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Research Article

Nutritional Status of Children Aged Between 6-59 Months in Mlimba Division, Kilombero District, Tanzania: Examining the Prevalence and Risk Factors

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Abstract

Background

Child malnutrition remains a major public health problem in developing countries and major contributor to global disease burden. Malnutrition is often a part of a vicious cycle of poverty, illiteracy and infections.

Childhood malnutrition is as a result of several factors that are often related to inadequate dietary intake, poor food quality and recurrent infectious diseases like diarrhoea, and lower respiratory tract infections.

Objectives

To determine the prevalence of childhood malnutrition and its associated factors among children aged 6-59 months in Mlimba division, Kilombero district, Tanzania.

Methodology

This was a descriptive cross sectional community based survey conducted in the 3 wards of Mlimba division in October 2017. The study assessed the prevalence and risk factors of malnutrition of children under 5 years old in Mlimba division. The sample size of the study was 345 children under 5 years old. A structured questionnaire was administered to parents and caretakers to obtain information on social economic status, morbidity and weaning practices. Anthropometrical measurements of weight and length were conducted in order to get those children who were undernourished. The equipment's used were Salter scales and supine length boards respectively. Pearson correlation, and risk measures were used in the analyses. Statistical Package for Social Sciences (SPSS) version 17 was used to analyse data to determine anthropometric indices: Height for age, Weight for Height and Weight for age.

Results

The prevalence of stunting, underweight and wasting in under 5 year old children in Mlimba division were 31.6%, 3.2% and 1.2% respectively. The study revealed no significant relationship between stunting and morbidity, large households with more than 4 people and stunted children, also no association was found between stunting and education of the mother, mother's income and time weaning started.

Conclusion

The status of malnutrition in children under 5 years old in Mlimba division is below national average, the efforts of the prevention program have shown some significant improvement.

Introduction

Child malnutrition remains a major public health problem in developing countries and major contributor to global disease burden [1]. It is the underlying cause of more than 2.6 million child deaths each year worldwide, a third of child deaths globally [2]. It is recognized as the underlying cause of related deaths of childhood disease such as measles, diarrhoea, and acute respiratory infectious diseases [3]. Many affected children indeed survive but suffer lifelong physical and cognitive impairments due to early macro and micronutrient deficiencies. Children with poor cognitive development in early life especially the first a thousand days are at risk of developing poor neurological functions, poor school performance, early school dropout, low skilled employment and poor care of their own children, thus creating a vicious cycle of intergenerational transmission of poverty [4,5]. Malnutrition contributes to 50% of all child deaths and 11% of the total

global disability-adjusted-life-years worldwide. Geographically, 70-80% of undernourished children worldwide live in lower and middle income countries, including Tanzania [6]. Undernutrition accounts for 45% of deaths of children younger than 5 years, and contributes to more than three million deaths every year [5,7]. Childhood malnutrition results from several factors that are often related to inadequate dietary intake, poor food quality and recurrent infectious diseases like diarrhoea, and lower respiratory tract infections [5]. Growth assessment is the best way of defining the health and nutritional status of a child, because disturbances in health and nutrition, regardless of their etiology, invariably affect child's growth. It also provides an indirect measurement of the quality of life of the entire population sampled [8]. The UN estimates that acute malnutrition affects 8% of children (52 million) across the world (1 in 12 children in this age group) [5,9]. Similarly, the prevalence of wasting among children younger than 5 years is 3.6% (12.9 million) in Asia and 3.3% (18.5 million) in low and middle income countries [10].

Chronic malnutrition and the resultant stunting are associated with increased child morbidity and mortality, reduced physical capacity, reduced economic productivity and poor school performance [11,12]. Intermediate factors include household and social demographic characteristics such as household size and economic status. Immediate causes include the child's age, gender, feeding practices, food preparation and overall health status [13,14].

In 2013, a United Nations report revealed that the proportion of undernourished children in developing countries had declined by 35.8% from 1990 to 2012 [15]. In this report, Tanzania had recorded a reduction of 2% in the same period [15]. However, no study has been conducted to assess the determinants of PEM in Mlimba division. Therefore, the objective of this study was to determine the socio-demographic and economic factors, and child care practice-associated determinants, that may help to strengthen the management of PEM among children aged 6-59 months in Mlimba division, Kilombero district, Tanzania.

Materials and Methods

Study Area

The study was conducted in Mlimba Division, one of the twenty one wards in Kilombero District, Morogoro Region, Tanzania. Mlimba is the division in Kilombero district, in Morogoro Region, covering a total area of 527.46 km2. It has 8 wards and 22 villages. People living in Mlimba are involved in agriculture activities, business, animal keeping and fishing. According to population census of 2012, Mlimba has a total population of 34,969 people of these 19,358 females and 18,752 males.

Study Design

A community based cross-sectional study was conducted in Mlimba division in October 2017.

Study Population

The study population comprised children aged 6 to 59 months in the selected house holds

Inclusion Criteria

All 6 to 59-month- old children in the selected households for whom informed written consent was obtained from the parent(s) or legal guardian(s)

Exclusion Criteria

Children for whom informed consent was not given.
Children who were not residents of the household (those visiting)

Sample Size Estimation

The sample size (n) was calculated by using the formula adopted from Kirkwood (2011) as follows:

$$N=\frac{z^2p(1-p)}{e^2}$$

Whereby;
N= sample size
Z= standard normal deviation of 1.96 corresponding for 95% confidence interval.
P= proportion of the target population estimated.
E= margin error
The following are their values;
Z= 1.96 (95% confidence interval)
P= 34% (according to Nutritional survey 2014)
E= 5%

The calculation resulted in a sample of 345 children. During sampling, in case a household was found to have no child of the target age, such household was replaced by another nearby household chosen randomly.

Sampling Method

In this study, a multi stage sampling technique was used. Mlimba division was selected from thirty five divisions of Kilombero district, then three wards from Mlimba division which has 8 wards. The selected wards were; Mlimba B, Kalengakeru and Kamwene. According to the calculated sample size of 345, of these 115 under five children were selected from each ward. The household was used as a sampling unit. Data were collected through measurement of weight/height and interpretation was done using Z-score (mild malnutrition ≤1SD, moderate malnutrition ≤2SD and severe malnutrition ≤3SD). The socio-demographic data were obtained using a questionnaire that was completed by interviewing children's parents/caregiver.

Data Collection

Mothers of children who were willing to participate in this study were interviewed using structured questionnaire. Information collected included: socio-demographic characteristics, child feeding practices. Assessment of child feeding practices included 24-hours dietary recall of all foods and drinks given. Child age was obtained from birth certificates, clinic cards or mother's recall. Where a household had two or more children in the target age group or twins, one child was selected randomly. The decision to enroll one child in a household was based on the fact that nutritional and health outcomes of siblings are likely to be related due to similarity in parental care, availability and quality of food within the household.

Physical signs were used to determine potential protein energy malnutrition, these were: low body weight, wasting and oedema.

Anthropometric Assessment

The anthropometrical indices used were:

• **Height-for-age (H/A):** Height-for-age allows us to compare a child's height with the reference height of children of the same age and sex.

• **Weight-for-height (W/H):** Weight-for-height is an expression of weight in relation to height, or an index of body mass.

• **Weight-for-age (W/A):** The W/A index is the most used index in assessing nutrition status of children.

Children of both sexes aged 6-59 months, were measured for height (cm) and weight (kg) to assess nutritional status. Weight was measured on a weighing scale (Standard SECA weighing scale, Hamburg, Germany). Height was measured with a portable Harpenden stadiometer (Hotain Ltd, London, UK). Readings were made to the nearest 0.1 cm. Adherence to the measuring techniques and recording procedures were observed to reduce measurement error. An assessment of bilateral oedema was done. The researcher gently applied pressure on the feet of children using the thumb. Children showing the print of the thumb after three seconds were considered to have oedema.

Data Analysis

Statistical Package for Social Sciences (SPSS) version 17 was used to analyse data. Descriptive statistics such as frequencies, percentages and means were used to obtain the variability and central tendencies of variables. The weight and height measurements were converted into three summary indices of nutritional status: Weight-for-height (wasting) and weight-for age (underweight) and height- for- age (stunting) according to WHO criterion based on Standard Deviation (SD) units (termed as Z scores). Thus, wasting was defined as weight-for-height Z score less than -2, underweight as weight for age Z score less than -2 and stunting as height-for-age Z score less than -2. The analysis was performed using ENA for SMART (2011) software.

Ethical Consideration

Permission was sought from St. Francis University College of Health and Allied Science (SFUCHAS) administration, District Executive Director (DED) Kilombero district, District Medical Officer (DMO) Kilombero district and local authorities of Mlimba division. Verbal consent to participate in the study was obtained from mothers to affirm the willingness to participate in the study.

Results

Socio-Demographic Characteristics

A total of 345 mothers and guardians participated in the study. Of these 95.7% were female. Most of them (45.8%) were between 25 and 34 years old while 30.7% were below 20 years. More than half of them (79.9%) had primary school education and 17.7% completed secondary school education. Most of the household size is 4-6 persons (52.2%). The majority are engaged in agricultural activities (78.8%) (Table1). The household expenditure in this study was below Tsh2200/= per day (90.7%) and 8,1% the expenditure was above Tsh 2200/= per day. In the present study the weaning age of children was 6 months (46.1%). Most of the children involved in this study were found to have been ill from malaria and few of them diarrhoea.

Table 1: *Socio-demographic characteristics of mothers and guardians (n=345)*

Variable	Category	Frequency	Percent (%)
Status of respondent	Mother	308	89.3
	other than mother	37	10.7
Sex of respondent	Female	330	95.7
	Male	15	4.3
Age of respondent	15-24	106	30.7
	25-34	158	45.8
	35-44	54	15.7
	45-54	18	5.2
	55-64	7	2.0
	65-74	2	0.6
Education level	Primary education	276	79.9
	secondary education	61	17.7
	Post-Secondary education	7	2.0
Household members	1-3	115	33.3
	4-6	180	52.2
	7-10	50	14.5
Occupation	Farmers	272	78.8
	Employed in formal sector	27	7.8
	Self-employed	34	9.9
	Others	10	2.9

Distribution of Age and Sex of Children in the Study

The bigger number of children who were involved in the study was boys with the age between 30-41 months (24.3%) and girls 18-29 months (22.9%) (Table 2).

Table 2: *Distribution of age and sex of children involved in the study*

	Boys		Girls		Total	
Age(months)	**no.**	**%**	**no.**	**%**	**no.**	**%**
6-17	40	51.3	38	48.7	78	22.6
18-29	31	39.2	48	60.8	79	22.9
30-41	47	56.0	37	44.0	84	24.3
42-53	37	49.3	38	50.7	75	21.7
54-59	13	44.8	16	55.2	29	8.4
Total	168	48.7	177	51.3	345	100.0

Nutritional Status of Children

The present study included 345 under-five children (168 boys and 177 girls). Prevalence of stunting (height-for- age Z score <-2), underweight (weight-for-age Z score <-2) and wasting (weight- for- height Z score <-2) were 31.6%, 3.2% and 1.2% respectively (Tables 3,4,5). Pearson correlation was used to estimate the association.

Stunting Based on Height-for-Age z-Scores

In the present study the age group which was affected with severe stunting was between 18-29 months were 25 (31.6%) (Table3).

Table 3: *Prevalence of stunting based on height-for-age z-scores*

	Normal (> = -2 z score)		Moderate stunting (>= -3 and <-2 z-score)		Severe stunting (<-3 z-score)		
Age (mo)	**No.**	**%**	**No.**	**%**	**No.**	**%**	**Total no.**
6-17	44	56.4	19	24.4	15	19.2	78
18-29	34	43.0	20	25.3	25	31.6	79
30-41	44	52.4	19	22.6	21	25.0	84
42-53	42	56.0	15	20.0	18	24.0	75
54-59	9	31.0	8	27.6	12	41.4	29
Total	173	50.1	81	23.5	91	26.4	345

Underweight Based on Weight-for-Age z-Scores

Out of 345 participants only 1 (0.3%) participant was found to have severe underweight and 10 (2.9%) moderate underweight. Thus, 11 (3.2%) of the participants were underweight (Table 4).

Table 4: *Prevalence of underweight based on weight-for-age z-scores*

		Severe under-weight (<-3 z-score)		Moderate underweight (>= -3 and <-2 z-score)		Normal (> = -2 z score)	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	77	0	0.0	0	0.0	77	100.0
18-29	79	0	0.0	2	2.5	77	97.5
30-41	84	1	1.2	4	4.8	79	94.0
42-53	74	0	0.0	2	2.7	72	97.3
54-59	27	0	0.0	2	7.4	25	92.6
Total	341	1	0.3	10	2.9	330	96.8

Wasting Based on Weight-for-Height z-Scores

The participants found to have oedema were 4(1.2%), all of these were girls (Table5).

Table 5: *Prevalence of wasting based on weight-for-height z-scores*

	All n = 345	**Boys** n = 168	**Girls** n = 177
Prevalence of malnutrition (<-2 z-score and/or oedema)	(4) 1.2 %	(0) 0.0 %	(4) 2.3 %
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(0) 0.0 %	(0) 0.0 %	(0) 0.0 %
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(4) 1.2 %	(0) 0.0 %	(4) 2.3 %

Household Members

Household members: WAZ: Pearson correlation is 0.056 and p= 0.302. The association is statistically not significant. HAZ: Pearson correlation is -0.035 and p= 0.513. The association is statistically not significant. WHZ: Pearson correlation is 0.086 and p= 110. The association is statistically not significant (Table 6).

Table 6: *Number of household members*

		Weight to Age Z score	Height to Age Z score	Weight to Height Z score	Members of household
	Pearson Correlation	1	.379**	.620**	.056
	Sig. (2-tailed)		.000	.000	.302
		345	345	345	345
Height to Age Z score	**Pearson Correlation**	.379**	1	-.473**	-.035
	Sig. (2-tailed)	.000		.000	.513
	N	345	345	345	345
Weight to Height Z score	**Pearson Correlation**	.620**	-.473**	1	.086
	Sig. (2-tailed)	.000	.000		.110
	N	345	345	345	345
Members of household	**Pearson Correlation**	.056	-.035	.086	1
	Sig. (2-tailed)	.302	.513	.110	
	N	345	345	345	345

**. Correlation is significant at the 0.01 level (2-tailed)

Household Expenditure

Household expenditure: WAZ: Pearson correlation is -0.003 and p= 0.958. The association is not statistically significant. HAZ: Pearson correlation is 0.096 and p= 0.075. The association is statistically not significant. WHZ: Pearson correlation is -0.081 and p= 0.135. The association is statistically no significant (Table 7).

Table 7: *Household expenditure per person*

Association between household expenditure per person and PEM		Household expenditure average	Weight to Age Z score	Height to Age Z score	Weight to Height Z score
Household expenditure average	Pearson Correlation	1	-.003	.096	-.081
	Sig. (2-tailed)		.958	.075	.135
	N	342	342	342	342
Weight to Age Z score	Pearson Correlation	-.003	1	.379**	.620**
	Sig. (2-tailed)	.958		.000	.000
	N	342	345	345	345
Height to Age Z score	Pearson Correlation	.096	.379**	1	-.473**
	Sig. (2-tailed)	.075	.000		.000
	N	342	345	345	345
Weight to Height Z score	Pearson Correlation	-.081	.620**	-.473**	1
	Sig. (2-tailed)	.135	.000	.000	
	N	342	345	345	345

**. Correlation is significant at the 0.01 level (2-tailed)

Illness Association to PEM

Illness: WAZ: t-value is -1.594 and p= 0.112. The association is statistically not significant. HAZ: t-value is -0.833 and p= 0.405. The association is not statistically significant.

WHZ: t-value is -0.697 and p=0.486. The association is statistically not significant (Table 8).

Table 8: *Illness association to PEM*

	Any sickness in household for the last two weeks	N	Mean	Std. Deviation	Std. Error Mean
Weight to Age Z score	yes	135	-.43470	.993107	.085473
	no	207	-.27105	.882935	.061368
Height to Age Z score	yes	135	-2.08771	1.446987	.124537
	no	207	-1.96050	1.335238	.092805
Weight to Height Z score	yes	135	1.04024	1.346621	.115899
	no	207	1.14412	1.348504	.093727

Feeding Practices

Weaning age: Pearson correlation is 0.068 and p= 0.210. The association is statistically significant. HAZ: Pearson correlation is 0.034 and p= 0.530. The association is statistically not significant. WHZ: Pearson correlation is 0.049 and p= 0.368. The association is statistically significant (Table 9).

Table 9: *Weaning age*

		Weight to Height Z score	Height to Age Z score	Weight to Age Z score	weaning age
Weight to Height Z score	**Pearson Correlation**	1	-.473**	.620**	.049
	Sig. (2-tailed)		.000	.000	.368
	N	345	345	345	344
Height to Age Z score	**Pearson Correlation**	-.473**	1	.379**	.034
	Sig. (2-tailed)	.000		.000	.530
	N	345	345	345	344
Weight to Age Z score	**Pearson Correlation**	.620**	.379**	1	.068
	Sig. (2-tailed)	.000	.000		.210
	N	345	345	345	344
weaning age	**Pearson Correlation**	.049	.034	.068	1
	Sig. (2-tailed)	.368	.530	.210	
	N	344	344	344	344

**. Correlation is significant at the 0.01 level (2-tailed).

Discussion

In Tanzania and the rest of Sub -Saharan African countries malnutrition is still a major health problem. MDG report 2013, showed that still one in eight people globally did not consume adequate food on regular basis to get their minimum dietary requirements and majority were in developing countries [16].

The objective of the study was to determine prevalence and the factors associated with malnutrition among children aged 6-59 months in Mlimba division. The study was carried out in October 2017 in 3 wards of Mlimba division.

In this study, the prevalence of stunting, underweight and wasting among children age 6 to 59 months were 31.6%, 3.4% and 1.2%, respectively. Prevalence of stunting was lower than the national average of 42% [15]. This could be attributed to the fact that the main economic activity in Mlimba division is food crop farming, there is no scarcity of food throughout the year.

Stunting is recognized as a serious public health problem because it is so common and is considered normal [17]. Children who are deprived of nutrients for health growth are also deprived of nutrients for healthy brain development and health immune systems [18]. Evidence shows associations between concurrent stunting and poor school progress or cognitive ability. For instance, studies in Tanzania and Ghana show that stunted children, compared with non-stunted children, were less likely to be enrolled in school, more likely to enroll late and have poorer cognitive ability or achievement scores [19].

Prevalence of underweight in Mlimba is 3.4% this is lower than national average of 29% and prevalence of wasting in Mlimba is 1.2% also this is lower than national average of 5% [20]. The results of stunting, underweight and wasting among children age 6 to 59 months in Mlimba division is lower than national average. This indicates that there is improved food intake and accessibility of health care.

Malnutrition prevalence was low among children in households with more than four children under five compared to those with less than four children in the age group: WHZ <-2 (1.2 versus 5%), WAZ <-2 (3.2 versus 29%) and HAZ <-2 (31.6 versus 42%). This is consistent with the results of a study done in Iran by Elham Kavosi (2014) [21], to assess prevalence and determinants of under-nutrition in under 6 year children. Food intake and accessibility of healthcare decrease with higher family size especially in low income families. Mothers belonging to households with many children did not have time to care and feed each one of them.

The influence of maternal education could be from various sources amongst them is the impact it has on economic means (higher educated mothers have better jobs and more money) or more directly its influence on childrearing practices since mothers with more education have been observed to provide optimal care for their children. The relationship between maternal education and malnutrition has been studied by Mosha and Philemon (2010) [22], who indicated that low level of education is not only associated with understanding of nutrition and food aspects but also with indirect effects of improvement of socio-economic conditions. In the present study, mothers with primary education were 79.9%, no association with malnutrition of children under 5 years of age was observed in the study area.

In the present study, we did not find any association between severe malnutrition and either sex, age of the child, parent family size, family income, illness or weaning age. The findings in our study are similar to previous studies done [23-25]. The present study is a cross-sectional in nature therefore, limits our ability to make inferences on causation.

Conclusion

The present study attempted to assess the prevalence of malnutrition, identify the factors that influence child nutritional status in Mlimba division. Malnutrition status in children under 5 years of age in Mlimba division is low in terms of stunting, underweight, and wasting. These results suggest that policies and programs aimed at reducing levels of child malnutrition should play particular attention to interventions that cut across sectors because of the diverse nature of the factors that impact child nutritional status. Therefore, determining the magnitude and identifying the risk factors for child undernutrition in the study area is important to guide public health planners, policy makers and implementers to plan and design appropriate intervention strategies in order to enhance nutritional status of children.

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