PatternsandFactors Associated With Acute Undernutrition amongHospitalized Children Six Month toTwelveYears inPaediatric Ward ofKampala International University Teaching Hospital

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Abstract.
Background: Undernutrition is a major developmental concern in Uganda, affecting all regions equally. It has been known as the skeleton in the hospital closet because it's overlooked, undiagnosed and untreated by health practitioners. Most studies done on undernutrition had been public facility and community based, as far as we are aware of, none had been private facility based. The study described the burden, patterns and the socio-demographic factors associated with acute undernutrition in hospitalized children on the paediatric ward of KIUTH.
Methods: A hospital based cross-sectional descriptive and analytical study was conducted in paediatric ward of Kampala International University Teaching Hospital between January and May 2017. Structured interviews were administered to caregivers of children aged 6 month to 12 years admitted on the ward. Data collected included socio-demographic characteristics, anthropometric measurement. Univariate, bivariate and multivariate logistic regression analysis was done to find the socio-economic factors associated with acute undernutrition.
Results: 379 caregiver-children pair were studied. 150(39.6%) 95%CI 34.8-44.6 children were undernourished. Children who stayed with non-biological caregivers were 3.13 at risk of acute undernutrition (aOR 3.13, 95%CI 1.03-9.51, p=0.04), those from Buhweju district were 20.80 times at risk of acute undernutrition (aOR 20.80, 95%CI 2.04-211.60, p=0.01). Children whose caregivers had no level of formal education were 3.07 times at risk of acute undernutrition than those who had primary level of formal education (aOR 3.07, 95%CI1.38-6.83, p=0.006). Likewise those who resided in semi-permanent houses were 3.01 times more likely to have acute undernutrition than those from permanent houses (aOR 3.01, 95%CI1.45-6.25, p=0.003).
Conclusion: The proportion of children with undernutrition in this paediatric ward was high. Hospital need to create a nutritional unit. Children with none-biological caregivers, Buhweju and whose caregivers have no formal education, those from semi-permanent houses need to have a more comprehensive nutritional assessment whenever they present to the hospital for care.
Keywords: Patterns;Factors; Undernutrition; 6month to 12 years, Paediatric ward and Kampala International University Teaching Hospital.

I. Background To The Study

The term malnutrition generally refers both to under nutrition and over nutrition [1] According to World Health Organisation, malnutrition is defined as the cellular disparity between the supply of nutrients and energy and the body needs to ensure growth and maintain specific functions [2].Malnutrition is often used precisely to refer to under nutrition where there is not enough calories, protein, or micronutrients [3], this will to apply to this dissertation. Under nutrition is occasionally used as a substitute of protein–energy malnutrition, for which two forms exist, which are edematous (kwashiorkor) and none edematous protein energy malnutrition

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(marasmus), and they commonly coexist [4].Worldwide its estimated that undernutrition accounts for 54 percent of mortality in children [5], and it's also estimated that eighty percent of undernourished children living in the developing countries live in countries that produce plenty of food [6]. Of the 34 countries that account for 90% of the global burden of undernutrition, 22 are in Africa, and out of that 52 million children are acutely undernourished, 13.8 million live in sub-Saharan Africa [7].According to UNICEF 2015, eastern and southern Africa had 25million (40%) of children under five of age were suffering from stunting also referred to as chronic undernutrition, in addition 18% of the under-fives were underweight and 7% were suffering from chronic undernutrition[8].Undernutrition is a major developmental concern in Uganda, affecting all regions of the country and most segments of the population. Our country is worryingly hit by undernutrition, were 29% and 4% of our children below five years are chronically and acutely undernourished respectively [9].Undernutrition has been shown to cause damage to our cells, physical appearance and also psychologically [10]. This damage is dependent on many factors, including the patient's age, gender, type and duration of illness, and current nutritional intake.

Undernutrition adds additional stress on health care facilities. As previously stated, undernourished patients often have increased chances of getting infections and pressure ulcers, require more medications, and are dependent on caregivers due to muscle loss and subsequently have longer 3 duration of hospital stay [11]. [12],in a peri-urban environment in Kabarole district in western Uganda, described the prevalence and factors associated with undernutrition in under-fives, [13],assessed by cross-sectional study undernutrition in Ugandan children with cerebral palsy in those above five years of age. Most of the aforementioned studies on undernutrition have been done in the community and in public clinical settings. As far as we were aware, no studies had been done in a private clinical setting to describe the burden of undernutrition, demographics of children, caregivers and the contribution of such facilities in the care of children with undernutrition, which this study aimed to find out in our paediatric ward.

II. Methods
Study Design, Site and Study Population.
This was a hospital based cross-sectional descriptive and analytical study to estimate the proportion of children with undernutrition, describe the patterns of undernutrition among childrenand to describe the socio-economic factors associated with acute undernutrition among children admitted on pediatric ward of KIUTH.The study was conducted on the pediatric ward of KIUTH. KIUTH is located in Ishaka- Bushenyi municipality approximately 319.7km from Kampala, via Mbarara (**www.distancebetween.com**). KIUTH is private hospital and one of the referral hospitals in western Uganda started in 2008. It is a teaching hospital for Kampala international University, it's a specialized hospital with the following departments: Pediatrics, Internal medicine, Surgery, Obstetrics and Gynecology, and other clinics all headed by professors and some by specialist. Patients seen in 2015 where 22975,it trains health workers. Pediatric Ward had a team of HCWs that comprised on average 11 nurses, 3 interns doctors, 1 medical officer, 7 Medical residents, 3 Pediatricians and 2 Professors, it had a total of 2500 under-fives and 1293 children above five years in 2015. On average there were about 30 patients admitted at any one time in the ward. Averagely 8-10 admissions per day.Children above 6 month to 12 years who were admitted in Pediatric ward KIUTH from January 2017 were consecutively enrolled until when the sample size was attained. The study participants were adult care givers attending to the children.

III. Study Procedure
All the children who were admitted on the ward were assessed for eligibility after the primary reason for admission had been taken care of and any urgent resuscitation (if required) had been done. The purpose of the study was first fully explained to the caregiver, who was then requested to sign a written informed consent statement or used a thumb print for those who couldn't write in order to participate in the study, the study would only commence after the child's major reason for admission had been taken care of. The caregiver-children pair who met the inclusion criteria were taken to the doctor's room within the ward where the interview was carried out. Data including the caregiver and child's demographics were collected.
Anthropometric measurements.
Anthropometric data included, weight, height, and length; age, which was obtained from the child's health card and birth certificates, and care givers recall if they had neither of the two.
Weight for height/Length.
This is an indicator for wasting (acute undernutrition), it was used to classify undernutrition as moderate and severe acute undernutrition according to WHO z-score for both boys and girls.
Height/Length for Age.
This was an indicator for stunting, it was used to classify undernutrition as moderate and severe stunting according to WHO z-score for both boys and girls.

Body Mass Index (BMI).

The body mass index were calculated for children above 5 years to assess their nutritional status. This was calculated using the formula, BMI= (weight in Kg)/ (Height in squared meters). The interpretation was as per the WHO reference charts.

IV. Data Management

Data from pre-coded and completed questionnaires were entered using statistical computer package software Microsoft excel 2016, it was cleaned, checked for errors, corrected and was then exported to STATA version 14, for analysis and summarized in frequency tables. To describe the factors associated with acute undernutrion, we preformed bivariate followed by multivariate logistic regression analysis. Factors with a p-value less than 0.2 on bivariate logistic regressionanalysis were subjected to multivariate logistic regression. Factors with p-value of less than 0.05 were considered to be statistically significant.

V. Results

Study participants.

A total of 508 children were admitted to the paediatric ward of Kampala International University Teaching Hospital from 1st January to 20th May 2017. One hundred and twenty nine (25.39%) were excluded from the study because they didn't fit the age group 89(17.50%), escaped 7(1.38%), died 7(1.38%), or where referred prior to enrolment into the study 26(5.17%). None of the caregivers refused to consent to participate into the study. Three hundred seventy nine caregiver-children pairs met the inclusion criteria and were consecutively enrolled into the study.

Figure 1 Patient flow chart.
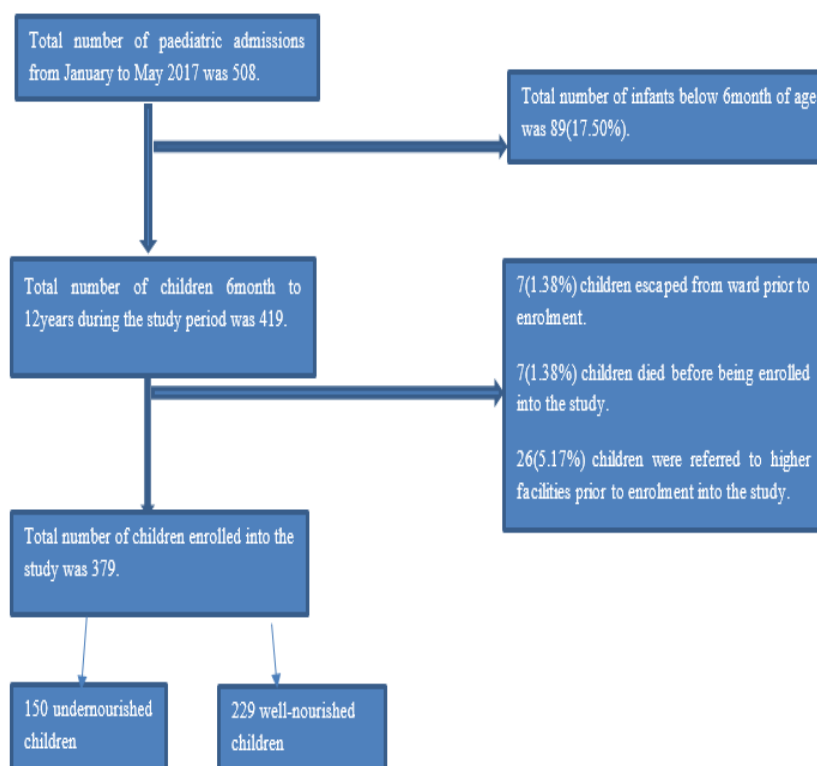
Socio-demographic characteristics of caregivers.

The socio-demographic characteristics of 379 caregivers are shown in Table 1. The majority 337(88.9%) were females with most 226(59.63%) having age range of 21-30 years. Most caregivers 351(92.61%) were married, peasants 231(60.95%) and Anglican 151(39.84%). 316(83.38%) of the caregivers were mothers and 30(7.92%) were fathers of the children. The majority 202(53.30%) of the caregivers had attained primary education as their highest level of formal education, 160(42.22%) had a monthly income less than Ushs 100,000. Most, 256(67.5%) resided in rural areas and 187(49.87%) stayed in permanent houses.

Table 1 Socio-demographic characteristics of the caregivers (January to May 2017).

Characteristics	Frequency(N=379)	Percentage.
Age.		
18-≤20years	29	7.65
21-30years	226	59.63
≥31years	124	32.72
Sex.		
Female	337	88.90
Male	42	11.10
Marital Status.		
Married	351	92.61
Widowed	6	1.58
Others	22	5.81
Occupation.		
Peasant	231	60.95
Business	55	14.51
Formal	47	12.45
Others	46	12.14
Religion.		
Anglican	151	39.84
Catholic	146	38.52
Moslem	41	10.82
Born Again	21	6.33
Others	17	4.49
Education.		
None	36	9.50
Primary	202	53.30
Secondary	96	25.33
Tertiary	45	11.87
Monthly Income.		
None	107	28.23
Less 100000	160	42.22
100000-500000	106	27.92
Above 5000000	6	1.58
Residence		
Rural	256	67.55
Urban	83	21.90
Semi-Urban	40	10.55
House.		
Permanent	189	49.87
Semi-Permanent	190	50.13

Socio-demographic characteristics of the children.

The socio-demographic characteristics of 379 children are shown in Table 2. Two hundred twelve (55.9%) were males. The majority, 155(40.90%) was 13-36 month of age, and 332(87.60%) stayed with both parents. Most of children, 271(71.50%) resided in Bushenyi district. Children with more than three siblings were, 320(84.43%) and 354(93.40%) had a birth order of 1-5.

Table 2 Socio-demographic characteristics of the children (January to May 2017)

Characteristics	Frequency(N=379)	Percentage
Age.		
≤12month	112	29.55
13-36month	155	40.90
≥37month	112	29.55
Sex.		
Female	167	44.10
Male	212	55.90
Family.		
Both Parents	332	87.60
Single Parent	28	7.39
None Biological Parent Relative	19	5.02
District.		
Bushenyi	271	71.50
Sheema	6	1.58
Rubirizi	44	11.61
Buhweju	4	1.06
Mitooma	44	11.61
Others	10	2.64
Sibling.		
≤3	320	84.43
>3	59	15.57

Birth Order.		
1-5	354	93.40
6-10	23	6.07
11	2	0.53

Proportion of children with undernutrition.
Of the three hundred and seventy nine (379) children who were enrolled into our study, 150(39.58%) with 95% CI 34.8-44.6 were undernourished.

Patterns of undernutrition in children.
Pattern of undernutrition is shown in Table 3. The patterns of undernutrition in our study were classified into two (2), acute and chronic undernutrition as presented in the table.

Table 3. Patterns of undernutrition in children (January to May 2017).

Patterns.		Frequency	Percentage
Acute Undernutrition		**50**	**13.19**
1	Moderate Acute Undernutrition.	21	5.54
2	Severe Acute Undernutrition.	29	7.65
	a. Oedematous.	14	3.69
	b. None Oedematous.	15	3.96
Chronic Undernutrition (Stunting).		**100**	**26.38**
1	Moderate Stunting.	67	17.68
2	Severe Stunting.	33	8.70

Of the one hundred and fifty children (150) with undernutrition, 50(13.72%) had acute undernutrition which was further divided into two categories, moderate acute undernutrion 21(5.54%) and severe acute undernutrition 29(7.65%). Amongst children with severe acute undernutrition, 14(3.69%) had oedema and 15(3.96%) none oedematous severe acute undernutrition. One hundred 100(26.38%) children had chronic undernutrition or stunting, 67(17.68%) had moderate stunting and 33 (8.70%) children had severe stunting.

Table 3. Bivariate logistic regression analysis of child factors associated with acute undernutrition (January to May 2017).

VARIABLE	ACUTE UNDERNUTRITION		cOR	95%CI	P-Value
	NO(N=329)	YES(N=50)			
Sex.					
Male	180	32	1.00		
Female	149	18	0.68	0.37-1.26	0.22
Age.					
13-36month	134	18	1.00		
≤12month	94	21	1.22	0.62-2.41	0.57
37-60month	77	8	0.66	0.28-1.57	0.35
≥61month	24	3	0.80	0.22-2.48	0.73
Family.					
Both Parent	290	42	1.00		
Single Parent	26	3	0.99	0.29-3.55	0.98
Relative	13	5	2.66	0.90-7.83	0.08
District.					
Bushenyi	237	34	1.00		
Sheema	5	1	1.39	0.16-12.2	0.77
Rubirizi	38	6	1.00	4.32-2.79	0.84
Buhweju	1	3	**20.91**	2.11-206.60	**0.009**
Mitooma	38	6	1.10	0.43-2.80	0.84
Others	10	0			
Sibling Number					
≤3	278	42	1.00		
>3	51	8	1.02	0.46-2.34	0.93
Birth Order					
1-5	306	28	1.00		
≥6	23	2	1.83	0.44-7.46	0.40

cOR= Crude odds ratio. CI= Confidence interval.
Table 3 shows bivariate logistic regression of child factors associated with acute undernutrition. Children who came from Buhweju district were 20.91 times more likely to have acute undernutrition than those from Bushenyi district (cOR 20.91, 95%CI 2.11-206.60: p=0.009). Childrens age, gender, children with relative caregiver, more than 3 siblings and birth order 6 and above, were not found to be significantly associated with acute undernutrition.

Table 4. Multivariate logistic regression analysis of child factors associated with acute undernutrition (January to May 2017).

VARIABLE	ACUTE UNDERNUTRITION		aOR	95%CI	P-Value
	NO(N=329)	YES(N=50)			
Family.					
Both Parent	290	42	1.00		
Single Parent	25	3	0.94	0.27-3.36	0.93
Relative	14	5	**3.13**	1.03-9.51	**0.04**
District.					
Bushenyi	237	34	1.00		
Sheema	5	1	1.10	0.12-10.13	0.92
Rubirizi	38	6	1.10	0.42-2.85	0.85
Buhweju	1	3	**20.80**	2.04-211.60	**0.01**
Mitooma	38	6	1.11	0.43-2.86	0.83
Others	10	0			

aOR=Adjusted odds ratio. CI= Confidence interval.

Table 4 above shows multivariate logistic regression analysis of child factors which was independently associated with acute undernutrition among children admitted on paediatric ward of KIUTH. Factors found to have a p-value less than 0.20 with occurrence of acute undernutrition at bivariate logistic regression analysis were considered together in a multivariate analysis. Three (3) child variables were considered in multivariate logistic regression, these were age of children, district of residence and family setting. Through a stepwise regression with removal of least significant variable in each step, family setting and district of residence remained significantly associated with acute undernutrition. Children whose caregivers were other relatives (none biological parent caregivers) were 3.13 times more likely to have acute undernutrition than those who stayed with both parents (aOR 3.13, 95%CI 1.03-9.51, p=0.04). Likewise those who resided in Buhweju district were 20.80 times more likely have acute undernutrition than those from Bushenyi district (aOR 20.80, 95%CI 2.04-211.60, p=0.01).

Table 5 shows bivariate logistic regression analysis of caregiver factors associated with of acute undernutrition in children admitted on the paediatric ward of Kampala International University Teaching Hospital. The factors that were significantly associated with acute undernutrition were; educational level, house of residence, occupational level and monthly income of caregiver. Children whose parents had no level of formal education were 3.35 times more likely to have acute undernutrition than those whose parents had primary level of formal educational (cOR 3.35, 95%CI 1.53-7.33, p=0.003). Those who resided in semi-permanent houses were 3.71 times more likely to have acute undernutrition than those from permanent houses (cOR 3.71, 95%CI 1.87-7.35, p<0.000). Children of peasant caregivers, were found to be 5.05 times more likely to have acute undernutrition as compared to those whose parents had business (cOR 5.05, 95%CI 1.18-21.65, p=0.03) and also those whose parents did other occupations which included Boda, waitress, bar attendants, carpentry and tailoring were found to be 5.58 times more likely to have acute undernutrition than those whose parents occupation was business. Children whose parents received a monthly income of less than 100000 Ushs were 2.41 times more likely to have acute undernutrition than those whose parents received 100000-500000 Ushs per month (cOR 2.41, 95%CI 1.05-5.56, p=0.04).

Table 5. Bivariate logistic regression analysis of caregiver factors associated with acute undernutrition (January to May 2017).

VARIABLE	ACUTE UNDERNUTRITION		cOR	95%CI	P-value
	NO(n=329)	YES(n=50)			
Age.					
21-30years	199	27	1.00		
18-≤20years	26	3	0.80	0.24-3.00	0.80
≥31years	104	20	1.42	0.76-2.64	0.27
Sex.					
Female	291	46	1.00		
male	38	4	0.46	0.23-1.95	0.45
Occupation.					
Business	53	2	1.00		
Peasant	194	37	**5.05**	1.18-21.65	**0.03**
Formal	44	3	1.81	0.29-11.30	0.53
Others	38	8	**5.58**	1.12-27.76	**0.04**
Education.					
Primary	174	26	1.00		
None	24	12	**3.35**	1.53-7.33	**0.003**
Secondary	90	8	0.34	0.13-0.91	0.03
Tertiary	41	4	0.60	0.20-1.81	0.37
Religion.					

Anglican	129	23	1.00		
Catholic	123	22	1.00	0.53-1.89	0.99
Moslem	40	1	0.14	0.02-1.07	0.06
Born again	22	2	0.51	0.11-2.32	0.38
Others	15	2	0.75	0.16-3.49	0.71
Marital status.					
Married	308	43	1.00		
Widowed	4	2	0.28	0.05-1.57	0.15
Others	17	5	0.36	0.12-1.07	0.07
Monthly income.					
100000-500000	103	9	1.00		
<100000	135	25	**2.41**	1.05-5.56	**0.04**
None	91	16	2.11	0.80-5.16	0.10
Residence.					
Rural	217	39	1.00		
Urban	76	7	0.51	0.22-1.19	0.12
Semi-urban	36	4	0.62	0.21-1.83	0.39
House.					
Permanent	177	12	1.00		
Semi-permanent	152	38	**3.71**	1.87-7.35	**0.000**

cOR=Crude odds ratio. CI=Confidence interval.

Table 6 shows multivariate logistic regression analysis of caregiver factors which was conducted to establish the socio-economic factors independently associated with acute undernutrition in children admitted on paediatric ward of KIUTH. Factors with p-value less than 0.20 with occurrence of acute undernutrition at bivariate logistic regression analysis were considered together in a multivariate analysis. Seven (7) caregiver variables were considered in multivariate logistic regression, these were occupation, education, religion, marital status, residence, house and monthly income, to determine factors that were independently associated with acute undernutrition in children. Through a stepwise logistic regression with removal of least significant variable in each step, educational level and house of residence remained significantly associated acute undernutrition in children. Children whose caregivers had no level of formal education were 3.07 times more likely to have acute undernutrition than those whose parents had primary level of formal education (aOR 3.07, 95%CI 1.38-6.83, p=0.006). Likewise children who resided in semi-permanent houses were 3.01 times more likely to have acute undernutrition than those from permanent houses.

Table 6. Multivariate logistic regression analysis of caregiver factors associated with acute undernutrition in children (January to May 2017).

	ACUTE UNDERNUTRITION				
VARIABLE	**NO(n=329)**	**YES(n=50)**	**aOR**	**95%CI**	**P-value**
Education.					
Primary	174	26	1.00		
None	24	12	**3.07**	1.38-6.83	**0.006**
Secondary	90	8	0.44	0.16-1.19	0.11
Tertiary	41	4	0.97	0.13-3.12	0.97
House.					
Permanent	177	12	1.00		
Semi-permanent	152	38	**3.01**	1.45-6.25	**0.003**

aOR =Adjusted odds ratio. CI= Confidence interval.

VI. Discussion

Proportion of children with undernutrition.

The proportion of undernutrition in our study was 39.6% (95%CI 34.8-44.6). This was the first study done in a private hospital in Uganda as far as we are aware of to estimate proportion of undernutrition amongst hospitalized children. In Mwanza region, north western Tanzania, [14], conducted a study on the prevalence ofundernutrition, in under five children in a district hospital, this study estimated the proportion at 30%, this was less than that in our study, this could have been that our study was done in a referral hospital rather than a district hospital, which receives many referrals fromperipheral health facilities and also manages children with different medical conditions as compared to a district hospital and therefore this leads many children with undernutrition being enrolled into the study, leading to a higher proportion of undernutrition.

[15]also carried out a study on the prevalence of undernutrition among children admitted to Bugando medical center in Mwanza Tanzania, there study estimated the proportion at 55.8%. The difference could have been that Bugando Hospital had a larger paediatric ward with a bed capacity of 89 beds, whereas KIUTH is a 50 bed capacity paediatric ward and therefore they admitted more children than KIUTH, also Bugando had a fully functional nutritional facility which is lacking in our hospital therefore they didn't have to refer patients with

acute undernutrition with complications, all this translated into an increased number of undernourished children who were later on enrolled into the study leading to a higher proportion than the one found by our study.

Patterns of undernutrition.

The patterns of undernutrition in our study were predominantly stunting 26.39% and acute undernutrition or wasting 13.97%. This trend was in agreement with a study in the general paediatric ward at the Chris Hani Baragwaneth hospital Johannesburg, South Africa which found that stunting was the most common 40.5%, and wasting 23.4% [16]. Though they found a slightly higher prevalence. The difference could have been because Chris Hani hospital is the 3rd largest hospital in the world, and largest in Africa, with a general paediatric ward bed capacity of 408, compared to ours with 50 beds. This implies they admitted more children, received referrals from peripheral hospitals, and had a functional nutritional facility, all this translated into a higher proportion of children with chronic and acute undernutrition than the one in our study. [17]in a single hospital study from Malaysia, they found that 14% of the admitted children were stunted and 11% had acute undernutrition, this too was in agreement with trend in the patterns of undernutrition in our study, but they had a lower value compared to ours, the difference could have been due to the age groups used in the two studies were they considered children from 3month to 15 years as compared to ours were we enrolled children from 6month to 12 years. Basing on the above studies, the trends in the patterns of undernutrition is similar, with chronic undernutrition (stunting) as the commonest, implying that children are normally exposed to an increased period of nutritional deprivation in all these settings where the studies were carried out.

Socioeconomic Factors Associated With Acute Undernutrition.

Our study also found out that educational level of the caregiver played a role in the nutritional status of children. Children whose caregivers had no level of formal education were more likely to have acute undernutrition compared to those whose caregivers had primary level of formal educational. This was in agreement with a study by [18] they found that lack of formal education by caregivers had 2.46 times high risk and significant association with severe acute undernutrition, this was through a cross-sectional facility based, in Ethiopia. Studies have also showed that there was a strong linkage between caregiver's education and children's health, according to [19].Children born to educated caregivers suffered less from acute undernutrition which manifested as wasting or oedematous, caregiver education has been associated with nutrition outcomes among children in Jamaica, according to [20]; in Bolivia, by [21] and Kenya, by [22]. [23] stressed three ties through which education might affect child health, which in our study lead to undernutrition. She found that formal education of caregivers directly transferred health awareness to future caregivers, also the knowledge and skills that caregivers acquired in school improve their ability to recognize diseases and seek treatment for their children and are better able to read medical instructions for treatment of childhood illness and apply the treatment appropriately. Also, increased number of years in school made caregivers more receptive to modern medicine. Other studies have found a strong link between caregiver education, social economic status and child nutritional status. This was because educated caregivers were expected to get steadier, get higher paying jobs; get married to men with higher education and higher income; and to live in better neighbourhoods, which had influence on child health and survival [21].

Our study also found that children who stayed with other none biological parent relative caregivers were 3.13 times more likely to have acute undernutrition. In a Malawian study on undernutrition in orphans by [24],he found that orphans were more at risk than none orphans at 54.8% and 30% respectively. This can also be explained in that other none biological parent relative caregiver would spend more time on feeding, giving psychosocial support and good medical care to their own children and devote less time to children who were not theirs in the long run predisposing them to acute undernutrition.

Children who resided in semi-permanent houses were more likely to have acute undernutrition than their counter parts from permanent houses. This can be explained in that living in permanent house is associated with a high socio-economic class in that they can afford to pay for nutritious foods for their children and afford good medical care for the children if they became unwell, well aware that all these factors can lead to acute undernutrition if not managed early. According to a study by [25],they found that most children in the shantytowns unlike in the non-slum areas resided in non-permanent or single room apartments and this group significantly contributed to the higher percentage of the undernutrition. Other studies in Africa and beyond reporting similar findings have attributed this disparity to differences in the social class in the areas studied which influenced the overall living standard, type of housing, quality of education, affordability of adequate food, and appropriate health services.

This study too found that children who resided in Buhweju were more likely to have acute undernutrition. [26], found that stunting rates were even higher in Buhweju County (55.6%) compared to 36.3% in Igara County. This agrees partly with our study that undernutrition is high in Buhweju. Buhweju being a hard to reach area predisposes children to acute undernutrition in that they are far away from good medical services

in case they fall sick, their parents little or no access to appropriate information as pertain to how to feed there children in order to prevent development of acute undernutrition.

VII.   Conclusions.

The proportion of undernutrition among children admitted in our paediatric ward was high. None-biological parent relative caregivers, no level of formal education, semi-permanent house and residing in Buhweju district were independently associated with acute undernutrition in children. Chronic undernutrition was the commonest pattern of undernutrition in children admitted on the paediatric ward.

We therefore recommend that in the future, children who have caregivers with no level of formal education, residing with none-biological parent relatives, living in a semi-permanent house and those who resided in Buhweju will need further nutritional scrutiny and assessment. We also recommend that additional factors in Buhweju that make there children susceptible to acute undernutrition should be described in subsequent undernutrition study.

The paediatric department, together with the hospital administration should open up nutritional facility to care for children with acute undernutrition, because the proportion of children with severe acute undernutrition was high, yet it is a paediatric emergency.

Acknowledgements

Availability of data and materials
Important data for this paper are contained in the manuscript. Individual patients' data are not shared in this work due to ethical reasons.

Authors' contributions
Richard Justin Odong principal investigator designed the study, carried out data collection all under the supervision of Barnabas R Atwiine. All other authors were fully involved in writing the manuscript and all have approved the final manuscript for submission.

Competing interests
All authors declares that they have no competing interests.

Consent for publication
Not applicable.

Ethics and consent to participate
Approval was sought from the Research and Ethical committee of Kampala International University and Mbarara University of Science and Technology Institutional Review Committee and from the department of pediatrics where the research was carried out. An informed consent and assent form was signed by parents/care takers before conducting the study. All children were assessed for eligibility and enrolled into the study after the reason for hospitalization was taken care of.

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