wormed were more likely to be stunted. Studies have established the association between stunting and helminthic infestations. Infestations impair the body's ability to absorb and utilize food nutrients. Deworming decreases or eliminates the population of helminths (worms) in the child's gastrointestinal tract and this reduces the competition for nutrients [16].

Table 2: Socio-economic, Dietary and Child-Related Determinants of Stunting in Children below 5 Years of Age in a Rural Sub-County in Western Uganda

Variable	Nutrition status (N=372)		Crude OR (95%CI)	p-value	Adjusted OR (95%CI)	P-value
	Stunted	Not stunted				
Presence of food stock for use in the dry season						P = 0.004
Food stock	6	27	0.23(0.09-0.58)	P=0.001	0.23 (0.08-0.62)	
No food stock	166	173				
Feeds given before initiation of breastfeeding						P=0.814
The child was not given pre-lactation feeds	42	67	0.64(0.41-1.01)	P=0.055	1.94 (0.55-1.61)	
The child was given pre-lactation feeds	130	133				
Child feeding 6 - 24 months						P=0.085
The child was exclusively breastfed	4	1	4.59(0.21-5.29)	P=0.24	0.13 (0.01-1.32)	
The child was given complementary feeds	171	196				
Utensils used during complementary feeding						P=0.159
Cup	142	178	0.59(0.32-1.06)	P=0.074	0.61 (0.30-1.22)	
Bottle	30	22				
Child's birth order						P=0.400
≤ 4 birth order	113	114	1.45(0.95-2.20)	P=0.086	1.23 (0.76-2.01)	
> 4 birth order	59	86				
Child's weight at birth						P=0.099
≥ 2.5 kg	149	185	0.53(0.27-1.04)	P= 0.062	0.51 (0.23-1.13)	
< 2.5 kg	23	15				
Child's de-worming status						P=0.001
Up to date	104	161	0.36(0.23-0.58)	P=0.001	0.32 (0.18-0.54)	
Not up to date	68	38				
Family monthly income						P=0.001
Earns at least 10,000 Ushs	73	144	0.28(0.18-0.43)	P=0.001	0.36 (0.22-0.58)	
Does not earn	99	55				
Presence of latrine at home						P=0.052
Yes	147	191	0.28(0.13-0.61)	P=0.001	0.40 (0.16-1.01)	
No	25	9				

CONCLUSIONS

We found a high prevalence of stunting among children 6 -59 months of age. Like other studies, we found that the occurrence of stunting in children 6 -59 months of age is determined by socioeconomic, dietary, and child factors especially food insecurity, low household income, and failure to de-worm children. We recommend enforcing ownership of food granary by households especially during the dry season, support to de-worming programs targeting children below five years of age, and establishing community-based income-generating livelihood projects.

Study limitation

The study relied on responses from mothers and some of these might have been affected by recall bias. We endeavored to clearly articulate the questions to ensure that the mothers

responded accurately.

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CONFLICTS OF INTEREST

The authors declare no competing interests in this study.

AUTHORS' CONTRIBUTION

EMM conceived the study, EMM & EK collected and analyzed data, EMM and CM wrote the manuscript.

ETHICAL STATEMENTS

Approval was sought from the ethics committee at the Faculty of Health Sciences, Uganda Martyrs University. Written consent was sought from mothers and legal care takers of children assessed for stunting in this study.

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