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SPECIFIC CORRELATED FACTORS TO UNDERNUTRITION AMONG CHILDREN 0-59 MONTHS IN MUBENDE DISTRICT: A CASE STUDY OF MUBENDE REGIONAL REFERRAL HOSPITAL, CENTRAL UGANDA.

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Abstract

Background:
Malnutrition is one of the major causes of mortality and morbidity among children 0-59 months of age not only in Uganda but worldwide. To understand the causes of malnutrition among children who are 0-59 months of age, a study was conducted in Mubende Regional Referral Hospital, Mubende district in the south-central region of Uganda to find out the specific correlated factors responsible for undernutrition children of this age category.

Methodology:
The data was collected from MMRH by use of a structured questionnaire that involved Child anthropometry, Child-related factors, maternal-related factors, and male involvement. Univariate, bivariate, and multivariate analysis of data was done in MS Excel, Epi Info program-nutrition module, and Stata statistical software.

Results:
It was found out that caretaker (P=0.03, 0.01, 0.00), age at which the mother got first born (P=0.00, 0.00, 0.02), maternal occupation (P=0.02, 0.00, 0.01), and maternal education level (P=0.03, 0.02, 0.01) were the major factors influencing on undernutrition (wasting, stunting and underweight) respectively. The study also noted that male involvement in activities to address childhood undernutrition was mainly in purchasing food while other activities were not paid much attention to.

Conclusion:
The study identifies that caretaker, age at which the mother got first born, maternal occupation, and maternal education level were the major factors influencing undernutrition in children 0-59 months of age in Mubende Regional Referral Hospital, Mubende district.

Recommendation:
The study recommends the government strengthen its poverty alleviation programs to improve household incomes, as a basis for food security. Further studies have also been recommended to be carried out with male partners themselves to understand their perspective.

Keywords: *Specific, Correlated Factors, Undernutrition, Children.*
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Background to the study

Malnutrition in all its forms specifically undernutrition remains one of the greatest universal public health challenges (WHO, 2021). The burden has remained unacceptably high and efforts to reduce it in many regions of the world remain slow (Kisiangani* *et al.*, 2014). Undernutrition is defined as an insufficient intake of energy and nutrients, such as good quality protein, and an inability to meet the daily requirements for proper body growth and development (Matrins *et al.*, 2011) Undernutrition in its simplest terms refers to wasting, stunting, and underweight (WHO, 2021)

Globally, the prevalence of undernutrition exceeds 900 million people (Matrins *et al.*, 2011). According to the World Health Organization (WHO, 2019), undernutrition in its simplest form worldwide has 155 million children under the age of five are stunted, 52 million are wasted and 17 million are severely wasted. In 2020, the figures were reduced as 149 million children were estimated to be stunted and 45 million estimated to be wasted (WHO, 2021). Furthermore, Worldwide, Child undernutrition is responsible for approximately 3.5 million deaths and 35% of the disease burden while stunting and underweight alone are responsible for 2.2 million deaths and for 21% of disability-adjusted life years (DALYs) in children below the age of 5 years (Matrins *et al.*, 2011).

About two out of every four stunted children live in South Asia and one in three in sub-Saharan Africa (Isanaka *et al.*, 2021). World Health Organization further states that in low- and middle-income countries including Uganda, around 45% of

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deaths among children under 5 years of age are linked to undernutrition (WHO, 2021). In the year 2000, it was estimated that 182 million preschool children which was one-third of children less than five years old in developing countries were stunted and approximately, 27% were estimated to be underweight (Kisiangani* *et al.*, 2014). These various forms of undernutrition have been attributed to poor household income, having no formal education, especially for mothers as well as having more than 2 children below five years of age in the same household (Mirembe Masereka *et al.*, 2020)

In the Eastern Africa region, stunting and underweight are estimated at 48% and 36% respectively, and are expected to increase over the next decade furthermore in Kenya, malnutrition is still a serious public health problem and the situation has been worsening despite the numerous activities geared towards improving food and nutrition security(Kisiangani* *et al.*, 2014),.

The commonest form of undernutrition in Uganda today among children is stunting at 29% in children below 60 months, this is followed by 11% underweight and 4% wasting for the same age category (UBOS, 2016b). Undernutrition specifically stunting in Uganda has been linked to low-income status as well, poor health of Caregivers poor health, longer distance from the health unit, and use of unsafe water. Generally, in rural central districts of Uganda including Mubende district not spared by undernutrition have 9.6% of children 0-59 months are wasted, 18.2% are underweight and 34.2% are stunted (Nahalomo *et al.*, 2018). A study conducted by Tumwine in districts around Mubende district indicates that undernutrition was attributed to not consuming milk, low father's and mother's formal education, not breastfeeding between 12-23 months, diseases such as diarrhea, and low consumption of high-energy foods (Tumwine, 2002).

At Mubende Regional Referral Hospital (MRRH), the proportion of undernourished children as of 2015 was 35% which was attributed to poverty and cultural beliefs (Shallon Atuhaire, 2019), seven years later the indicator has not changed significantly. The above background therefore forms a basis for this study to investigate the specific correlated factors associated with undernutrition (stunting, underweight, and wasting) among children 0-59 months in Mubende district with a focus on Mubende Regional Referral Hospital.

Over the past years, the government and development partners particularly UNICEF have increased resources in the district to address the disease burden including undernutrition, but slow progress is being registered across all core undernutrition indicators.

This study, therefore, examined the specific correlated factors to undernutrition among children 0-59 months of age in Mubende district with special attention to Mubende Regional Referral Hospital and proposed recommendations to address them. The study aimed to determine the factors associated with undernutrition among children 0-59 months in Mubende Regional Referral Hospital, Mubende district.

Methodology

Research design.

This study was a descriptive cross-sectional study that involved the use of both quantitative and qualitative approaches to data collection and analysis.

Study setting

This study was carried out at Mubende Regional Referral Hospital a public health facility. This health facility is located in Mubende district, which is the north-central region of Uganda (UBOS 2016). It is also located at 00°36'N31°24'E. The district of Mubende borders Kyankwanzi district in the north, Kiboga District and Kassanda in the northeast, Mityana district in the east, Gomba and Sembabule district in the southwest, and Kibaale district in the northwest. The health facility is the biggest in the district and this region and it serves a population from all these neighboring districts. The facility itself is located at 0°34'03N, 31°23'35E. It is about 150km west of Mulago National Referral Hospital and 148 km east of Fort Portal Regional Hospital. The approval for the study was obtained in January 2023, data collected in April- May 2023, analyzed in June 2023, and the report submitted in July 2023.

Target population.

The research targeted children in the age group of 0 to 59 months who attended the outpatient care department (OPD) at Mubende Regional Referral Hospital.

Inclusion criteria.

The study included children in the age group of 0 - 59 months who attended the outpatient care department and their caretakers at Mubende Regional Referral Hospital and who consented to the study.

Exclusion criteria.

The study excluded all the malnourished children who required immediate referral, those with caretakers 18 years and below, malnourished children with caregivers who had not stayed with them for more than 3 months, and those malnourished children whose caretakers who failed to comprehend the study.

Sample size determination

Sample size determination: The research sample size was determined using the Kish and Leslie formula (1965) which states that:

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Where $n = z^2 \times p(1-p)/d^2$

n = required sample size; z = standard error of the mean which corresponds to a 95% confidence level (standard value of 1.96); p = 0.24 (24 %) i.e. proportion of children stunted as a proxy indicator for undernutrition. We used a prevalence of 24% based on a study of the routine Ministry of Health data (MoH 2021/22), d = margin of error at 5% (standard value of 0.05), therefore,

$n = 1.96^2 \times 0.24 (1-0.24) / (0.05)^2 = 280$ participants.

A nonresponse factor of 5%=14 respondent

Total sample size estimation = 280 +14 = **294 respondents**

Sampling procedure.

Children in the age group of 0-59 months who met the selection criteria were estimated using last year's 2022 (April-May) OPD register, the total number of children was divided by the estimated sample size resulting in every 3rd child enrolled at OPD being selected to the study.

Participants' enrolment/recruitment process and procedure.

Once the child has been screened for eligibility, and meets the inclusion criteria, the caretaker was informed about the study by the triage team, on acceptancy to participate, she/he was linked to the study recruitment team, upon verbal acceptance and subsequently filling out a written consent form, his/her child was immediately be recruited into the study.

The selected children aged 0-59 months were then screened for malnutrition using weight, height Odema or length, and MUAC.

The caretakers of the selected children were then requested to respond to some questions using a preset questionnaire. These helped to answer the researcher's questions under study.

Each caretaker of the participating child was provided with refreshments worth UGX 5,000/ and UGX 20,000/- each as compensation for their waiting time only when the discussion went beyond the expected time of discussion of 45-60 minutes

Data collection instrument

The following instruments will be used to collect the data

Weighing scale. A balance or scale is a device used to measure weight. For this particular study, a hanging salter scale will be used.

MUAC tape. This is a medical device used to measure the circumference of the arm (MUAC), usually the left but can also be the right, measured at the mid-point between the tip of the shoulder and the tip of the elbow (olecranon process and the acromion).

Height or length board. This is a tool usually constructed based on the ruler with a sliding horizontal headpiece that adjusts to rest on the top of the head of an individual. The instrument measures height or length.

Questionnaire. This is a set of printed or written questions with a choice of answers. The questionnaire will have multiple choices of answers from which the participant will select the most appropriate or most applicable response. This instrument will be intended to provide answers on demographic data, child-related factors, and maternal-related factors as well as male involvement from a female partner-based perspective. This instrument was selected as offers faster, more efficient, and less expense in gathering information. The instrument creates a structured discussion environment, gives respondents the same discussion environment, and reduces the risk of bias in the discussion process.

Administration of instruments.

Measuring weight using a weighing scale. The routinely used scale at the facility was used. This scale was calibrated at the start of the study. The scale was then tightly tied to a horizontal support so that the scale hung in balance at the eye level of the researcher. A weighing pants/basins were cleaned and hung on the scale nob using pant strings/ropes. At this stage, the scale meter was set back/tared to zero, the children who could not stand were dressed in light clothes and no shoes, then put in weighing pants, hanged on the weighing scale, and measurements were read. Those children who could stand were dressed in light clothes and no shoes, made to stand upright on the scale and measurements were then red. The readings were documented to the nearest 100 gm (0.1kg).

Measuring MUAC using MUAC tape.

This was done as follows, determining the mid-point between the elbow and the tip of the shoulder (acromion and olecranon) on the left flexed arm.

Placed the tape measure around the left arm (the arm is hanging down the side of the body and is relaxed).
Measured the MUAC. Read the measurement from the window of the tape, with the right tension (without tightening the tape or leaving the tape loose).

Recorded the MUAC to the nearest 1 mm (or 0.1 cm)
A colored MUAC tape was preferred for color codes as well, recording the color zone within the window; Green (normal), Yellow (moderate), or Red (severe).
Repeat the measurement to ensure an accurate measurement

Measuring height or length using a height or length board:

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This was done as follows.
The child stood erect & barefooted on a height board with a movable headpiece. The headpiece was leveled with a skull vault & height was recorded to the nearest 0.5cm**,** for children less than 85 cm, their length was taken**.**

Figure 1: Illustration of how to take MUAC of the child

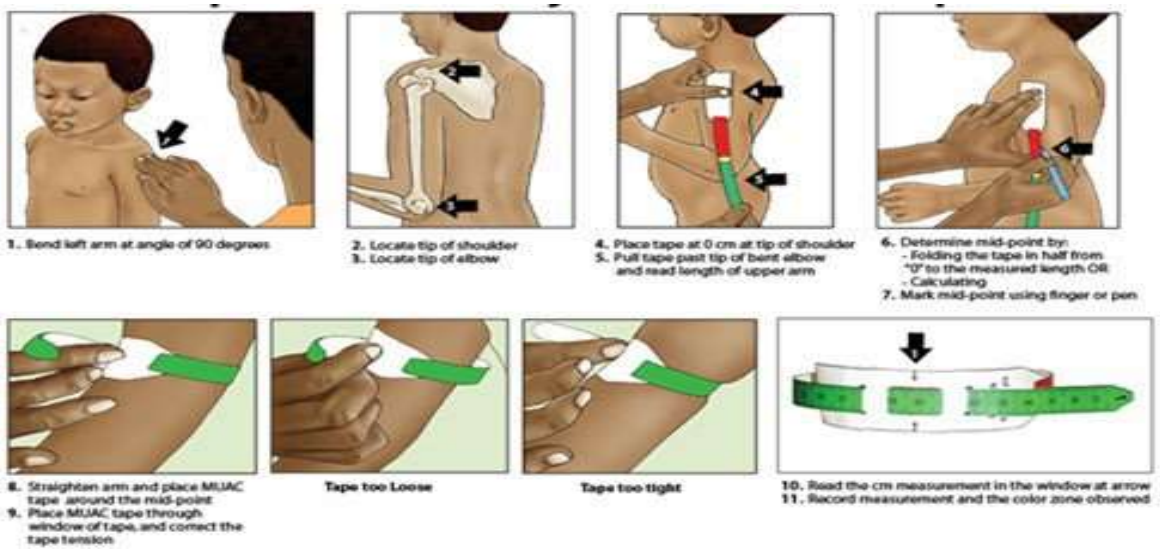

Table 1: Categorizing malnutrition levels in children using MUAC

Group	Severe Acute Malnutrition (SAM)	Moderate acute malnutrition (MAM)	Normal
Children 6-59 months	<11.5 cm	≥ 11.5 to < 12.5 cm	≥ 12.5cm

Source: IMAM guidelines 2020

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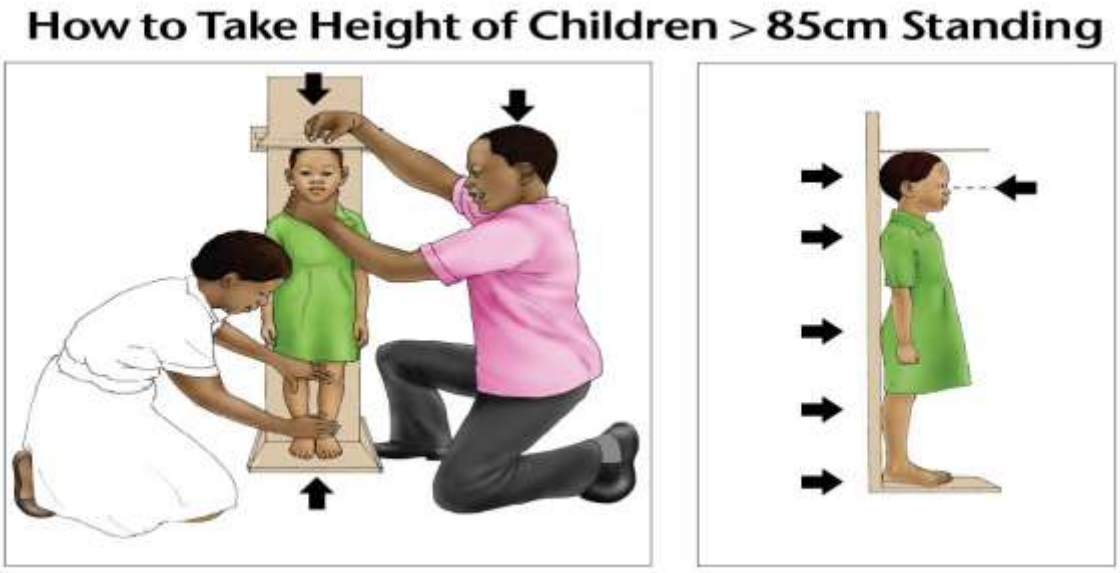
Figure 2: Demonstrating how to measure Height



Questionnaire 2 was administered to caretakers who appeared with the child at the facility for care. This tool with questions having multiple choices of responses was administered to the respondents by the researcher, this was literally because of high levels of illiteracy in the area of study, and the inability to read and or understand simple in English or the local language in which this tool was written. The researcher documented all the responses provided by the respondent during the interview session. The questionnaire was set to last for 30-45 minutes beyond which the respondents were entitled to a waiting time allowance and a refreshment

All respondents were required to consent to the study by signing a consent form attached.

Data analysis procedure

Data collected was analyzed for frequency and percentages and displayed using the statistical package of social scientists (SPSS version 21), Microsoft Excel spreadsheet, and ENA Smart, for those children less than 6 months their data will be analyzed separately using the WHO anthropometric tool. Information was summarized in the form of Numbers, percentages, bar charts, and tables to give descriptive statistics for easy understanding. Further anthropometry technique is used to assess the malnutrition status of under-five children (Gibson; 2005). Child variables including weight, height/length, sex, and age were entered in the Epi Info7 software nutrition module to generate measurement indices of weight-for-age, height-forage, and weight-for-height. The indices generated were compared with standard reference values for WHO Child Growth Standards and CDC 2000 to obtain the Z-scores. This was done automatically by the Epi Info program. Only three indices were used and included wasting, stunting, and underweight

Validity and reliability of research instruments

Validity: This study was discussed and approved by the research supervisor as well as technical colleagues both in research and Nutrition circles to ensure that the design was well formulated.

Reliability: The researcher utilized research assistants with medical backgrounds and who could speak the local language so that interpretation of tools became lighter for them, similarly, these research assistants underwent a day's training to ensure that they got used to the tools and their requirements. Furthermore pre-testing of instruments was done in a facility near MRRH to ensure that the team gets hands-on experience.

Ethical considerations

The study was conducted upon approval by the supervisor, Faculty of Agriculture of Uganda Christian University. The approval letter was then presented to the Hospital management of MRRH who acknowledged receipt and gave nodes up for the study. The participants were explained the importance of their participation in the study and the possible benefits of the

findings to their communities. Informed consent/assent was sought from them.

RESULTS

Social demographics

The majority of the children (67.6%) were females and males were nearly half the number of females (32.4). A large number of mothers were aged 7-24 months (70.6%) and a very small percentage of the children (13.3%). Slightly more than half of the mothers (51.1%) had attained a primary level of education with only a few mothers (5.5%) who had attained a tertiary education level. A large percentage of about 68.3% were peasants while 6.8% were engaged in another kind of work, half of the children were of birth interval 1-2 (50.2%). The majority of the mothers had their firstborn when they were <19 years (51%) and a very small percentage of mothers had them when they were >=40 years old (0.3%).

To determine the prevalence of undernutrition in children 0-59 months

The overall prevalence of global malnutrition based on weight for height z-score was 11.6%. On the other hand, its prevalence based on sex was 11.7% and 11.6% for boys and girls respectively.

The table indicates that the overall prevalence combined GAM and SAM based on WHZ and MUAC cut-offs was 25.9% and that according to sex was 22.1%, and 27.8% for boys and girls respectively. The prevalence of overall GAM in regards to wasting, underweight, and stunting was 11.6%, 10.6%, and 8.2% respectively. On the other hand, the prevalence of GAM in regards to wasting, being underweight, and stunting by sex was 11.7%,11.6%,15.8%, and 11.6%,10.1%,4.5% for boys and girls respectively

There was no association between undernutrition categories ie wasting, stunting, underweight, and child age category since their P-value (0.32, 0.34, and 0.08) respectively is > 0.05 level of significance.

From Table 7, there is a significant relationship between exclusive breastfeeding, age of family food initiation, continued breastfeeding, sickness history in the last 6 months, and child age i.e. *(p=0.02, 0.03, 0.00, 0.00)* respectively. However, there was no significant relationship between early breastfeeding initiation and age with a P= 0.14)

Related to child sex, there is a significant relationship between exclusive breastfeeding and continued breastfeeding and child sex with the P-values of (p=0.07, P=0.08) respectively, however, there was no relationship between early breastfeeding initiation, history of sickness in the last six months, and child sex since their p-values are >0.05 level of significance i.e. *p=0.17, 0.23,* 0.83) respectively.

From Table 8A, the findings reveal that there was a significant relationship between child helper/ caretaker (P=0.03, 0.01, 0.00), age of the mother at first born (P=0.00, 0.00, 0.02), maternal education (P=0.03, 0.02, 0.00) and maternal occupation (P=0.03, 0.00, 0.01) and nutritional status (wasting, stunting and underweight respectively) since its P-value was <0.05 level of significance.

Tablem table 8B, the findings reveal that there was no association between the undernutrition category ie wasting, stunting, underweight and maternal marital status, maternal antenatal attendance, family household size, household land possession, and household land size since all their P-value is >0.05 level of significance.

To assess the role of male involvement in addressing undernutrition among children 0-59 months

A large percentage of males (42%) were more engaged in the purchase of family food. On the other hand, the lowest percentage of men (9.2%) was those who didn't participate in any of the above activities.

From Table 9, the relationship between wasting and land purchase was significant with a P-value of <0.05 (0.005) However was no relationship between wasting and male involvement in all other activities since their P-value>0.05.

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Table 2: Socio-demographic characteristics

Demographic characteristics		Frequency	Percent
Sex of children	Girls	198	67.6
	Boys	95	32.4
AGE CATEGORY	0-6	39	13.3
	,7-24	207	70.6
	25-59	47	16.0
BIRTH INTERVAL	1-2	147	50.2
	3-4	94	32.1
	5+	52	17.7
BIRTH ORDER	<2	118	40.3
	3-4	124	42.3
	5+	51	17.4
AGE OF FIRST-BORN BIRTH	<19	150	51
	20-29	126	43
	30-39	16	6
	40+	1	0
EDUCATION LEVEL OF THE MOTHER	No formal education	35	11.9
	Primary	152	51.9
	Secondary	90	30.7
	Tertiary	16	5.5
MARITAL STATUS	Married	250	85.3
	Single	23	7.8
	Separated	19	6.5
	Widowed	1	0.3
OCCUPATION	Peasant	200	68.3
	Business	51	17.4
	Civil servant	22	7.5
	Others	20	6.8
	Total	293	100.0

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Table 3: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex.

	All n = 293	**Boys** n = 93	**Girls** n = 198
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(34) 11.6 % (8.5 - 15.8 95% C.I.)	(11) 11.7 % (6.7 - 19.8 95% C.I.)	(23) 11.6 % (7.9 - 16.8 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(22) 7.2 % (4.8 - 10.7 95% C.I.)	(7) 6.4 % (3.0 - 13.2 95% C.I.)	(15) 7.6 % (4.6 - 12.1 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(13) 4.5 % (2.6 - 7.5 95% C.I.)	(5) 5.3 % (2.3 - 11.9 95% C.I.)	(8) 4.0 % (2.1 - 7.8 95% C.I.)

Table 4: Prevalence of combined GAM and SAM based on WHZ and MUAC cut-offs (and/or edema) and by sex*

	All n = 293	**Boys** n = 95	**Girls** n = 198
Prevalence of combined GAM (WHZ <-2 and/or MUAC < 125 mm and/or oedema)	(76) 25.9 % (21.3 - 31.2 95% C.I.)	(21) 22.1 % (14.9 - 31.4 95% C.I.)	(55) 27.8 % (22.0 - 34.4 95% C.I.)
Prevalence of combined SAM (WHZ < -3 and/or MUAC < 115 mm and/or oedema	(44) 15.0 % (11.4 - 19.6 95% C.I.)	(14) 14.7 % (9.0 - 23.2 95% C.I.)	(30) 15.2 % (10.8 - 20.8 95% C.I.)

Table 5: Prevalence of GAM for stunting, underweight, and wasting based on height-for-age z-scores and by sex.

Wasting	**All n = 293**	**Boys n = 95**	**Girls n = 198**
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(34) 11.6% (8.5 - 15.8 95% C.I.)	(11) 11.7% (6.7 - 19.8 95% C.I.)	(23) 11.6% (7.9 - 16.8 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(22) 7.2% (4.8 - 10.7 95% C.I.)	(7) 6.4% (3.0 - 13.2 95% C.I.)	(15) 7.6% (4.6 - 12.1 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(13) 4.5% (2.6 - 7.5 95% C.I.)	(5) 5.3% (2.3 - 11.9 95% C.I.)	(8) 4.0% (2.1 - 7.8 95% C.I.)
Underweight	**n = 293**	**n = 95**	**n = 198**
Prevalence of underweight (<-2 z-score)	(31) 10.6% (7.6 - 14.6 95% C.I.)	(11) 11.6% (6.6 - 19.6 95% C.I.)	(20) 10.1% (6.6 - 15.1 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(26) 8.9% (6.1 - 12.7 95% C.I.)	(7) 7.4% (3.6 - 14.4 95% C.I.)	(19) 9.6% (6.2 - 14.5 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(5) 1.7% (0.7 - 3.9 95% C.I.)	(4) 4.2% (1.6 - 10.3 95% C.I.)	(1) 0.5% (0.1 - 2.8 95% C.I.)
Stunting	**n = 293**	**n = 95**	**n = 198**
Prevalence of stunting (<-2 z-score)	(24) 8.2% (5.6 - 11.9 95% C.I.)	(15) 15.8% (9.8 - 24.4 95% C.I.)	(9) 4.5% (2.4 - 8.4 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(24) 8.2% (5.6 - 11.9 95% C.I.)	(15) 15.8% (9.8 - 24.4 95% C.I.)	(9) 4.5% (2.4 - 8.4 95% C.I.)

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Prevalence of severe stunting (<-3 z-score)	(0) 0.0% (0.0 - 1.3 95% C.I.)	(0) 0.0% (0.0 - 3.9 95% C.I.)	(0) 0.0% (0.0 - 1.9 95% C.I.)

Table 6: Prevalence of malnutrition by age category

Undernutrition categories		Age/Months 0-6	7-24	25-59	P-value
Wasting	SAM	2 (0.7%)	2 (0.7%)	1 (0.3%)	0.32
	MAM	5 (1.7%)	18 (6.1%)	3 (1.0%)	
Stunting	Moderate	5 (1.7%)	14 (4.8%)	5 (1.7%)	0.34
Underweight	Severe	5 (1.7%)	6 (2.0%)	3 (1.0%)	0.08
	Moderate	4 (1.4%)	14 (4.8%)	3 (1.0%)	

Table 7: showing the relationship between child-related and caregiver's socio-economic factors associated with undernutrition among children 0-59 months

IYCF Practices		Age/Months 0-6	7-24	25-59	P-value	Sex Girls	Boys	P-vaLue	Overall
Early breast-feeding initiation	Yes	35 (11.9%)	180 (61.4%)	43 (14.7%)	0.14	178 (60.8%)	80 (27.3%)	0.17	258 (88.1%)
	No	4 (1.4%)	27 (9.2%)	3 (1.0%)		20 (6.8%)	14 (4.8%)		34 (11.6%)
	Don't know	0 (0.0%)	0 (0.0%)	1 (0.3%)		0 (0.0%)	1 (0.3%)		1 (0.3%)
Exclusive breastfeeding	Yes	17 (5.8%)	138 (47.1%)	30 (10.2%)	0.02*	132 (45.1%)	53 (18.1%	0.07	185 (63.1%)
	No	22 (7.5%)	69 (23.5%)	17 (5.8%)		66 (22.5%)	42 (14.3%)		108 (36.9%)
Age of family food initiation	<6 months	6 (2.0%)	56 (19.1%)	15 (5.1%)	0.003	45 (15.4%)	32 (10.9%)	0.08	77 (26.3%)
	At 6 months	17 (5.8%)	120 (41.0%)	21 (7.2%)		115 (39.2%)	43 (14.7%)		158 (53.9%)
	>6 months	16 (5.5%)	31 (10.6%)	11 (3.8%)		38 (13.0%)	20 (6.8%)		58 (19.8%)
CONTINUED BREASTFEEDING	Yes	2 (0.7%)	16 (5.5%)	13 (4.4%)	0.00*	21 (7.2%)	10 (3.4%)	0.23	31 (10.6%)
	No	7 (2.4%)	92 (31.4%)	29 (9.9%)		80 (27.3%)	48 (16.4%)		128 (43.7%)
	NA	30 (10.2%)	99 (33.8%)	5 (1.7%)		97 (33.1%)	37 (12.6%)		134 (45.7%)
Sickness history in last 6 months	1-2	33 (11.3%)	121 (41.3%)	36 (12.3%)	0.00*	130 (44.4%)	60 (20.5%)	0.83	190 (64.8%)
	>3	4 (1.4%)	77 (26.3%)	5 (1.7%)		56 (19.1%)	30 (10.2%)		86 (29.4%)
	None	2 (0.7%)	9 (3.1%)	6 (2.0%)		12 (4.1%)	5 (1.7%)		17 (5.8%)

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Table 8A: Showing the relationship between household socio-demographics and nutritional status

		Wasting		P-value	Stunting	P-value	Underweight		P-value	Total
		MAM	SAM		Moderate		Moderate	Severe		
CARETAKER	Helper	1 (0.3%)	0 (0.0%)	0.03*	0 (0.0%)	0.01*	0 (0.0%)	0 (0.0%)	0.00*	12 (4.1%)
	Mother	22 (7.5%)	4 (1.4%)		19 (6.5%)		14 (4.8%)	11 (3.8%)		255 (87.0%)
	Grandmother	3 (1.0%)	0 (0.0%)		3 (1.0%)		7 (2.4%)	2 (0.7%)		22 (7.5%)
	Other	0 (0.0%)	1 (0.3%)		2 (0.7%)		0 (0.0%)	1 (0.3%)		4 (1.4%)
AGE OF FIRST-BORN BIRTH	<19	15 (5.1%)	2 (0.7%)	0.00*	13 (4.4%)	0.00*	14 (4.8%)	9 (3.1%)	0.02*	150 (51.2%)
	20-29	10 (3.4%)	3 (1.0%)		10 (3.4%)		6 (2.0%)	5 (1.7%)		126 (43.0%)
	30-39	1 (0.3%)	0 (0.0%)		0 (0.0%)		1 (0.3%)	0 (0.0%)		16 (5.5%)
	40+	0 (0.0%)	0 (0.0%)		1 (0.3%)		0 (0.0%)	0 (0.0%)		1 (0.3%)
EDUCATION	No formal	4 (1.4%)	2 (0.7%)	0.03*	5 (1.7%)	0.02*	3 (1.0%)	5 (1.7%)	0.00*	35 (11.9%)
	Primary	14 (4.8%)	2 (0.7%)		13 (4.4%)		11 (3.8%)	7 (2.4%)		152 (51.9%)
	Secondary	8 (2.7%)	1 (0.3%)		4 (1.4%)		7 (2.4%)	2 (0.7%)		90 (30.7%)
	Tertiary	0 (0.0%)	0 (0.0%)		2 (0.7%)		0 (0.0%)	0 (0.0%)		16 (5.5%)
OCCUPATION	Peasant	22 (7.5%)	4 (1.4%)	0.02*	17 (5.8%)	0.00*	19 (6.5%)	11 (3.8%)	0.01*	200 (68.3%)
	Buisness	4 (1.4%)	1 (0.3%)		4 (1.4%)		2 (0.7%)	3 (1.0%)		51 (17.4%)
	Civil servant	0 (0.0%)	0 (0.0%)		1 (0.3%)		0 (0.0%)	0 (0.0%)		22 (7.5%)
	Other	0 (0.0%)	0 (0.0%)		2 (0.7%)		0 (0.0%)	0 (0.0%)		20 (6.8%)

Table 8B: Showing the relationship between household socio-demographics and nutritional status

MARITAL STATUS	Married	24 (8.2%)	4 (1.40%)	0.60	19 (6.5%)	0.79	17 (5.8%)	11 (3.8%)	0.152	250 (85.3%)
	Single	0 (0.0%)	0 (0.0%)		3 (1.0%)		1 (0.3%)	0 (0.0%)		23 (7.8%)
	Separated	2 (0.7%)	1 (0.30%)		2 (0.7%)		3 (1.0%)	3 (1.0%)		19 (6.5%)
	Widowed	0 (0.0%)	0 (0.0%)		0 (0.0%)		0 (0.0%)	0 (0.0%)		1 (0.3%)
ANC ATTENDANCE	1-4	16 (5.5%)	4 (1.4%)	0.72	13 (4.4%)	0.50	17 (5.8%)	11 (3.8%)	0.082	195 (66.6%)
	5-8	8 (2.7%)	1 (0.3%)		9 (3.1%)		2 (0.7%)	2 (0.7%)		85 (29.0%)
	>8	2 (0.7%)	0 (0.0%)		1 (0.3%)		2 (0.7%)	1 (0.3%)		8 (2.7%)
	None	0 (0.0%)	0 (0.0%)		1 (0.3%)		0 (0.0%)	0 (0.0%)		HOUSEHOLD
HOUSEHOLD SIZE	1-4	12 (4.1%)	2 (0.7%)	0.81	11 (3.8%)	0.66	10 (3.4%)	4 (1.4%)	0.239	147 (50.2%)
	>5	14 (4.8%)	3 (1.0%)		13 (4.4%)		11 (3.8%)	10 (3.4%)		146 (49.8%)
LAND POSSESSION	Yes	22 (7.5%)	5 (1.7%)	0.33	23 (7.8%)	0.03*	16 (5.5%)	14 (4.8%)	0.128	229 (78.2%)
	No	4 (1.4%)	0 (0.0%)		1 (0.3%)		5 (1.7%)	0 (0.0%)		64 (21.8%)
LAND SIZE	<2	16 (5.5%)	3 (1.0%)	0.20	12 (4.1%)	0.69	10 (3.4%)	10 (3.4%)	0.144	135 (46.1%)

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Figure 2: Showing male involvement in addressing under nutrition among children 0-59 months

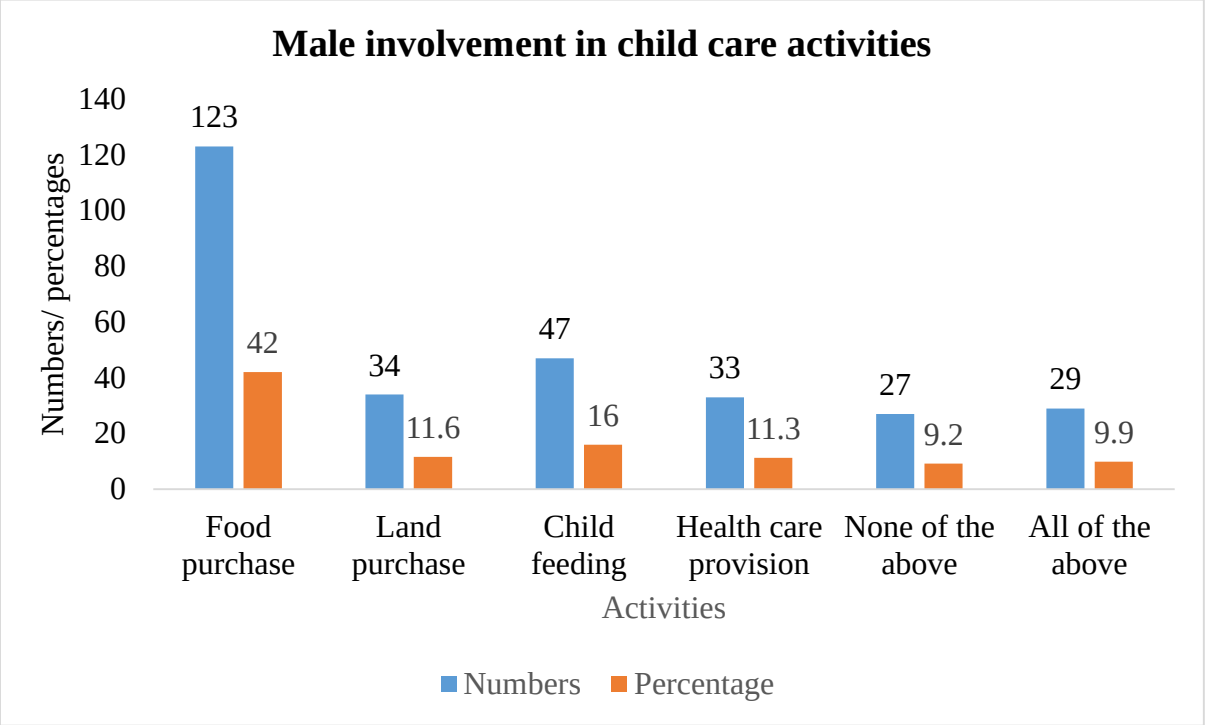

Table 9: Relationship between stunting and many male involvement activities

Activities	Normal	Stunting Moderate	Severe	P-value
Food purchase	109(88.6%)	9(7.3%)	5(4.1)	**0.856**
Land purchase /ownership	29(85.3%)	4(11.8%)	1(2.9)	**0.005**
Child feeding	44(93.6%)	3(6.4%)	0	**0.334**
Health care provision	29(87.9%)	1(3.0%)	3(9.1%)	**0.172**
None of the above	25(92.6%)	1(3.7%)	1(3.7%)	**0.826**
All of the above	27(93.1%)	1(8.4%)	1(8.4%)	**0.777**

Table 10: Relationship between wasting and male involvement activities

Activities	Normal	Wasting moderate	Severe	P-value
Food purchase	113(91.9%)	6(4.9%)	4(3.8%)	**0.146**
Land purchase /ownership	23(67.6%)	7(20.6%)	4(11.8%)	**0.00**
Child feeding	44(93.6%)	0	3(6.4%)	**0.160**
Health care provision	27(81.8%)	2(6.1%)	4(12.1%)	**0.315**
None of the above	25(92.6%)	0	2(7.4%)	**0.371**
All of the above	25(86.2%)	3(10.3%)	1(3.4%)	**0.518**

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Table 11: Relationship between underweight many male involvement activities

Activities	Normal	Underweight moderate	Severe	P-value
Food purchase	111(90%)	10(8.1%)	2(1.6%)	**0.346**
Land purchase /ownership	27(79.4%)	4(11.8%)	3(8.8%)	**0.009**
Child feeding	45(95.7%)	2(4.3%)	0	**0.225**
Health care provision	28(84.9%)	3(9.1%)	2(6.1%)	**0.618**
None of the above	25(92.6%)	2(7.4%)	0	**0.590**
All of the above	25(862%)	1(3.4%)	3(10.3%)	**0.072**

From the table above, the only significance was identified in land purchase or ownership at a P-value of 0.000. There is no relationship between underweight and many male involvement activities since all their P-values are >0.05 level of significance.

From Table 11, the only significance was identified in land purchase or ownership at a P-value of 0.009. There is no relationship between underweight and many male involvement activities since all their P-values are >0.05 level of significance.

DISCUSSION OF RESULTS

Prevalence of under nutrition of children 0-59 months attending Mubende Regional referral hospital, Mubende district.

Stunting

In this study, the stunting was 8.2%. This was much lower than Uganda's stunting rate of 29% representing 3 in every 10 children in Uganda (UBOS, 2016). Furthermore, these results were much lower than the results from a cohort study on the effect of inappropriate complementary feeding practices on the nutritional status of children aged 6-24 months in urban Moshi, Northern Tanzania where the overall proportion of stunting, was 20.7%. The variation in prevalence between these studies could have been because there was a difference in the study population, study design, and sample size.

Wasting

The prevalence of wasting was 11.6%, This was almost thrice the national prevalence of wasting for children under 5 years which currently stands at 4% (UBOS, 2016). This could be because of the time this study was commissioned, this was planting season for most crops in the region which resulted from seasonal changes in the area. Probably most of the seeds were being reserved for planting not for food leading to the wasting of these children.

Underweight

The prevalence of underweight was 10.6%. This prevalence was nearly similar to the national level statistics (UBOS, 2016) which indicated that the prevalence of underweight for children under 5 years stands at 11%, this means that the factors such as caretakers of the children, age at first birth of the mother, maternal education and occupation contributing to underweight as identified from this study may be similar factors affecting underweight across other regions to be reflected at the nation level. Furthermore, this prevalence was slightly higher than 10% according to the Health Management Information System report from Mubende Regional Referral Hospital (HMIS 2020/21). This similarity in these results which still reflects high figures may further stem from the fact that the community has poor health-seeking practices as well lack of active community structures to detect early and refer children underweight for management.

Relationship between child-related and caregiver's socio-economic factors with under nutrition among children 0-59 months.

Maternal education

There was a significant relationship between maternal education and a child's nutrition status category i.e. wasting, stunting, and underweight since their P-value was less than 0.05 level of significance. This was in agreement with the results from a study done by Nkurinziza where children whose mothers had no education were more likely to be stunted (*p* less than 0.001) than those whose mothers reached secondary school and above (Nkurunziza *et al.*, 2017). That might be because maternal education affects complementary feeding and provision of complementary foods which is essential for child growth, still, education of the mother about complementary feeding led to an added weight gain of 0.30 kg (± 0.26) and a gain of 0.49 cm (± 0.50) in height in the intervention group compared to control (Imdad, Yakoob and Bhutta, 2011)

Marital status

This study found that there was no significant relationship between maternal marital status and child's nutrition status

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category i.e. wasting stunting and underweight since their P-value was greater than 0.05 level of significance i.e. 0.60, 0.79, and 0.152 respectively, findings from this study deviate from a study on determinants of stunting and severe stunting among Burundian children aged 6-23 months by Nkurinziza where marital status of the mother was found to be associated with severe stunting ie (*p* equals 0.001), (Nkurunziza *et al.*, 2017). This result is probably because most children who come to this hospital are from rural settings where mothers/caretakers usually stay with their spouses or parents but usually not alone creating on much room for feeling married or not.

Maternal occupation

This study's findings reveal that there was a significant relationship between maternal occupation and a child's nutritional status in regards to stunting, wasting, and underweight with P values of 0.00, 0.02, and 0.01 respectively. These findings agree with the study done by Gilbert in the Nakaseke and Nakasongola districts in which results showed that stunted children were from peasant farmers. Gilbert categorically stated that children whose mothers were pastoralists (OR equals 0.12) were less likely to be stunted, unlike their counterparts whose mothers were peasant farmers. Furthermore, these results agree with a study according to Nkurinziza on the determinants of stunting and severe stunting among Burundian children aged 6-23 months which stated that children from poor households were more likely to be stunted compared to all other wealthier categories (p less than 0.001), (Nkurunziza *et al.*, 2017). The above studies suggest that maternal occupation has a big contribution to the nutrition status outcomes, this is because occupation is the source of childhood provisions including feeding

Maternal age of firstborn birth

Several studies have reported that a mother's age at birth is one of the most important determinants of malnutrition among under-five children. It has been suggested that the risk is greater in younger mothers particularly those below 24 years because they are not ready to take care of the child including providing all the necessary attention required for the baby(citation). Similarly, under-five malnutrition is higher also among children whose mothers give birth when they are older, especially after 35 years (Gilbert, 2014). This was in agreement with the P-value for stunting (0.005) which was less than 0.05 level of significance indicating that there was a significant relationship between stunting and maternal age of firstborn birth. The above studies are in agreement with results from this study regarding wasting and underweight since their P-value was less than 0.05 level of significance at a p-value of 0.00, 0.00, and 0.02 for wasting, stunting, and underweight respectively

Relationship between roles of male involvement with under nutrition among children 0-59 months.

This study noticed that a large percentage of males (42%) were more engaged in the purchase of family food, this agreement with a study by Kansiime *et al,2017* that noted male partners(93.6%) among many household activities to address childhood nutrition they provided money to buy food for the children (Kansiime *et al.*, 2017). Further analysis revealed that there was no relationship between stunting, wasting, underweight with most male involvement in childcare activities since their P-values were greater than 0.05 level of significance, except for land purchase/ownership which had a P-value of greater than 0.05 (0.005, 0.000, 0.009) level of significance for stunting, wasting and underweight respectively. Land in this region is a hot cake for most people like any other region in Uganda. Land plays a big role in nourishing people more so children. Land availability and accessibility are a source of food security for households.

CONCLUSION.

The prevalence of under nutrition in Mubende Regional Referral Hospital regarding wasting, underweight, and stunting was 11.6%, 10.6%, and 8.2% compared to central Uganda statistics of 9.6%, 18.2% 34.2% (Nahalomo *et al.*, 2018) and national level figures of 4%, 11% and 29% respectively (UBOS, 2016). There was a significant association between the under nutrition category i.e. wasting, stunting, underweight and caretaker of the child, age of maternal firstborn birth, maternal education status, maternal marital status, maternal occupation, maternal antenatal attendance, occupation of the caretaker of the child, and land ownership, these are in agreement with several studies conducted from different scholars

RECOMMENDATIONS

Government through the ministry of health

Strengthening maternal education levels, with the introduction of Universal primary and secondary education, every individual is recommended to undergo these basic education levels to reduce further the levels of malnutrition

Strengthening household income levels incoming. Using government-initiated programs like Bonabagagawale, Emyoga, and Parish development model and wealth creation to be linked for food security more so for children to reduce the current provenances

Put in place Behavioral change communication interventions such as awareness creation campaigns targeting males and their involvement in appropriate infant feeding practices.

Mothers/caretakers.

Mothers are encouraged to participate in antenatal and postnatal visits and growth monitoring programs for them to acquire adequate knowledge of infant and young child feeding practices.

Mothers are recommended to engage in the establishment of backyard gardens as a way to improve the nutrition status of their children

Research academia

Future studies are recommended to be carried out with males to deeply understand their roles in addressing malnutrition in the region

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List of Abbreviations

MoH: Ministry of Health
MRRH; Mubende Regional Referral Hospital
MUAC: Mid Upper Arm Circumference
OPD: Outpatient department
UNICEF: United Nations International Children's Funds
WHO: World Health Organization

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