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Review Article

Association of Childcare Practices with Nutritional Status of Children Aged 6 to 23 Months in Lusaka District, Zambia

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Abstract

Background: The purpose of this study was to establish whether childcare practices have an influence on the nutritional status of children aged 6 to 23 months in Lusaka district.

Methods: A researcher administered questionnaire was used to collect data on demographic characteristics, hygiene practices, health seeking behaviour and food consumption pattern. WHO AnthroPlus was used to generate anthropometric indices. Bivariate analysis used to establish associations between variables and logistic regression was used to establish predictors of stunting.

Results: Prevalence of wasting, underweight and stunting was 3.8%, 9.6% and 25.5%, respectively. Stunting was more prevalent among male than female children, (p-value=0.015). Child care practices that were associated with stunting included: breastfeeding (p-value=0.002), education level of caregiver (p-value=0.013), type of toilet used (p-value=0.004), child morbidity (p-value=0.040), use of insecticide treated mosquito net (p-value=0.012). Predictors of stunting included breastfeeding and child morbidity. Breast feeding before the survey was associated with a reduction in risk of stunting among children (p-value=0.009, OR=0.347, 95% CI (0.156-0.769)). Surprisingly morbidity two weeks prior to the study was also associated with a reduction in the likelihood of stunting (p-value= 0.009, OR= 0.350, 95% CI (0.166-0.773)).

Conclusion: The study revealed high levels of stunting. Breastfeeding night before survey, type of toilet used, and use of insecticide treated mosquito net, education level of caregiver and child morbidity had a significant relationship with nutritional status.

Keywords: Childcare; Stunting; Underweight; Wasting; Zambia

Abbreviations

SPSS: Statistical Package for Social Sciences; WHO: World Health Organisation; MDD: Minimum Dietary Diversity; MMF: Minimum Meal Frequency; MAD: Minimum Acceptable Diet; WHZ: Weight for Height Z-score; HAZ: Height for Age Z-score; WAZ: Weight for Age Z-score; ITN: Insecticide Treated mosquito Net; ZDHS: Zambia Demographic Health Survey

Background

In Africa, about one third of the population currently live in urban areas, and this percentage is expected to increase to over half of a billion by the year 2045 [1]. Zambia is one of Sub-Saharan Africa's most highly urbanized countries, where about one-half of the country's population lives in urban centres. Rapid urbanisation, has resulted into numerous challenges in meeting the needs of Zambia's growing urban population, including high unemployment and underemployment, poor sanitation, environmental hazards, and sub-standard public service delivery, such as education and healthcare [2,3]. A high proportion of women are working away from home, and the deteriorating environmental conditions pose challenges to the care of children.

The nutrition, growth and development of infants and young children depend not only on sufficient food, but also on adequate health services and appropriate care behaviours [4]. Childcare practices play a vital role in the nutritional status of children aged less than two years. The first 1000 days from conception to two years of age are a very critical window of opportunity for optimal growth and cognitive development [5]. Nutritional deficiencies during the first two years of life can have both immediate and long term consequences including poor education achievement, reduced quality of life, impaired cognitive development and low productivity which becomes difficult to reverse later in life [5,6]. Optimal nutritional status results when children have access to affordable, diverse, nutrient rich foods, appropriate maternal and childcare practices; adequate health services and a health environment including safe water, sanitation and hygiene practices [7].

Poor childcare practices have been identified as a key contributing factor to child mortality in developing countries. Other documented causes of mortality include malaria, measles, water and poor hygiene [8]. Apart from socio-cultural, economic and demographic factors,

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childcare practices have been found to be associated with nutritional status of children [9]. Malnutrition has been a major public health problem in many developing countries, Zambia inclusive. Children grow very rapidly and are usually very active, therefore, require a constant adequate supply of energy and nutrients in order to meet their nutritional requirements. Several nutrition-specific and nutrition-sensitive intervention strategies have been put in place by the government of the Republic of Zambia to mitigate the adverse effects of malnutrition. However, little improvements have been recorded despite the efforts, with stunting, wasting and underweight registering 45 percent, 5 percent and 25 percent respectively, in 1992 compared to 40 percent, 6 percent and 15 percent respectively in 2014 [10].

Childcare practices encompass a number of factors that include breastfeeding and complementary feeding practices. Other factors that have a bearing on childcare practices include water sources, sanitation and hygiene. Research indicates that adequate care of children can prevent up to 6 percent of deaths for children under the age of five years [11]. In Zambia, the emphasis to tackle child under nutrition has been to address the causes of infections and provision of adequate diversified diets to children to fight under nutrition, with breastfeeding and complementary feeding aspects being the main dimension of focus for the few studies that have looked at childcare practices [12, 13]. Very little is known on how the broader approach childcare practices are linked to under nutrition in Zambia. Appropriate complementary feeding practices (e.g. dietary diversity and meal frequency), water sources, sanitation, hygiene and health seeking practices which are important aspects in prevention of under nutrition in children less than 2 years old have not been adequately addressed. This study therefore, sought to close the existing gap in knowledge on the link between childcare practices and nutritional status of children aged 6 to 23 months in Zambia. The aim of this study was to establish the influence of childcare practices on nutritional status of children aged 6 to 23 months in Lusaka district in Zambia. Children in this age group have been found to be more vulnerable to malnutrition, than children younger than 6 months and those aged 24 to 35 months [14]. The age range 6 to 23 months provides a window of opportunity in which interventions that can have a positive impact on a child can be undertaken. Some of the childcare practices that the study considered include: feeding practices (dietary diversity and meal frequency), use of insecticide treated mosquito net, quality of water used at a household, breastfeeding, education level of the caregiver and type of toilet used at a household.

Methods

Research Design and Study Area

A cross-sectional research design was employed to establish childcare practices and how they are associated to the nutritional status of children aged 6 to 23 months. Caregivers with children aged 6 to 23 months resident in Munali constituency of Lusaka district, in Zambia, were enrolled in the study. The study excluded children who were sick at the time of data collection and children whose caregivers did not consent to participate in the study.

Lusaka district is a cosmopolitan city with a mixed representation of economic classes. The area has all the socio-economic classes, cultural and religious groupings, hence, was an ideal site for establishing the association of childcare practices and nutritional status of children aged 6 to 23 months.

Sample Size and Sampling

The sample size was calculated using the following formula:

$n=Z^2pq/d^2$

Where: n=sample size; Z=standard normal deviation which is 1.96; p=proportion of the target population more likely to receive a diverse diet in urban areas which is at 17 percent [15]; q=population without the characteristic being measured (1-p); d=margin of error 0.05

Multi-stage sampling technique was employed to arrive at the required sample size. In the first stage, simple random sampling was used to select two wards from four wards in Munali constituency. Chakunkula and Chainda wards were selected. In the second stage, communities were randomly selected from each ward. In the third stage, purposive sampling was used to identify households with children aged 6 to 23 months old. This was done with the help of community health workers. Lists of households were drawn from each community. Simple random sampling was used to sample households from the list. A total of 121 caregivers/child pair was sampled from Chakunkula ward while 118 caregiver/child pair were sampled from Chainda ward giving a total of 239 participants.

Data Collection Procedures

Ethical clearance to conduct the study was obtained from Excellence in Research Ethics in Science Converge Independent Review Board (ERES IRB) in Lusaka, Zambia. Data was collected using a structured questionnaire that comprised of subsections with questions on socio-economic and demographic characteristic, breastfeeding, complementary feeding practices, health seeking practices, and anthropometric measurements. The questionnaire was pre-tested for accuracy and clarity on 10 caregivers who had children aged 6 to 23 months living in an area with similar settings to the study site. Before the onset of interviews and data collection, community leaders from the selected communities were informed about the study. Introductions were done and permission sought from the mothers or caregivers. If the mother or caregiver agreed to participate in the study, they were required to sign a consent form.

A 24 hour dietary recall was used to collect data on the foods that were consumed by the child in the last 24 hours. The caregiver was required to provide information on the foods and drinks that were given to the child in the last 24 hours. The information given by the caregiver was used to determine the diversity of the diet given to the child. The diversity of the diet was based on the seven foods recommended by the World Health Organisation (WHO). According to WHO [16], the food groups include: 1) grains and tubers, 2) legumes and nuts, 3) dairy products, 4) flesh products, 5) eggs, 6) vitamin A rich fruits and vegetables, 7) other fruits and vegetables. Consumption of any amount of food or liquid was counted except where it was used as a condiment.

The data that was collected on childcare practices included; feeding practices, health seeking behaviour, source of water, sanitary conditions and hygiene practices. Adequate childcare practices entail appropriate feeding practices. According WHO [16], appropriate

feeding practices means introduction of complementary feeding at six months after birth, recommended meal frequency and dietary diversity.

Anthropometric Measurements

Weight and height or length measurements were used for determining weight for height (wasting), height for age (stunting) and weight for age (underweight) z scores. The weight of the children was determined using an electronic.

Seca scale model: 874 1021659. For children who could not stand alone, this was done by first determining the weight of the caregiver by making her stand alone on the scale. Then later the care giver was weighed again while holding the baby in her/his arms. The baby was required to wear only light clothing. Thereafter, the initial weight of the mother was subtracted from the second caregiver-baby weight to determine the weight of the baby. For children who could stand on their own, they were made to stand on the scale to determine their weight. Children's weight was determined to the nearest 0.1 kg. Children's height/length was determined using height/length boards. The length of the children was taken in the recumbent position. The measurement was taken to the nearest 0.1 cm. Age of the children was given by the caregiver and then verified using the under-five card.

Statistical analysis

Statistical Package for Social Sciences (SPSS) version 20 was used to analyse data. The analysis generated both descriptive and inferential statistics.

In order to establish the impact of childcare practices on nutritional status, the study quantified appropriate feeding, health seeking behaviour, source of water, sanitary conditions and hygiene practices as independent variables. Minimum dietary diversity is defined as the proportion of children aged 6 to 23 months who receive foods from at least four out of seven food groups [17]. Scoring of the dietary diversity was calculated using a score of 1 for those who consumed the food item, 0 for those who did not consume the food item in the previous 24 hours. The dietary diversity score ranges from zero to seven. Determination of meal frequency of the children was based on WHO guidelines. On a population basis, the recommended meal frequencies assuming a diet with energy density of 0.8 kcal per gram in the last 24 hours should be: (1) 2 to 3 meals per day for infants 6-8 months; (2) 3 to 4 meals per day for infants aged 9-11 and children 12-23 months [18]. For non-breastfed children the minimum meal frequency is 4. The proportion of children 6 to 23 months of age who receive a minimum dietary diversity and minimum meal frequency (apart from breast milk) are said to have a minimum acceptable diet. The minimum acceptable diet indicator combines standards of dietary diversity and feeding frequency by breastfeeding status. The numerator includes only those children who received both the Minimum Dietary Diversity (MMD) and the minimum meal frequency (MMF) for child's breastfeeding status [16]. Minimum acceptable diet is calculated as shown in the equation below:

MAD = Children who had at least MDD and MMF divided by Breastfed children aged 6 -23 months

To analyse anthropometric data, first, the WHO AnthroPlus was used to transform anthropometric data into Weight for Height (WHZ), Height for Age (HAZ) and Weight for Age (WAZ) scores according to WHO child growth standards and Z-score cut-off points. This was done in order to determine the nutritional status of the children. The WAZ, HAZ and WHZ data were then exported to SPSS for further analysis. Afterwards the anthropometric data was exported to SPSS. Descriptive statistics were used to describe data on nutritional status, feeding practices, socio-demographic characteristics, environmental conditions and health seeking behaviour. Study results were presented using tables, charts and graphs.

Student T-test was used to establish if there were any differences in nutritional status between male and female children in the sampled children. Determinants of nutritional status of children were established using a binary logistic regression; the dependent variable was height for age Z-score. This variable was dichotomised so that zero denoted stunting and one denoted not stunted (normal). The choice of independent variables to include in the binary logistic regression was determined by first running a bivariate correlation analysis between nutritional status and independent variables. Those which were significantly correlated with the former were automatically included in the model. Other independent variables were included based on plausible biological reasons as well as using the literature.

Results

Demographic and Socio-economic Information of Caregivers

Munali constituency is divided into two wards from which the study participants were drawn. 56.1 percent (n=134) of the respondents were from Chakunkula ward while 43.9 percent (n=105) were from Chainda ward. Table 1 shows the socio-economic demographic of the caregivers. The majority of the caregivers attained secondary level of education.

Sanitation and Hygiene Practices

Table 2 shows sanitation and hygiene practices by the caregivers.

Table 1: Demographic and socio-economic information of caregivers.

Characteristic	Frequency (n)	Percent (%)
Marital status of caregiver		
Married	167	69.9
Single	59	24.7
Divorced	6	2.5
Widowed	2	0.8
Separated	4	1.7
Cohabiting	1	0.4
Children under five years at the house		
1 child	151	63.2
2 children	77	32.2
3 children	7	2.9
4 or more children	4	1.7
Education level of caregiver		
None	12	5
Primary	70	29.3
Secondary	123	51.5
Tertiary	34	14.2

Table 2: Sanitation and hygiene practices.

Characteristic	Frequency	Percent (%)
Water treatment		
Yes always	95	39.7
Sometimes	41	17.2
No	103	43.1
Method of water treatment		
Boiling	73	54
Chlorine	62	56
Disposal of refuse		
Rubbish pit	73	30.5
Garbage collector	136	56.9
Open space	8	3.3
Communal bin	22	9.2
Cleanliness of surrounding		
Yes always	218	91.3
No	21	8.8
Wash of hands		
Yes always	141	59
No	46	192
Yes sometimes	52	21.8
Wash of utensils		
Yes	226	94.6
No	5	2.1
Yes sometimes	8	3.3
Disposal of children's faeces		
Rubbish pit	35	14.6
Garbage collector	37	15.5
Toilet	167	69.9

Almost 40 percent of the respondents treated their drinking water. Most of the respondents (56.9%) used garbage collectors to get rid of their refuse. The majority of the respondents (91.2%) kept their yards surrounding the house clean. More than half (59%) of the respondents washed their hands using soap before feeding the child. The majority of the respondents (94.6%) reported that they washed the utensils before using them to feed the child. Over half (69.9%) of the caregivers disposed of the children's faeces in the toilet.

Prevalence of Illness and Health Seeking Practices

Sixty three percent of the children fell sick two weeks prior to the study. Most (89.5%) of the caregivers indicated that their children were fully immunised for age. The majority (70.7%) of the caregivers took their children for growth monitoring and promotion at health facilities. Most (85.4%) of the respondents indicated that their children were given vitamin A supplementation.

About half (50.2%) of the respondents reported that their children were dewormed. Sixty percent of the respondents owned an insecticide treated mosquito net and their children were sleeping under an insecticide treated net (Table 3).

Table 3: Health seeking practices.

Characteristic	Frequency	Percent
Health status		
Sick	152	63.6
Sick Not	87	36.4
Full Immunisation		
Yes	214	89.5
No	25	10.5
Growth monitoring		
Every month	169	70.7
Rarely	68	28.5
Don't	2	0.8
Vitamin A supplementation		
Yes	204	85.4
No	22	9.2
I don't know	13	5.4
Deworming		
Yes	120	50.2
No	119	49.8
Use of ITN		
Yes	146	61.1
No	93	38.9

ITN: Insecticide Treated-mosquito Net

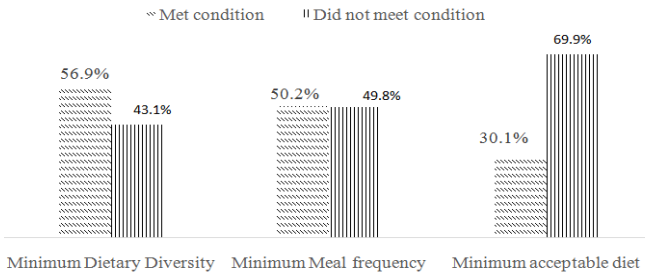

Figure 1: Infant and young child indicators.

Breastfeeding and Food Consumption Pattern

Table 4 shows the breastfeeding pattern and meal frequency of children in the study area. Nearly all (96.7%) respondents indicated that their children were breastfeeding at the time of the study and if not, the child had breast fed at least at one point in its life. Most of the caregivers (53.1%) indicated that their children started complementary feeding at the age of six months.

Infant and Young Child Feeding Indicators

Figure 1 shows infant and young child feeding indicators on minimum acceptable diet. About 60 percent of the respondents gave their children a diversified diet while 50.2 percent of the children met minimum meal frequency as recommended by WHO. Overall, 30.1 percent of the children aged 6 to 23 months met minimum acceptable diet condition. The study findings showed that only 17.6 percent of the children had appropriate complementary feeding.

Nutritional status of the children aged 6 to 23 months.

Table 4: Breast feeding pattern and meal frequency.

Characteristic	Frequency	Percent
Child breastfed		
Yes	231	96.7
No	8	3.3
Age at which child started complementary breast feeding		
Before six months	84	35.1
At six months	127	53.1
After six months	20	8.4
Child breast feed previous night		
Yes	166	69.5
No	73	30.5
Frequency of meals		
1 meal	23	9.6
2 meals	22	9.2
3 meals	62	25.9
4 or more meals	132	55.2

Table 5: Categorisation nutritional status of the children aged 6-23 months.

Nutritional status	Boys (%)	Girls (%)	Total (%)	T –test (gender)	
				Df	*P* – value
Height for age Z-scores					
Below -3 SD (severe stunting)	12.8	4.6	8.4	237	0.015
>-3 to <-2 (moderate stunting)	20.2	14.6	17.2		
Below -2 (stunted)	33	19.2	25.5		
Above -2 normal	67	80.8	74.5		
Weight for age Z-scores					
Below -3 SD (severe underweight)	3.7	1.5	2.5	237	0.508
> -3 to < -2 (moderate underweight)	7.3	6.9	7.1		
Below -2 (underweight)	11	8.5	9.6		
> -2 to < +2 (normal)	89.9	91.5	90.2		
Weigh for height Z-scores					
Below -3 SD (severe wasting)	0	1.5	0.8	237	0.943
> -3 to < -2 (moderate wasting)	3.7	2.3	2.9		
Below -2 (wasting)	3.7	3.8	3.8		
> -2 to < +2 (normal)	90.8	91.5	91.2		
Above +2 (overweight)	5.5	3.8	4.7		

Overall, 25.5 percent of the children were stunted, with boys and girls representing 33 percent and 19.2 percent respectively. More boys (12.8%) than girls (4.6%) were severely stunted. Underweight was 9.6 percent of which 11 percent were boys and 8.5 percent were girls. The proportion of wasting in boys (3.7%) was almost the same as that in girls (3.8%) giving an overall wasting prevalence of 3.8 percent. A significant difference was observed between boys and girls in the height for age Z-scores, (p=0.015) (Table 5).

Relationship between Childcare Practices and Nutritional Status of the Children

Factors correlated to height for age: Correlation between nutritional status and selected childcare practices are shown in Table 6. Spearman's rank order correlation coefficient analyses were performed to establish the relationship between nutritional status and selected childcare practices. There was a significant relationship between height for age (continuous) and type of toilet used (p=0.004), child sickness (p=0.040), fever (p=0.020), cough (p<0.001), diarrhoea (p=0.046), and minimum acceptable diet (p=0.017). Breast feeding night before survey, type of toilet at household and use of insecticide treated mosquito net had a weak positive significant relationship with height for age respectively, (rho=0.195, p=0.002; rho=0.185, p=0.004; rho=0.163, p=0.012). Child sickness (e.g. diarrhoea) had a negative relationship with height for age. There was a significant relationship between height for age and other characteristics such as education level of the caregiver (p=0.013), expenditure on food (p=0.047)

Table 6: Relationship between childcare practices and height for age Z-scores of children.

Characteristic	Height for age	
	Rho	*p*-value
Education level of caregiver	0.160*	0.013
Type of toilet used	0.185**	0.004
Washing of utensils	-0.073	0.259
Child sickness	0.184*	0.040
Fever	-0.157*	0.020
Cough	-0.248**	0.000
Diarrhoea	-0.131*	0.046
Breastfed night before survey	0.195**	0.002
Wash of hands	0.002	0.972
Insecticide treated nets	0.163**	0.012
Immunisation	-0.113	0.080
Vitamin A supplementation	-0.060	0.689
Deworming	0.460	0.484
MAD	0.154*	0.017

**correlation significant at 0.01 level (2 tailed). *correlation significant at 0.05 level (2 tailed).

Table 7: Predictors of stunting in children.

Variable	Sig	Exp. B	95% C.I. Exp. B	
			Lower	Upper
Morbidity	0.009	0.358	0.166	0.773
Source of drinking water	0.157	0.726	0.466	1.131
Use of insecticide treated net	0.106	1.749	0.889	3.442
Level of education	0.389	2.230	0.359	13.842
Type of toilet used	1.000	5400000	0.0000	-
Breastfed night before survey	0.009	0.347	0.156	0.769
Minimum Acceptable Diet	0.625	1.255	0.504	3.128
Vitamin A supplementation	0.354	2.080	0.443	9.771
Deworming	0.684	1.165	0.559	2.425
Disposal of refuse	0.325	1.859	0.541	6.391
Age complementary feeding	0.191	0.419	0.114	1.544

Predictors of stunting and wasting in children: A logistic regression analysis was conducted to predict stunting in children using childcare practices as predictors. The Wald criterion demonstrated that child illness (p=0.009) and breast feeding night before survey (p=0.009) made a significant contribution to stunting in children. Children that were not sick two weeks prior to the study were 0.358 times more likely to be stunted compared to children that were sick. The likelihood of stunting in children who were not breast fed during the night or the day before the survey was 0.347 more times compared to children that were breastfed (Table 7).

Discussion

Hygiene and sanitation practices have a bearing on health. Less than half (39.7%) of the respondents treated the water they gave their children. A similar study that was carried in Zambia [19], found that 60 percent of the population consume safe water. Poor quality of water causes a lot of water borne diseases. Diseases have a direct impact on the nutritional status [20]. Fifty-five percent of the respondents indicated that they treated the drinking water by boiling. Quite a large proportion of caregivers disposed of their refuse using appropriate means, but there were still a number of caregivers who dumped their refuse in open spaces of the communities. Open space refuse dumping in Lusaka is rampant [21] and can lead to water borne infections. Almost sixty percent of respondents indicated that they washed their hands before feeding a baby. This is contrary to the findings in a similar study [22] in India where only 34% percent of the respondents indicated that they washed their hands before feeding the baby.

A caregiver is required to seek health attention whenever a child falls sick. There was a large proportion (63.6%) of children that were reportedly sick two weeks prior to the survey. This was comparable to a similar study [23] that found that 64.5% of the children in Zambia fell sick two weeks prior to the study they did. This clearly indicates that child sickness is rife in Zambia. Most children were immunised against vaccine preventable diseases. However, there were still a large proportion of caregivers who do not appreciate the importance of immunisation. Immunisation is a free government sponsored programme in Zambia and every child has a right to receive vaccines. About 90 percent of respondents reported that their children were fully immunised for age. This was relatively high compared to the finding by [24] in Zambia, were only 40.9 percent of the children were fully immunised. Children that did not receive vaccines, deworming and vitamin A supplementation tablets, were from households where caregivers did not appreciate the growth monitoring services provided by the government and hence did not adhere to the guidelines for vaccination and immunisation. This was demonstrated by low attendance for growth monitoring and promotion by some caregivers whose children had not received deworming tablets, vaccines and vitamin A supplementation. A relatively large proportion of respondents (90%) in the study area indicated that their children had received vitamin A supplementation. A similar study in Zambia found that 88 percent of the children had received vitamin A supplementation [25]. However, only 50.2 percent of the respondents indicated that their children were dewormed. This compares very well with the Zambia Demographic Health Survey (ZDHS) that found that 60 percent of the children had received deworming tablets six months prior to the survey in 2013 [26]. The slightly lower proportion of children that received deworming tablets in the study population compared to the national average can be attributed to low growth monitoring and promotion visits undertaken by the caregivers to the children in the study area. There were a large number of households that own insecticide treated mosquito nets (61%) but the proportion in the study area was lower than the national average that stands at 68 percent [26]. This could be due to the elimination of malaria causing mosquitoes in Lusaka district by government hence the reduction in the use of insecticide treated mosquito nets.

The World Health Organisation recommends that a child should be breastfed exclusively for the first six months and that breastfeeding should continue up to two years of age or beyond. Most children were still breastfeeding at the time of the survey. Nearly all the children were breast fed at least once in their life. This is similar to ZDHS findings were 98 percent of the respondents indicated that their children had breastfed at least once before starting complementary feeding [26]. Children who were not breastfeeding were 0.347 times more likely to be stunted compared to children that were breastfeeding. Exclusive breastfeeding is still low at 53.1 percent. This is consistent with the findings by Nchimunya [27] who found that breastfeeding rate was at 52.1 percent in Cheslton Township in Zambia. The lower proportion of exclusively breastfed children could be due to cultural and environmental influences [27]. The rate of exclusive breastfeeding for the first six months (53.1%) in the study area was lower than the national average that stands at 73 percent [26].

The proportion of children who had a minimum diversified diet in the study area was 56.9 percent. This was much higher compared to the findings by Disha [28], in Zambia were minimum dietary diversity was 37 percent. Children who met the minimum meal frequency condition in the study population (50.2%) were slightly higher than the national average that stands at 42 percent. However, the study findings compare very well with the ZDHS findings in Lusaka that stands at 52.4 percent [26]. The proportion of children who received a minimum acceptable diet (30.1%) was higher compared to the findings in Ethiopia where minimum acceptable diet was 8.4% [29]. The proportion of children that were fed appropriately (17%) was very low compared to the findings [30], in Ghana where appropriate feeding was at 29.6 percent. This can be attributed to high poverty levels in the country with about seventy percent of the population living below the poverty datum line. However, the proportion of children who were fed appropriately in the study area was relatively higher compared to the findings [31] in Ethiopia where only 9.5 percent of the children were fed appropriately

Overall, the nutritional status of the children in the study area was relatively better than the average nutritional status for Zambia. Stunting, underweight and wasting level was 25.5 percent, 9.6 percent and 3.8 percent respectively. In Lusaka province, stunting is at 35.7 percent, underweight 11 percent and wasting 7 percent [26]. The proportion of children that were overweight (4.7%) was higher than the national average that stands at less than one percent. The differences between findings by the ZDHS and the findings by this study on nutritional status of children could be attributed to the fact that this study was done in urban and peri-urban setting where poverty levels are not as high as in some rural parts of Lusaka

province. The proportion of stunting, underweight and wasting in boys was 33 percent, 11 percent and 3.7 percent while in girls it was 19.2 percent, 8.5 percent and 3.8 percent respectively. There was a significant difference in stunting between male and female children. This compares well with the national average were nutritional status of female children was found to be better compared to that of male children [26]. The difference in nutritional status between male and female children cannot be attributed to childcare practices only in this study since there were no significant differences in childcare practices by gender. The differences in nutritional status could be due to biological reasons. Despite improvements in medical care, male children are more vulnerable to harsher environmental conditions than female children in early years of life [32].

Association between Hygiene Practices and Nutritional Status of the Children

Good hygiene and sanitation practices are very important in ensuring good nutritional status of the children. The proportion of households that indicated that they treated the water they gave to their children to drink is lower than the national average that stands at 65 percent [26]. There was no significant relationship between water treatment method and nutritional status of the children. The findings are comparable to a study in Kenya that found that there was no association between water treatment method and nutritional status of the children [33]. However, the quality of water given to children to drink is very important because water is known to carry a lot of microorganisms that are pathogenic.

Association between Health Seeking Practices and Nutritional Status of the Children

More than half (63.6%) of the children were reported to have been sick two weeks prior to the study. Diseases like diarrhoea will result in poor uptake of nutrients in the gut. Diarrhoea has been found to impair nutritional status through the loss of appetite and malabsorption of nutrients [34,35]. Frequent diarrhoeal episodes in the first one thousand days of a child's life increase the risk of stunting [6]. This study found that children who were not sick were 0.358 times more likely to be stunted compared to children who were reported sick. The positive impact of sickness on nutritional status could be due to the care provided. Mainly children who are sick are given nutritious foods in addition to seeking medical attention while children who are mildly sick may not receive much care, ultimately affecting their nutritional status negatively.

Immunisation in a child's life is very important because it gives a child a good start in life in that a child is prevented from contracting communicable diseases such as polio, whooping cough, diphtheria and diarrhoea. Almost 90 percent of caregivers indicated that their children were fully immunised for age. The findings on the rate of immunisation in the study area were higher compared to the national average that stands at 68 percent [26]. There was a significant relationship between immunisation for age with underweight. This compares very well with a study in Tanzania [36] that found that children who were not immunised had a higher prevalence of underweight compared to those that were immunised.

Seventy percent of the respondents indicated that they took their children for growth monitoring and promotion every month. Growth monitoring helps to detect growth faltering at an early stage enabling remedial measures to be undertaken. There was an association between underweight and growth monitoring. The findings are in contrast with a study in Tanzania that found that there was no relationship between growth monitoring and nutritional status of the children [36].

Worms have been known to cause anaemia if deworming is not done regularly [37]. Soil transmitted helminths cause malabsorption of nutrients and loss of appetite thereby affecting the nutritional status of children. However, in this study, there was no significant relationship between deworming and nutritional status of the children. However, some studies have found that there was an association between worm infestation and nutritional status of the children [38]. Use of insecticide treated mosquito net helps to reduce the incidences of malaria. Malaria is known to cause high fever and loss of appetite thereby affecting the nutritional status of the patient. There was a significant relationship between stunting and sleeping under an insecticide treated mosquito net. The findings of this study are contrary to the findings by Kibua [33] who found that there was no significant relationship between use of insecticide treated mosquito net and nutritional status.

Association between Feeding Practices and Nutritional Status

Children who started complementary feeding before six months accounted for 38.5 percent of the children. It is recommended that children start complementary feeding at six months because the gut of children by the age of six months is ready to handle semi-solid foods. There was no significant relationship between age at which complementary feeding was started and nutritional status of the children. Children who did not attain minimum meal frequency were more likely to be wasted.

Children who satisfied the Minimum acceptable diet condition are those children who met both minimum meal frequency and minimum dietary diversity. The overall minimum acceptable diet for children aged 6 to 23 months was 30.1 percent. The findings are relatively higher compared to the findings by ZDHS were minimum acceptable diet in children age 6 to 23 months was found to be 12.7 percent in Lusaka province [26]. The high minimum acceptable diet in this study compared to the national average can be attributed to the socio-economic demographic of the region. The findings are however lower compared to minimum acceptable diet in Kenya which stands at 44 percent [39]. Minimum acceptable diet was found to be significantly related to stunting in children. A study by Ndanu [40], found that there was no significant relationship between stunting and minimum acceptable diet.

There was a weak positive relationship (rs=0.16) between education level of the caregiver and stunting in children. Children taken care of by caregiver who had attained a higher level of education were less likely to be stunted. Education of the caregiver is a better predictor of child malnutrition. Children raised by an educated caregiver suffer less when it comes to malnutrition [41]. In many countries, caregiver's education has been found to be related to malnutrition in children.

Conclusion

The study revealed that prevalence of stunting, underweight

and wasting in children aged 6 to 23 months in the study area was high. The study showed childcare practices that had a significant relationship with nutritional status (height for age) of the children. The education level of the caregiver was also related to the nutritional status of the child. The predictors of stunting included breastfeeding and child morbidity.

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