Journal of Food and Nutrition Research, 2020, Vol. 8, No. 7, 320-328
Available online at http://pubs.sciepub.com/jfnr/8/7/3
Published by Science and Education Publishing
DOI:10.12691/jfnr-8-7-3

Prevalence and Risk Factors of Malnutrition among Children of Ages 6 to 59 Months in Manyovu, Buhigwe District Kigoma-Tanzania

Yvonne Tshiya[1,2,*], Happy Magoha[2]

[1]Nutrition Department, Heri Adventist Hospital, Manyovu, Kigoma Tanzania
[2]Department of Food and Nutrition, Open University of Tanzania, Dar Es Salaam, Tanzania
*Corresponding author: tshiya.yvonner@gmail.com

Received June 18, 2020; Revised July 19, 2020; Accepted July 29, 2020

Abstract Malnutrition among children below 5 years is a recognized problem worldwide and more so in sub-Saharan Africa. This study aimed at finding the prevalence and risk factors of malnutrition among children of ages 6 to 59 months in Manyovu, Buhigwe District Kigoma, Tanzania. Knowledge of the prevalence of malnutrition and their risk factors in the community will serve the purpose of designing and implementing a program that targets this challenge with a view to ameliorating it. A total number of 362 children and their mothers were involved. Anthropometric data of children, breastfeeding practices, 24h dietary recall of both mothers and children and socio demographic/economic status of both parents and children were taken. The findings were as follows: underweight 9.7 %, stunting 43.1%, and 3.6% wasting. The risk factors found to be significant were education level of both parents, and earnings per month of both parents. Breastfeeding and dietary assessment did not have any statistical effect to malnutrition of the children possibly because of poor knowledge of nutrition and feeding practices. The children in the study were already consuming other food and were not only breastfeeding at the time they were recruited in the present study. Therefore, this study confirms the existence of child malnutrition in Manyovu and the surrounding communities. The level of malnutrition in this community is relatively high and requires a closer look with a view to determining strategies for mitigating them.

Keywords: *food frequency, malnutrition, weight for age z-score, weight for height z-score, anthropometric measurements*

Cite This Article: Yvonne Tshiya, and Happy Magoha, "Prevalence and Risk Factors of Malnutrition among Children of Ages 6 to 59 Months in Manyovu, Buhigwe District Kigoma-Tanzania." *Journal of Food and Nutrition Research*, vol. 8, no. 7 (2020): 320-328. doi: 10.12691/jfnr-8-7-3.

1. Introduction

Malnutrition is a big problem the world over particularly in the developing countries. Malnutrition is any condition caused by any excess or deficiency of food energy or nutrient intake or by an imbalance of nutrient [1]. Stunted growth refers to low height-for-age, when a child is short for his/her age but not necessarily thin [2]. Wasted refers to low weight-for-height where a child is thin for his/her height but not necessarily short [2]. Underweight refers to low weight-for-age, when a child can be either thin or short for his/her age [2].

Malnutrition is a challenge in Tanzania and ranks as the 3rd worst affected Country in Africa with respect to malnutrition after Ethiopia and the Democratic Republic of Congo [3]. The Country ranks 10th in its contribution to the World's chronically undernourished [3]. Malnutrition affects 42% of children under five in Tanzania and this rate has fallen only two percentage points since 2005 [4].

In 2015, more than 2.7 million Tanzanian children under 5 years of age were estimated to be stunted and more than 600,000 were suffering from acute malnutrition, of which 100,000 were severe cases [5]. According to 2014 Tanzania profiles deaths attributable to various nutritional problems between 2014 and 2025 if nutritional challenges do not improve include: under 5 deaths due to stunting 580,687, infant deaths due to low birth weight 148,873, child deaths due to Vitamin A deficiency 209,638, deaths amongst children aged under 2 yrs due to suboptimal breastfeeding practices 360,487 [6].

Tanzania nutritional fact sheet indicates that 57 % of babies are not breastfed exclusively, 34% of children under 5 years are stunted, 33% of same under 5 population are vitamin A deficient, 14% are underweight and 5% are wasted [7].

In Kigoma region amongst children under 5 years of age 37.9% are stunted, 6.0% are wasted, 19.4% are underweight, [7]. These are all above national average.

Stunting continues to affect children globally and regionally, it was estimated in 2016 that 22.9 percent or 154.8 million children under five years globally. In the

same 2016, wasting continued to threaten the lives of an estimated 7.7 percent or nearly 52 million children under five years globally [8]. In the same 2016, Stunting affected 37.6 percent of children under five years in East Africa, and the prevalence of wasting among children under five years in East Africa in 2016 was 6.5 percent [8].

Malnutrition and diet are by far the biggest risk factors for the global burden of disease: every country is facing a serious public health challenge from malnutrition. The economic consequences represent losses of 11% of gross domestic product (GDP) every year in Africa and Asia, whereas preventing malnutrition delivers $16 in returns on investment for every $1 spent. The world's countries have agreed on targets for nutrition, but despite some progress in recent years the world is off track to reach those targets. [9].

A lot of work has been done around the world, in developing countries and in Tanzania to determine the prevalence and risk factors of malnutrition [10-16]. All these studies prove the fact that child malnutrition is still a big challenge. The most common form of malnutrition in developing countries is under nutrition with its many long-term effects. Apart from the serious consequences on a person's health, the economy is also affected by under nutrition, because the high prevalence of this condition hinders economic development and perpetuates poverty both directly, through a loss of productivity due to poor physical condition, and indirectly, through poor cognitive function and learning deficits [17].

Food and Nutrition Technical Assistance report in 2014 stated the estimated deaths in Tanzania attributable to various nutritional problems between 2014 and 2025 if nutritional challenges do not improve. The estimations were for the whole Tanzania and does not give specific estimates for Manyovu in Buhigwe District of Kigoma Region, however if this is broken down using malnutrition statistics across the Country; Manyovu Buhigwe will have its own share of these estimated mortalities. There is scanty if any documented data on malnutrition in Manyovu Buhigwe District and no evidence that the community knows about the challenges of malnutrition. This study intended to find out the prevalence and risk factor of malnutrition among children of ages 6 to 59 months in Manyovu Division of Buhigwe District and provides the status of malnutrition.

2. Materials and Methods

2.1 Description of the Study Area

The study was conducted in Manyovu which is one of the two divisions in Buhigwe district of Kigoma Region. Manyovu is made up of 30 villages and the local language in all these villages is Kiha. Most people in villages around Manyovu are peasants (they are more engaged in farming crops). The coordinates of Manyovu are -4.4739, 29.8361 and its altitude is 1363.

The main crops produced in the area are: maize, beans, cassava, coffee, sweet potatoes, cocoyam and different kind banana plantation. They also grow different kinds of vegetables such as: amaranths (mchicha) cabbages, tomatoes, garden egg, and different other kinds of traditional vegetables. There is trading across the border with neighboring Burundi where they have markets for food and other things three days in a week including Sunday, Tuesday and Thursday at Mnanila.

Data was collected at Heri Adventist hospital. Heri is located in Manyovu at 5 kilometers to Burundi border and 70 kilometers to kigoma Town. The coordinates of Heri are 4.4445361, 29.7928398.

2.2. Study Design and Sampling Approach

This was a descriptive observational study that enrolled children of ages 6 to 59 months that attended Heri Hospital who met inclusion criteria after obtaining a written or thumb print consent for non literate mothers/caregivers.

Sample frame was a pair of mother-child who was seen at Heri Hospital, in and out patients. Convenient and random samplings were both used. Convenient sampling because our respondents were those who came to the hospital and were easy to reach. About 90% of these where children who came for immunization. Random sampling because about 80% of the mothers had more than one child that met the inclusion criteria. One child was selected randomly per family.

The following Fisher's formula was used to determine the sample size.

$$n = z^2 p(1-p) d^2$$

Where,
n = Minimum sample size.
Z =is the table value for standard normal deviate corresponding to 95% significance level (= 1.96).
p = Prevalence of characteristic being estimated (in this case, prevalence of malnutrition, = 0.379%) [18].
d = Margin error, set at ± 0.05

2.3. Recruitment of the Subject and Sample Collection

Mother-child pairs who met inclusion criteria were recruited. The inclusion criteria were (1) Children from 6 to 59 months seen in the outpatient department, maternal and child health clinic or admitted to Heri Adventist Hospital (2) Children who were born with a normal birth weight (≥2.5 kg) (3) Children who were breastfed or were breastfeeding and their mothers lactated (4) Children whose mothers/guardians consented to being recruited to the study

2.4. Data Collection

Two nurses who had competency in carrying out interviews and taking the anthropometric measurements were recruited from Heri hospital to work with the researcher on data collection.

Data collection was done using pre tested questionnaires. Questionnaire had three sections, the first one was for recording anthropometric measurements, the second section was for socio economic characteristics of the family and the last section for 24 hrs dietary recall and Food Frequency Questions. The following information were collected: socio demographic/economic of both

parents, age, education, marital status, employment status, income per month, number of children in the family, livestock and land ownership, number of crops cultivated, breastfeeding practices, 24hr dietary recall and food group frequencies for both mother and child: all the food and beverages consumed in the pasted 24hr, number of food groups consumed by both mother and child. Through interviews the information were collected from mothers/guardians.

2.4.1. Anthropometric Measurements

Anthropometry measurements: weight and height/length of the children were taken upon admission for those admitted and those seen in the out patients' department. Salter weighing scales model 235 6S manufactured by Salter England and donated to the hospital by UNICEF, was used to measure the weight of the children. The weighing scale was calibrated and all measuring equipments were checked periodically during the study to prevent instrumental errors that could arise due to faulty equipment. A wooden height measuring board donated to the Hospital by UK aid, was used for taking length/height of the children.

2.4.2. Determination of Prevalence of Malnutrition

The anthropometric data of the children was distributed in z-score and analyzed using WHO growth standards of 2006. The anthropometric statistical programme (WHO Anthro 3.2.2.1 - 2018), WHO Anthropometric calculator version 3.2.2 used to convert raw anthropometric measurements (weight, height or length) into anthropometric indices of weight for age Z-score (WAZ), weight for height Z-score (WHZ), and height for age Z-score (HAZ) and was compared with the WHO reference data.

2.5. Data Analysis and Presentation and Analysis

To assess prevalence of malnutrition and risk factors, data were statistically analyzed using Statistical Package for Social Science (SPSS version 3.2.2) software, and presented in text description, tables and figures to ease understanding of data. The anthropometric data among children ages 6 to 59 months was distributed in z-score and analyzed using WHO growth standards of 2006. The anthropometric statistical programme (WHO Anthro 3.2.2.1 - 2018), WHO Anthropometric calculator version 3.2.2 was used to convert raw anthropometric measurements (weight, height or length of the children) into anthropometric indices of weight for age Z-score (WAZ), weight for height Z-score (WHZ), and height for age Z-score (HAZ) and was compared with the WHO reference data.

2.5.1. Ethical Consideration

The Open University of Tanzania issued a permission letter for this research. Permission to carry out the research at Heri Adventist Hospital was sought for and obtained from the administration committee (ADCOM) to conduct the research at the Hospital. Consent was also sought from all the parents/guardian of all the children who were included in this study. Confidentially of information / data obtained from recruited mother-child pairs was ensured.

3. Results

3.1. Demographic Characteristics of the Study Children

The total number of respondents that were enrolled in this study was 377. Out of the 377 respondents, 15 were dropped because their parents were not willing to give all the information required in the questionnaires. Therefore, data were collected from 362 respondents. The number of male children was 182 (50.3%) and female children were 180 (49.7 %). The ages of the children in the study ranged from 6 months to 59 months. The mean age of the Children was 26 months with mode of 9 and standard deviation of 14. Table 1 shows the detailed distribution of the children in this study by age and gender in number and percentage. 22 % of the boys were aged 6 to 11 months, 20.9% were of the age bracket of 12 to 23 months, 24.7% were aged 24 to 35 months, 19.2% were 36 to 47 months and 13.2% were 48 to 60 months. 18.3% of the girls were aged between 6 to 11 months, 26.1% were 12 to 23 months, 23.9% were 24 to 35 months old, 20% were 36 to 47 months, and 11.7% were aged between 48 and 60 months.

Table 1. Distributions of Study Children by Age and Gender

Age in Months All= 362	Boys		Girls		Total	
	No	%	No	%	No	%
6-11	40	22	33	18.3	73	20.2
12-23	38	20.9	47	26.1	85	23.5
24-35	45	24.7	43	23.9	88	24.3
36-47	35	19.2	36	20	71	19.6
48-60	24	13.2	21	11.7	45	12.4
Total	**182**	**100**	**180**	**100**	**362**	**100**

3.2. Economic Characteristics of the Respondents

Ages of mothers: range 17 to 50 years. Mean 30, Mode 25 and standard deviation of 7. Ages of fathers: range 20 to 82 years. Mean 35, Mode 30 and standard deviation of 8.

Majority of mothers (60.8%) had primary level education and 1.1% university, while 58.3% of fathers attended primary education and 2.8% university. 92.0% of mothers were farmers, 2.8 % had formal employment. Amongst the fathers, most - 311 (85.9 %) were also farmers. Majority of respondents - 340 (93.9%) were married; the remaining few were either single, divorced or widows.

The economic status of the respondents was determined by using ownership of land, livestock and earnings per month. Majority of respondents 198 (54.7%) in the study owned livestock (cows, goats, chickens, and sheep). 163 (45.3%) respondents did not own any livestock. 289(79.8%) respondents own a piece of land while 73(20.2%) did not own any piece of land. The earnings per month were reported to range from 0.86c to 870$ approximately.

3.3. Prevalence of Malnutrition among Children aged 6 to 59 months.

This section presents the results of the analysis of nutritional status of the children. Figure 1 is a histogram showing < - 3 and < 2 standard deviations of wasting, underweight and stunting found in the children.

Wasting was found to be < -3SD 1.7%, <-2SD 3.6%, underweight < -3SD 1.9%, < -2SD 9.7% and stunting < -3SD 16%, <-2SD 43.1%

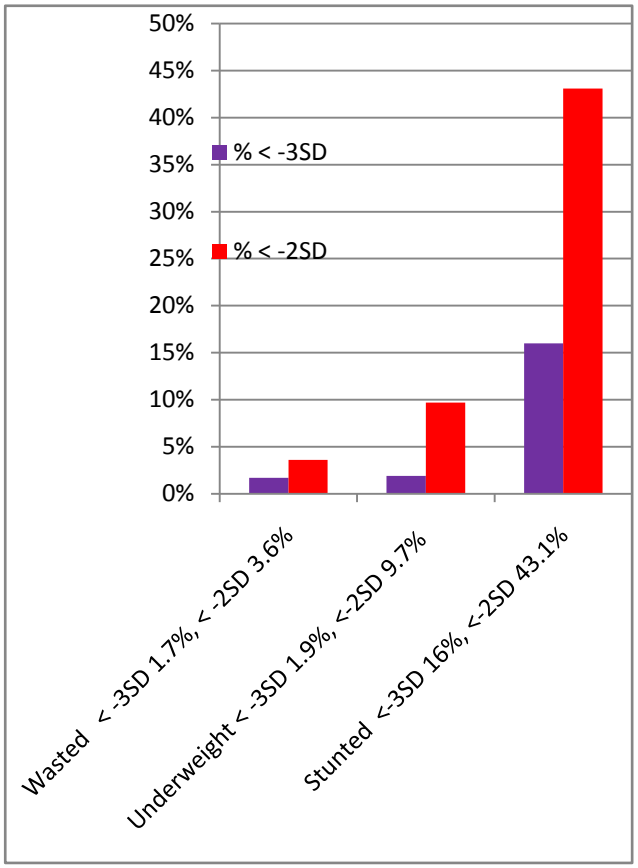

Figure 1. Nutritional status of Children

As explained previously, the nutritional status of the children was assessed using the indicators of weight-for-Age Z score (WAZ), Weight-for- Height Z score (WHZ) and Height-for-Age Z score (HAZ). Table 3 shows the summary of nutritional status (WAZ, HAZ, and WHZ) of children per age.

Prevalence of underweight (WAZ) < -2SD was 9.7 %, (95% CI; 6.5-12.9). The prevalence of WAZ < -3SD was 1.9%, (95% CI; 0.4- 3.5). The most affected age for both genders < -2SD and < -3SD were children between ages 6-11 months. The least affect children were between ages 24-35 months. The prevalence of stunting (HAZ) < -2SD was 43.1 %, (95% CI; 37.9- 48.3) the most affected children were ages 24-35 months with the prevalence of 54.5% (95% CI; 43.6-65.5).

Prevalence of stunting < -3SD was 16 %, (95% CI; 12.1-19.9). Children between ages 6-11 months were the most affected with the prevalence of 20.5 %, (95% CI; 10.6-30.5). Prevalence of wasting < -2SD, was 3.6 % (95% CI; 1.5- 5.6). The prevalence of wasting < -3SD was 1.7 %, (95% CI; 0.2- 3.1). The most affected children were between ages 36-47 months. Children with mild wasting were between ages 6-11 months. The least affected for mild wasting were between ages 24-35 months. The Table 2 shows the detailed information.

Table 2. The Nutrition Status of Children Per Age Group

Age Groups	N	WAZ (%)		HAZ (%)		WHZ (%)	
		<-3SD	<-2SD	<-3SD	<-2SD	<-3SD	<-2 SD
Total:	362	1.9	9.7	16	43.1	1.7	3.6
(6-11)	73	4.1	15.1	20.5	43.8	1.4	5.5
(12-23)	85	1.2	8.2	16.5	45.9	2.4	3.5
(24-35)	88	1.1	6.8	18.2	54.5	1.1	1.1
(36-47)	71	1.4	8.5	9.9	29.6	2.8	4.2
(48-60)	45	2.2	11.1	13.3	35.6	0	4.4

WAZ: weight for age Z-score, HAZ: height for age Z-score, WHZ: weight for height Z-score.

Male children had higher prevalence of underweight WAZ <-2 SD of 10.4 % (95% CI; 5.7-15.2) and < -3SD 2.2 % (95% CI; 0-4.6) compared to female children who had prevalence of 8.9 % (95% CI; 4.5-13.3) and 1.7 % (95% CI; 0-3.8). Prevalence of wasting < -2SD and < -3SD were higher amongst male children with 4.9% and 2.2% respectively compared to female children 2.2% and 1.1% . The affected male children with mild wasting were those between ages 6-11 months by 10% and severe wasting was ages 36-47 months by 5.7%. Female children of ages 48-60 months were the most affected with mild wasting as 4.8% of them had mild wasting. The age group that was most affected by severe wasting was 24-35 months with a prevalence of 2.3 %. Prevalence of stunting < -2SD was higher amongst male children 44 %, (95% CI; 36.5-51.4) compared to female children 42.2 %, (95% CI; 34.7- 49.7). The most affected male children were aged 24-35 months. The least affected were those of ages 36-47 months. Prevalence of severe stunting was higher amongst female children of ages 6-11 months at 24.2%. The least affected children were ages 48-60 months. More detail can be seen in Table 3.

Table 3. Nutrition status (WAZ, HAZ and WHZ) of children per age per gender

Age group	MALE							FEMALE						
	No.	WAZ (%)		HAZ (%)		WHZ (%)		No.	WAZ (%)		HAZ (%)		WHZ (%)	
		< -3SD	< -2SD	< -3SD	< -2SD	< -3SD	< -2SD		< -3SD	< -2SD	< -3SD	< -2SD	< -3SD	< -2SD
Total:	182	2.2	10.4	13.2	44	2.2	4.9	180	1.7	8.9	18.9	42.2	1.1	2.2
(6-11)	40	5	20	17.5	47.5	2.5	10	33	3	9.1	24.2	39.4	0	0
(12-23)	38	2.6	5.3	10.5	44.7	2.6	5.3	47	0	10.6	21.3	46.8	2.1	2.1
(24-35)	45	0	4.4	13.3	55.6	0	0	43	2.3	9.3	23.3	53.5	2.3	2.3
(36-47)	35	2.9	11.4	8.6	31.4	5.7	5.7	36	0	5.6	11.1	27.8	0	2.8
(48-60)	24	0	12.5	16.7	33.3	0	4.2	21	4.8	9.5	9.5	38.1	0	4.8

WAZ: weight for age Z-score HAZ: Height for age Z-score WHZ: weight for height Z-score, < -3SD: - 3 standard deviation, < -2SD: - 2 standard.

3.6. Dietary Pattern for Children and Mothers

3.6.1. Breastfeeding

94.5% of the mothers did exclusive breastfeeding, however there was no correlation between breastfeeding and the nutritional status of the children.

3.6.2. Food Consumed by Mother in the Last 24 Hour

Food groups were adopted from FANTA [19] into eleven groups namely: Cereals, roots, and tuber, vegetables, Fruits, meat and poultry, eggs, fish and sea food pulse/legume/nuts, milk and milk products, oils/fats, sugar/honey. Cereals were consumed by 188 (51.9%) of mother, 263 (72.7%) consumed roots and tubers, 143 (39.5%) consumed vegetables, 204 (56.6%) consumed fruits and 38 (10.5%) consumed meat and poultry. Only 12 (3.3%) mothers consumed eggs, 240 (66.3%) consumed fish and sea foods, 333 (92.0%) consumed pulse/legumes/nuts, 36 (9.9%) consumed milk or milk products, 357 (98.4%) consumed foods cooked in oils/fats and 121 (33.4%) of the mothers consumed sugar/honey.

Cereals were consumed by 188 (51.9%) of mother, 263 (72.7%) consumed roots and tubers, 143 (39.5%) consumed vegetables, 204 (56.6%) consumed fruits and 38 (10.5%) consumed meat and poultry. Only 12 (3.3%) mothers consumed eggs, 240 (66.3%) consumed fish and sea foods, 333 (92.0%) consumed pulse/legumes/nuts, 36 (9.9%) consumed milk or milk products, 357 (98.4%) consumed foods cooked in oils/fats and 121 (33.4%) of the mothers consumed sugar/honey. The detail is illustrated in Table 4.

Table 4. Food group distribution for mother's diet 24 hours

Food group distribution for mothers diet		
Food group	Mothers who consumed	%
Cereals	188	51.9
Roots and tubers	263	72.7
Vegetables mother	143	39.5
Fruits	204	56.3
Meat and poultry	38	10.5
24hr eggs	12	3.3
24hrs fish and sea foods	240	66.3
24hrs pulse/legumes/nuts	333	92
24hrs milk/milk products	36	9.9
24hrs oils/fats	357	98.6
24hrs sugars/honey	121	34.3
24hrs miscellaneous mother (soft drink, juice, biscuits)	124	34.3

3.6.3. Food Group Consumed by Children in Last 24 Hours

The foods for children were grouped into eight groups adopted from FANTA (19). The groups include: grains/roots/tubers, Vit A rich plant foods (carrots, sweet potatoes, orange, spinach, fruits/vegetables, meat/poultry/fish/ seafood, eggs, pulse/legumes/nuts, milk and milk products, and oils/ food cooked in oil. Table 5 shows food group distribution of the children's diet in 24hours recall.

Grains/roots/tubers were consumed by 353 (97.5%) children, 70 (19.3%) had vit A rich plant foods, 231 (63.8%) ate fruits /vegetables, 220 (60.8%) of the children took meat/poultry/fish/seafood. Only 10 (2.8%) ate egg, 316 (87.3%) consumed pulse/legume/nuts, 134 (37.0%) of the children had milk or milk product and 352 (97.2%) took food cooked in oils/fats. Food group distribution for children's 24 hours diet recall is illustrated in Table 5.

Table 5. Food group distribution for children's diet 24 hours

Food group	Children who consumed	%
24hrs grains/roots/tuber	353	97.5
24hrs Vit A rich plants food (carrots, sweet potatoes, orange, spinach…)	70	19.3
24hrs fruits/vegetables	231	63.8
24hrs meat/poultry/fish/seafood	220	60.8
24hrs egg	10	2.8
24hrs pulse/legume/nuts	316	87.3
24hrs milk/milk products	134	37
24hrs food cooked in oil/fat	352	97.2

3.6.4. Mothers and Children Number of Food Groups Consumed and Their Frequencies

Table 6 shows the food groups consumed by the children and their mothers as well as the frequency percentage of consumption of these food groups.

Table 6. Number of food groups consumed, frequency and percentage

Child			Mother		
Number of food groups	**Frequency**	**%**	**Number of food groups**	**Frequency**	**%**
0	1	.3	**3**	17	4.7
1	6	1.7	**4**	67	18.5
2	4	1.1	**5**	100	27.6
3	32	8.8	**6**	75	20.7
4	106	29.3	**7**	51	14.1
5	140	38.7	**8**	41	11.3
6	62	17.1	**9**	7	1.9
7	11	3.0	**10**	4	1.1
Total	362	100	**Total**	362	100

Number of food groups consumed by mothers and their children and their frequencies are presented in Table 6. The table indicates that 27.6% of mothers consumed 5 food groups out of the 11, and only 1.1% consumed up to 7 food groups. The same was also noted for the children, 38.7% also consumed 5 food groups like their mothers, and 3.0% consumed up to 7 different food groups.

Food groups consumed by the majority of respondents are from food they locally cultivate in this area such as grains, roots/tubers, fruits and vegetable, pulse/legumes/nuts.

The average dietary diversity of mothers representing household dietary diversity in 24 hrs is 4.65 with the highest being 7 and the least being 0. The food diversity of the upper tercile is 5.69.

3.7. Correlation of Risk Factors Identified in the Study

3.7.1. Socio Demographic Factors of the Parents

The level of education of both parents were found to significantly positively correlate with the nutritional status

of the children by .152** and .116* with weight for age and height for age respectively. The children from families where mothers and fathers did not have formal education or were primary school leavers were negatively affected by -.071 and -.116* for mothers and -.116* and -.147** for fathers on the weight for age and height for age of the children respectively.

Children whose parents had secondary education and above were less malnourished compared to those who had no formal education or primary school leavers. This is more so when the mother of the child was more educated. Table 7 illustrates the correlation of socio demographic factors of the parents with nutritional status of the children.

Table 7. Correlations Sig. (2-Tailed) of Maternal and Paternal Level of Education with Nutritional Status of the Children

Maternal and paternal level of education correlation	Weight for age Z score	Height for age Z score	Weight for height Z score
No formal education Mother	-.071	-.116	.023
Primary Mother	-.074	-.013	-.080
Secondary Mother	.152**	.116*	.070
Certificate/Diploma Mother	.062	.106*	-.010
University Mother	.136**	.105*	.082
No formal education Father	-.049	-.147**	.074
Primary Father	-.125*	-.011	-.112*

**. Correlation is significant at the 0.01 level (2-tailed)
*. Correlation is significant at the 0.05 level (2-tailed).

3.7.2. Socio Economic Factors with the Nutritional Status of the Children

The monthly income of parents (earnings per month) were found to significantly and positively correlate by .161** and .172** with weight for age, and height for age of the children respectively. There was a positive correlation with number of crops with weight for height of the children and negative with height for age. Occupation of the parents and marital status were found not to correlate with the nutritional status of the children. There was no significant correlation between land ownership, access to clean water, type of housing, and ownership of livestock with nutritional status of the children. Table 8 illustrates the correlation between socio demographic/economic of both parents with the nutritional status of the children.

Table 8. Pearson Correlation Sig. (2-Tailed) of Maternal and Paternal socio demographic/economic with Nutritional Status of the Children

Maternal and paternal demographics/economic	Weight for Age Z score	Height for Age Z score	Weight for Height Z score
Age of Mother/guardian	-0.046	-0.056	0.009
Age of Father/Guardian	-0.028	-0.035	0.01
Maternal Education	.185**	.197**	0.048
Paternal Education	.158**	.206**	0.017
Maternal occupation	0.099	0.095	0.027
Paternal occupation	-0.023	-0.043	0.013
Marital status	-0.023	0.009	-0.017
Maternal and paternal socio economic			
Number of children	-0.087	-.131*	0.019
Earn per Month	.161**	.172**	0.036
Own piece of land	-0.023	0.088	-0.085
Access to clean water	0.031	0.049	-0.008
Type of housing	-.111*	-0.098	-0.043
Own livestock	-0.059	-0.06	-0.024

4. Discussion

The study showed that the prevalence of underweight was 9.7%, stunting was 43.1%, and wasting 3.6%. The observed prevalence of underweight and wasting were lower than those recorded for Kigoma Region which was 19.4% and 6.0% respectively [7]. This could be because Kigoma region includes those of Buhigwe District which comprises Manyovu and Muyama Divisions. Manyovu probably contributes less to the overall childhood malnutrition in the region. There is also the possibility that the malnutrition of children in the region now is less that it was when the survey that documents those rates of malnutrition were carried out. The prevalence of both underweight and wasting were also lower when compared to that of Nzega district which was 11.7% and 6.0% [22].

The study in Nzega was done in 2012 on prevalence of malnutrition amongst the children of the same age groups as in this study. We expected to see similar results as both studies were conducted in rural areas where food can be relatively easier to reach than in urban areas [23]. This is however not surprising as different villages may not have similar resources. The time difference in these studies could also be a factor in the difference in findings as efforts of the Tanzanian government and other agencies to improve the nutrition of the communities is also yielding positive fruits.

The prevalence of stunting in this study was 43.1 %. It is higher than that of both kigoma region and Nzega district which are 37.9% and 26.1% respectively [22]. The reason for this could be nutritional, genetic or both. This requires further studies to clearly determine the reason for this level of stunting in the area. This study suggests that Manyovu division of Buhigwe district may contribute more to the overall status of stunting in Kigoma. A study done in Burundi on the prevalence of malnutrition on the children of the same age groups found the prevalence of stunting to be at 57.7% [11]

This study raises awareness on the challenges of malnutrition in children of ages 6 to 59 months to mother in the community. Health care providers in the district will also become aware of the statistics of malnutrition in the district for focused work in this area.

Prevalence of severe stunting reported was higher amongst female children of ages between 6-11 months with a rate of 24.2%. This could be because this is the age range when they start supplementary foods, given the fact that their mothers may not be well aware of how or what foods to start their children on. It is also possible that these young ones are left under the care of not much older siblings or relations. Male children had higher prevalence of underweight compared to female children. This could be due to the fact that female children are always where food is being cooked while the boys are out playing a lot more, coming in when it is meal time.

Given the fact that nearby Burundi (a walking distance from Mnanila) has prevalence of stunting of 57.7% [11] one wonders if the same sociocultural, factures account for the high prevalence of stunting in this study. This is a question that needs to be answered. Therefore, further study needs to be conducted in this same area in order to find out for a fact if the cause of the level of stunting is due to lack of nutrients, or by enteric infections leading to

intestinal inflammation and malabsorption of nutrients or human genetic polymorphisms that can alter host genes that affect nutrient absorption and metabolism.

4.1. Risk Factors for Malnutrition among under Fives

4.1.1. Maternal and Paternal Age

The age of mothers was found not to correlate with the nutritional status of the children. The fathers in this study were older than the mothers; however their ages similarly did not correlate with the nutritional status of the children. Ages of both mothers and fathers was found however to significantly positively correlate with the number of children. The older the fathers and mothers are the more children they had. This is because they do not believe in any form of family planning as they believe that each child comes with his own "luck" in life. They believe that the more children they have the higher the chances of one doing well in life.

4.1.2. Maternal and Paternal Education

The more the parents were educated, the better their children's nutritional status. The findings of this study supports the study previously done at Kilimanjaro Tanzania [20] where it was also found that mother's education had strong relationship with the nutritional status of the children. The finding also supports the study done in Democratic Republic of Congo [21] where it was also reported that mother's education positively correlated with the nutritional status of the children.

Similarly, there was significant and positive correlation between fathers' education and nutritional status of the children. The children from parents who were primary school leavers or those who did not have formal education were more malnourished compared to those from families where both parents had secondary education and above. Parents' education contributes in various ways to the nutritional status of children as their earning power is increased and they are better informed of the basics of food and nutrition. Based on their level of education, they could be also more aware of the importance of personal and home hygiene and general cleanliness. All these impact positively on the nutritional status of their children and the members of the household in general.

4.1.3. Maternal and Paternal Occupation

As stated in the results section, majority of the parents were farmers. No correlation was observed between both mothers' and fathers' occupation with the nutritional status of the children in this study. This supports a similar study carried out in Kenya where there was no correlation between maternal occupation and nutritional status of the children

4.1.4. Marital Status

It was observed that majority of the mothers registered in the study were married and few were single, divorced or widow. There was no correlation found between marital status and the nutritional status of the children in this study. This may be because the percentage of single mothers, divorced and widows were low. This finding corroborates previous findings of the study done in Kenya [12], Bugando Tanzania [13] which did not find relationship between marital status and nutritional status of the children,

4.1.5. Land and Livestock Ownership

Although higher percentage of respondents in this study owned a piece of land and livestock this did not impact significantly of the nutritional status of the children. This is likely due to the knowledge base of the parents as they are unable to take advantage of the resources they have to benefit the nutrition of the home

4.1.6. Number of Foods Groups Consumed by Mothers and Children in the Last 24 Hours

The 24 hrs recall suggests that the eating pattern of nearly the entire community is the same. The quantity of these classes and items consumed are possibly a factor that needs exploration. The children eat the same foods as their mothers eat.

It was observed that majority of children 88 (24.3%) consumed five food groups, and minority 1.1% of the children consumed two food group. Though higher percentage of children consumed five food groups, there was no correlation with their nutritional status. This is not surprising as those who ate more number of food groups were only 11 (3.0%), this percentage could not have made any major difference.

In the meat/poultry/fish/seafood groups almost only "daga", a kind of small fish they obtain from a distant Lake Victoria town was consumed in most homes. Most homes do not consume any other form of animal protein. The small fish is more affordable than fish from Lake Tanganyika which are much more expensive.

Most of the homes do not consume eggs as those whose chickens lay eggs sell them to make money while those who do not have poultry cannot afford eggs. Oils that are consumed by most households in the community are as food ingredients. No other forms of fats such as margarine, butter or cheese are consumed. Even though most people in the community are farmers they do not consume many food groups in their homes because much of their farm produce is sold to earn money for family use.

4.1.7. Breastfeeding Practices, Access to Clean Water and Health Centre

Some of direct causes of malnutrition are: unclean water, breastfeeding practices, and access to health center. In the study 341 (94.2%) of the families had access to clean water, more than 342 (94.5%) exclusively breast fed their children, 349 (96.4%) had access to health center, 343 (94.8%) had easy access to school and 257 (71.0%) had electricity. However these findings did not have any relationship with the nutritional status of the children. This is contrary to a previous study done in DRC [15], and also contrary to the previous study done in Nzega district [22-25] where it was found that breastfeeding practices and access to clean water was a big problem as it had significant relationship with the nutritional status of the children. This could however explain the fact that the percentage of wasting and underweight is significantly low in this area mostly because of good breastfeeding practices and access to clean water, even though stunting is at a significantly higher level.

The lack of correlation found between parents' occupation and number of food groups and the nutritional status of the children is possibly because of poor knowledge of nutrition and feeding practices. These reasons for the lack of correlation between breastfeeding and nutritional status of the children are possibly because the children in the study were already consuming other food and were not only breastfeeding at the time they were recruited in the present study.

5. Conclusion

The result of this study confirms the existence of child malnutrition in Manyovu and the surrounding communities. Malnutrition status recorded in this study was: underweight 9.7 %, stunting 43.1%, and 3.6% wasting. The risk factors found to significantly correlate with nutritional status of the children were education level of both parents and earnings per months of both parents. Breastfeeding and dietary assessment did not have any statistical effect to malnutrition of the children possibly because of poor knowledge of nutrition and feeding practices. Therefore it is very important to empower women by Creating Nutritional education programs exposing them to the knowledge they need on child Nutrition.

5.1. Recommendations.

Nutrition is a very important part of everyone's health, especially for growing children. Every health worker should take it personal in order to make sure even the clients understand the importance.

Advocate for and support all Hospitals to have nutritional units and ensure the availability of all the necessary supplementary feeding programs. Improve nutritional surveillance especially in rural areas and response through capacity building of the Ministry of Health and partners on nutrition.

The governments, support agencies, organizations and health institution to conduct further nutrition surveys in this area to establish if the factors are consistent over time or if there have been any changes; to inform health and nutritional interventions in order to take appropriate actions.

Establishing economic empowerment programs for women in the community as what they earn when they are economically empowered will most likely be spent on their children. It is very important for the government, partner Organizations and health care institutions to put more efforts to create Nutritional units in rural areas to enable those women in these areas to be exposed to the knowledge they need on child Nutrition. If these mothers have good understanding on the importance of child nutrition, the chances of reducing and controlling malnutrition will be greater. The government can have programs in rural areas such as supporting families in agriculture, by providing the necessary tools even land they need to facilitate their agriculture activities.

The district government can come up with regulation that mandates parents to education their female children up to a minimum of secondary level education. This will increase the chances of mothers being better informed on groups, classes on foods and child nutrition. This also ensures that even if it is a house help or relative that prepares the food of the children in the home in the absence of the mother they understand the basics of good nutrition and the benefits of combination of different food groups in the feeding of the children.

The Hospitals to work closely with the agencies that could help ensure the establishment of nutritional unit within the hospital, and availability of all existing supplementary feeding programs that will enable the unit to function accordingly.

Acknowledgements

The authors would like to thank the management and authority of the Open University of Tanzania, and the Heri Adventist Hospital administration for their support and guidance during the whole period of the implementation of the study.

References

[1] Whitney, E., & Rolfe, S. R. (2008). *Understanding Nutrition*, Eleventh Edition Published by Wadsworth cengage learning .

[2] UNICEF/WHO/World Bank Group *Joint malnutrition estimates*, (2017). Levels and Trends in Malnutrition 2017 edition.

[3] UNICEF, (2009). Tracking progress in Child and Maternal Nutrition. A survival and development priority: New York, NY 10017, USA.

[4] Robinson E., & Nyagaya M. (2014). *Malnutrition in Tanzania: Will food fortification laws work?* https://www.theguardian.com/global-development-professionals-network/2014/sep/15/malnutrition-tanzania-food-fortification-laws.

[5] UNICEF Tanzania, (2014). *The Situation; made significant progress in improving nutrition among children under 5 years of age.* https://www.unicef.org/ tanzania/nutrition.html.

[6] Ash, Deborah; Sethuraman, Kavita; Sommerfelt, A. Elisabeth; Oot, Lesley; Kovach, Tara; Kaganda, Joyceline; Chiduo, Geoffrey; and Yokobety, Malisa. (2014). *Reducing Malnutrition in Tanzania: Estimates to Support Nutrition Advocacy: Tanzania PROFILES 2014*. Washington, DC and Dar es Salaam, Tanzania: FHI 360/FANTA, Tanzania Food and Nutrition Centre and Prime Minister's Office, Tanzania.

[7] Ash, Deborah; Sethuraman, Kavita; Sommerfelt, A. Elisabeth; Oot, Lesley; Kovach, Tara; Kaganda, Joyceline; Chiduo, Geoffrey; and Yokobety, Malisa (2017). *Reducing Malnutrition in Tanzania: Estimates to Support Nutrition Advocacy: Tanzania PROFILES 2016*. Washington, DC and Dar es Salaam, Tanzania: FHI 360/FANTA, Tanzania Food and Nutrition Centre and Prime Minister's Office, Tanzania.

[8] WHO, (2007). *Malnutrition Fact sheet* Updated May 2017. http://www.who.int/ mediacentre/factsheets/malnutrition/en/).

[9] International Food Policy Research Institute. 2016. *Global Nutrition Report 2016: From Promise to Impact: Ending Malnutrition by 2030*. Washington, DC.

[10] Ubesie A. C., Ibeziako N.S., Ndiokwelu C.I., Uzoka C.M., Nwafor C.A (2012). *Under-five protein energy malnutrition admitted at the University of Nigeria Teaching Hospital, Enugu: a 10 year retrospective review. Nutrition* Journal 2012 11:43.

[11] Akombi, B.J., Agho, K.E., Merom, D., Renzaho, A.M. and Hall. J.J. (2017) *Child malnutrition in sub-Saharan Africa: A meta-analysis of demographic and health surveys* (2006-2016). PLoS ONE 12(5): e0177338.

[12] Abinya C. A. (2012). Prevalence of malnutrition and related factors among children aged 6-60 months admitted at Siaya district Hospital Pediatric Wards, Kenya. Published by http://erepository.uonbi.ac.ke/bitstream/handle/ 11295/9356/.

[13] Ahmed M.M, Hokororo A., Kidenya B.R., Kabyemera R. and Kamugisha E (2016). *Prevalence of undernutrition and risk*

factors of severe undernutrition among children admitted to Bugando Medical Centre in Mwanza, Tanzania.

[14] Muller, O., & Krawinkel, M. (2005). *Malnutrition and health in developing countries.. Available from: http://www.cmaj.ca/cgi/content/full/173/3/279. View ArticlePubMed*Central Google Published by Canadian *Medical Association Journal*. Cited January 2018. Regents of University of California (2003): All rights reserved.

[15] Kandala, N. B., Madungu, T., Emina, J., Nzita, K. P D., & Cappuccio, F. (2011). *Malnutrition among children under the age of five in the Democratic Republic of Congo (DRC): Does geographic location matter?*. BMC public health. 11. 261.

[16] Ali J, Omar & Obinna , Zachary & Wheatley, Hannah & Rafiq, M. Yunus & Shekalaghe, Seif & Ali, Ali & Mgonia, Shishira & Abdulla, Salim. (2016). *Prevalence and assessment of malnutrition among children attending the Reproductive and Child Health clinic at Bagamoyo District Hospital, Tanzania.* Bugando Medical Center Public Health. 16.

[17] Martins, V. J. B., Toledo F, T. M. M., Grillo, L. P., Franco, and M. do C. P., Martins, P. A., Clemente, A. P. G., & Sawaya, A. L. (2011). *Long-Lasting Effects of Undernutrition. International Journal of Environmental Research and Public Health*, *8*(6), 1817-1846.

[18] WHO, (2009). *Guidelines for Integrated Management of Acute Malnutrition in Kenya.*

[19] Swindale A, Bilinsky 2006. Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access: Indicator Guide VERSION 2 Food and Nutrition Technical Assistance Project (FANTA)Academy for Educational Development 1825 Connecticut Ave., NW Washington, DC 20009-5721 Tel: 202-884-8000 Fax: 202-884-8432 E-mail: fanta@aed.org Website: www.fantaproject.org.

[20] Abubakar, A., Uriyo, J. Msuya, S. E. Swai, M., & Stray-Pedersen, B. (2012). *Prevalence and Risk Factors for Poor Nutritional Status among Children in the Kilimanjaro Region of Tanzania*. *International Journal of Environmental Research and Public Health*, *9*(10), 3506-3518.

[21] Kandala, N. B., Madungu, T., Emina, J., Nzita, K. P D., & Cappuccio, F. (2011). *Malnutrition among children under the age of five in the Democratic Republic of Congo (DRC): Does geographic location matter?* BMC public health. 11. 261.

[22] Safari G, John & Masanyiwa, Zacharia & Lwelamira, James. (2015). *Prevalence and Factors Associated with Child Malnutrition in Nzega District, Rural Tanzania*. Current Research Journal of Social Sciences. 7. 94-100.

[23] John G.S, Zacharia.S, James. E, Departement of population studies, department of Development Finance and Management studies, Institute of rural Development (2015). *Prevalence and Factors Associated with child Malnutrition in Nzega District, rural Tanzania.*

[24] Akombi, B.J., Agho, K.E., Merom, D., Renzaho, A.M. and Hall. J.J. (2017) *Child malnutrition in sub-Saharan Africa: A meta-analysis of demographic and health surveys* (2006-2016). PLoS ONE 12(5): e0177338.

[25] Ahmed M.M, Hokororo A., Kidenya B.R., Kabyemera R. and Kamugisha E (2016). *Prevalence of undernutrition and risk factors of severe undernutrition among children admitted to Bugando Medical Centre in Mwanza, Tanzania*.