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Factors contributing to malnutrition among HIV positive children aged between 6 and 60 months

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Abstract: *The objective of the study was to identify factors contributing to malnutrition among HIV positive children aged between 6 and 60 months. The study utilized a non experimental descriptive design. It was a hospital based study conducted at Parirenyatwa Group of Hospital pediatric wards. A total of 30 children and 30 caregivers were recruited through convenience sampling. The children had a confirmed diagnosis of malnutrition, confirmed HIV positive, aged between 6 and 60 months and had to have a present caregiver during data collection. There were no dropouts. The main outcome measure were anthropometric measurements of the children namely; height, weight and mid upper arm circumference and the various stressors contributing to malnutrition. Twenty-two (73.33%) children were males and 8 (26.66%) were females. Contributing factors to malnutrition identified were presence other illnesses such as diarrhea, pneumonia, tuberculosis and kwashiorkor, 19 (63.33%), low socioeconomic status (earned less than USD$100 dollars per month), 16 (53.33%), coming from a family with more than 5 dependants 11 (36.67%), not being on ART 15 (50%), and birth weight below or equal to 2500g 6 (20%). The major contributing factors to malnutrition were extrapersonal stressors (54.83) interpersonal stressors (30.28%) and intrapersonal stressors (29.76%).*

Keywords: *anthropometric measurements, HIV positive, malnutrition, stressors*

I. Introduction

Worldwide there are about 60 million children with moderate acute and 13 million with severe acute malnutrition [1]. Nutritional state during growth and development has far reaching health consequences which may extend in to adult life [2]. Undernutrition is associated with at least 35% of child deaths and is a risk factor for poor cognitive development, reduced human capital, premature death and other health consequences [2]. The association between HIV infection and malnutrition is complex [2]. The immunologic compromise caused by HIV infection accelerates co morbid disease processes such as Tuberculosis (TB), malaria, or chronic diarrhea that cause increased metabolic demands and malnutrition. Children with HIV infection require adequate nutritional supplementation to meet their increased metabolic needs [3].

Despite some progress being made towards both, HIV/AIDS continues to take a terrible toll and deaths of under 5 children [4]. HIV has increased the prevalence of severe acute malnutrition and vice versa [5]. There are still about 800 million undernourished people in the world and in some countries severe malnutrition is the most common reason for pediatric hospitalization [5].

Around 27% of the children younger than five years of age in the developing world are underweight, 32 % are stunted, and 10 % wasted (seen as a deficit of more than two standard deviations below the WHO reference value) [6]. An estimated 19 million children are severely wasted in developing countries and malnutrition is responsible for 11% of the total global disease burden and 35% of child deaths worldwide [7].In some regions notably sub-Saharan Africa, HIV infection poses an added challenge to the case of malnourished children, HIV can lead to poor nutrition as a result of poor food intake, increased nutrient usage, loss of nutrients from the body and other metabolic derangements [7].

1.1 Problem statement

Between 1990 and 2006, about 27 countries in Sub Saharan Africa made no progress in reducing child deaths with Zimbabwe having the highest number of child deaths due to malnutrition [4]. In a recent review more than 30% of severely malnourished children in sub-Saharan Africa admitted to inpatient rehabilitation units were HIV infected [7]. HIV infected children with severe acute malnutrition were 3 times more likely to die compared with uninfected children[7]. The infected group had persistent diarrhea, pneumonia, extensive skin infections and oral thrush which contributed to higher case fatalities and poorer response to management [7].

Malnutrition remains one of the most common causes of morbidity and mortality among children in Zimbabwe and it is estimated that malnutrition may contribute to nearly 12 000 child deaths each year [8]. Zimbabwe continues to experience one of the worst HIV infection rates in sub-Saharan Africa. As of 2009, an estimated 1.1million adult and children in the country were living with HIV. Reports from routine program

monitoring suggest that up to 70% of children admitted for treatment of severe acute malnutrition are HIV infected [9].

While the clinical context and interventions for many common causes of childhood mortality have been addressed over the last decade, the management of severe wasting disease and malnutrition in children – particularly in those infected with HIV remains poorly addressed [7]. This population of HIV infected malnourished children is in many ways very different from the uninfected population for which international malnutrition guidelines were originally developed [7].

Malnutrition results from socio economic and other problems such as poor water and sanitation, sub-optimal care practices, poor access to nutritious food, low education and repeated infections, which may also be HIV related [9]. Successful prevention and management of malnutrition requires that both medical and social problems be recognized and corrected [9]. The purpose of this study was to identify the factors contributing to malnutrition in HIV positive children. A descriptive study design was used with 60 participants (30 children and thirty caregivers). Neuman Systems Model was used as the guiding framework for the study.

1.2 Purpose of the study

The purpose of the study was to identify the factors contributing to malnutrition in HIV positive children aged from 6 to 60 months at a central hospital in Harare, Zimbabwe

1.3 Objectives of the study

- To identify intrapersonal, extrapersonal and interpersonal stressors contributing to malnutrition in HIV positive children aged from 6 to 60 months at a central hospital in Harare, Zimbabwe
- To measure anthropometric variables (weight, height and MUAC) of HIV positive children aged from 6 to 60 months at a central hospital in Harare, Zimbabwe

1.4 Conceptual framework

Betty Neumann's system model was used as the guiding framework for the study.

II. Materials And Methods

The study used a quantitative descriptive design and was conducted at Parirenyatwa Group of Hospitals pediatric wards, nutritional cubicles. Convenience sampling was used to select a sample of 30 caregivers and 30 infants aged from 6-60 months. Included in the study were malnourished children aged 6-60 months with a weight-for-age below 80 % of expected weight who were HIV positive, admitted to pediatric wards at Parirenyatwa and whose caregiver was present. Caregivers were English or Shona speaking. Excluded for the study were malnourished, HIV negative children, children below 6 months and above 60 months and very ill children.

Permission to carry out this study was obtained from the Joint Research Ethics Committee, the Sister in Charge and Heads of the pediatric wards and the Consultants. Informed consent was obtained from the caregivers and they all signed an informed consent form.

Data was collected by means of face to face interviews with the caregivers using a researcher administered questionnaire. After the interview anthropometric measurements were taken from the child,(weight, height/length and mid upper arm circumference (MUAC)). Children below 24 months were weighed with an infant spring scale. The child was naked or wearing minimal clothing. The child was suspended in a hanging bag placed on the scale so that the weight was distributed evenly. For children above the age of 24months, weight was measured using a digital electronic scale, accurate to the nearest 0.1kg. Length of children below 24 months was measured from the crown to the heel using a paediatric measuring board to the nearest 0.1cm. Length/height boards were designed to measure children under 2 years of age lying down (recumbent), and older children standing up. The board measured up to 1200 cm (1.2 meters) for children and be readable to 0.1 of a centimeter. The researcher used a non- stretch measuring tape to the nearest 1 mm to measure MUAC. The child stood/was lain straight with the arms alongside the body. One arm bent at the elbow, the distance of the upper arm between the point of the bent elbow and the knob at the top of the shoulder was measured. The middle point of this distance was calculated and a mark made on the skin of the upper arm. At this mark, the circumference of the upper arm was measured. The measuring tape was fitted tightly, but not to make a dent in the upper arm. All measurements were taken 3 times and the average used.

Data was analyzed using descriptive statistics, namely frequencies and percentages for categorical data and means and standard deviations or medians, were calculated. Microsoft Excel was used for analysis.

III. Results And Findings

A total of 60 participants (30 children and 30 caregivers) were recruited into the study

3.1: Section 1: Demographis characteristics

Table 1 shows demographic variables such as age and gender of the child, the age of the caregiver, marital status and level of education. Twenty-two (73.33%) children were male while 8 (26.27%) were female. Seventeen (56.67%) children were aged 13-24 months. The caregiver's ages ranged from 18-65years. Nineteen (63.33%) caregivers were married.

Table 1: Demographic variables (N=30)

Variable	Frequency	Percentage (%)
Age of child		
6-12months	4	13.33
13-24months	17	56.67
25-36months	5	16.67
>37months	4	13.33
Gender of child		
Male	22	73.33
Female	8	26.67
Caregiver's age		
18-25	11	36.67
26-35	13	43.33
36-45	3	10
>45	3	10
Caregiver's level of education		
Never went to school	6	20
Primary	5	16.67
Secondary	18	60
Tertiary	1	3.33
Caregiver's marital status		
Married	19	63.33
Single	5	16.67
Divorced	1	3.33
Co-habiting	4	13.33
Separated	1	3.33

3.2 Anthropometric measurements

Table 2 shows the anthropometric measurements. Birth weight ranged from 1900g to 4100g. Median birth weight being 2900g. Current weight measurements ranged from 3800g to 12800g and median weight was 6700g. the median for height was 65cm and it ranged from 50cm to 98cm. Eighteen (60%) children had MUAC of less than 110mm and 12 (40%) had MUAC of between 111 and 125mm.

Table 2: Anthropometric Measurements (N=30)

Variable	Number	Percent (%)
Birth weight of child		
1900-2500	6	20
2501-3000	13	43.74
3001-3500	7	23.33
3501-4100	4	13.33
Weight of child		
3800 - 5000	4	13.33
5001 - 7000	6	26.32
7001 - 9000	11	36.67
9001 -11000	4	13.33
11001 - 12800	5	26.32
Height/length of child		
50-60cm	9	30
61-70	10	33.33
71-80	5	26.32
81-90	4	13.33
91-98	2	8.70
MUAC of child / baby (mm)		
< 110 mm	18	60
111 – 125 mm	12	40
> 125 mm	0	0

3.3 Intrapersonal Stressors

Table 3 represents intrapersonal stressors. Twenty-nine (96.67%) children were born full term babies and 1(3.33%) was. Nineteen children (63.33%) had previous admissions for such illnesses as diarrhea, pneumonia, tuberculosis and kwashiorkor and 11(36.67%) children were index admissions. Diarrhea and tuberculosis resulted in 6 (31.58%) admissions each while pneumonia and kwashiorkor were responsible for 5(26.32%) and 2(10.52%) admissions.

Table 3: Intrapersonal Stressors (i)

Variables	Number	Percentage (%)
Prematurity of child		
Yes	1	3.33
No	29	96.67
HIV positive age		
1-12months	14	46.67
13-24months	15	50
>37months	1	3.33
Hospital admittance of child		
Yes	19	63.33
No	11	36.67
Reason for child to be admitted (N=19)		
Diarrhea	6	31.58
Kwashiorkor	2	10.52
Pneumonia	5	26.32
Tuberculosis	6	31.58
Number of admissions (N=19)		
Once	12	63.16
Twice	5	26.32
Thrice	1	5.26
More than 3times	1	5.26

3.4 Intrapersonal stressors (2)

Table 4 is a continuation of intrapersonal stressors. Twenty-one (70%) children were being admitted for malnutrition for the first time. Fifteen (50%) children were not on any treatment, 9(30%) children were on ART, 5 (16.67%) were on TB treatment and 1(3.33%) child was on cotrimoxazole prophylaxis. Eight (26.67%) children were on PEM scheme while 22(73.33%) children were not. Twenty three (76.67%) children were breastfed and 7(23.33%) were not. Of the 7 non-breastfed children, 6 (85.71%) had formula milk and 1 child (14.29%) was fed cow's milk. Fourteen (46.67%) children were started on solid foods at the age of 0-4, 11(36.67%) at 5-6 months and 5(16.67%) at 7-12months.

Table 4: Intrapersonal stressors (ii)

Variable	Number	Percentage (%)
Malnutrition admissions		
First	21	70
Second	7	23.33
Third	1	3.33
More than 3times	1	3.33
Treatment the child is on		
ART	9	30
TB	5	16.67
None	15	50
Cotrimoxazole(only)	1	3.33
PEM Scheme		
Yes	8	26.67
No	22	73.33
Child ever breastfed		
Yes	23	76.67
No	7	23.33
To what age was the child breastfed? (N=23)		
7-12months		
13-18months	7	30.43
19-24months	14	60.87
Length of exclusive breastfeeding (N=23)	2	8.70
0-2months		
3-4months		
5-6months	2	8.70

>6months	7	30.43
Other milk drank by child	12	52.17
(N=7)	2	8.70
Formula milk		
Cow's milk		
Age of solid food introduction	6	85.71
(N=30)	1	14.29
0-4		
5-6		
7-12	14	46.67
	11	36.67
	5	16.67

3.5 Interpersonal stressors

Table 5 and 6 display results for interpersonal stressors. Twenty-eight (93.33%) of children's mothers were alive and 24 (80%) lived with their parents while 6(20%) were being taken care of by grandparents. Twenty two (73.33%) mothers attended antenatal clinic and 8(26.67%) mothers did not. Ten children (33.33%) were the only child, 6 (20%) were second born and 8 (26.67%) were third born.

Table 5: Interpersonal stressors (N=60)

Variable	**Number**	**Percentage (%)**
Mother alive?		
Yes	28	93.33
No	2	6.67
Caregiver of child most of time		
Parents	24	80
Grandparents	6	20
Attendance of ANC by mother		
Yes	22	73.33
No	8	26.67
Live births by mother		
1	10	33.33
2	5	16.67
3	9	30
4	5	16.67
More than 4	1	3.33
Order of child		
1st	10	33.33
2nd	6	20
3rd	8	26.67
4th	5	16.67
5th	1	3.33
Child spacing		
(N=20)		
< 10months	2	10
10-18months	3	15
18-24months	5	25
>24months	10	50

3.6 Interpersonal stressors (2)

Table 6 is a continuation of interpersonal stressors. Ten (50%) children had spacing of greater than 24months with their siblings followed by 5(25%) with spacing between 18-24months and 3 (10%) with less than 10months spacing. Four (20%) siblings had previous admissions of malnutrition and 16 (80%) never had any admissions. Four (13.33%) caregivers had tuberculosis while 2 (6.67%) had pneumonia. All children had their road to health cards, 16 (53.33%) had their weight checks up to date and 26 (86.67%) children had their immunizations up to date.

Table 6: Interpersonal Stressors (ii)

Variable	**Number**	**Percentage**
Sibling malnutrition		
(N=20)		20
Yes		80
No	4	
Admittance in hospital of sibling	16	10
Pneumonia		6.67
Malnutrition	3	6.67
Diarrhea	2	3.33
Oral thrush	2	33.33
No sibling	1	40
None of the above	10	

Mother's HIV status	12	100
Positive		0
Negative	30	
Treatment mother is/was on	0	
ART		60
PMTCT		60
TB	18	13.33
None	18	26.67
Disease condition with caregiver	4	
Tuberculosis	8	
Frequent diarrhea		13.33
Oral thrush		0
Pneumonia	4	0
None of the above	0	6.67
Road to health card of child	0	80
Yes	2	
No	24	100
Weight checks up to date		0
Yes	30	
No	0	53.33
Immunizations up to date		46.67
Yes	16	
No	14	86.67
		13.33
	26	
	4	

3.7 Extrapersonal stressors

Table 7 displays extrapersonal stressors. Twenty eight (93.33%) caregivers had received information on hygiene, 22 (73.33%) on breastfeeding, 22 (73.33%) on diarrhea and 12 (73.33%) on growth chart at the clinic. Twenty one (70%) mothers had input on healthy eating, 21 (70%) on PMTCT and 15 (50%) on complementary feeding. Three (10%) caregivers had knowledge about HIV and malnutrition and 11 (36.67%) knew about food fortification. Sixteen (53.33%) households had a monthly family income of less than US$100, 13 (43.33%) had an income between US$101-US$500 and one (3.33%) household had an income between US$501-US$1000. Eleven households (36.67%) consisted of more than 5 family members' dependant on the income in the household. Seventeen (56.67%) caregivers lived in the high density suburbs, 5 (16.67%) in rural areas, 4 (13.33%) in middle density suburbs and 4 (13.33%) in low density suburbs.

Table 7: Extrapersonal stressors (N=30)

Variable	**Number**	**Percent (%)**
Health education and counseling on:		
PMTCT	21	70
HIV and malnutrition	3	10
Diarrhea	22	73.33
Healthy eating	21	70
Breastfeeding	22	73.33
Complementary feeding	15	50
Food fortification	11	36.67
Growth chart	22	73.33
Hygiene	28	93.33
Monthly family income		
< US$100	16	53.33
US$101-US$500	13	43.33
US$501-US$1000	1	3.33
Number of dependents		
2	2	6.67
3	3	10
4	5	16.67
5	9	30
>5	11	36.67
Area of residence		
Low density suburb	4	13.33
Middle density suburbs	3	10
High density suburbs	17	56.67
Farms	1	3.33
Rural areas	5	16.67

Summary of Stressors

The stressors investigated in the study, extrapersonal had a percentage (54.83%) of such stressors experienced by the participants followed by interpersonal stressors (30.28%) and intrapersonal stressors (29.76%). This is represented in the figure below, with the stressors represented in the x-axis and percentage prevalence of stressors in the y-axis.

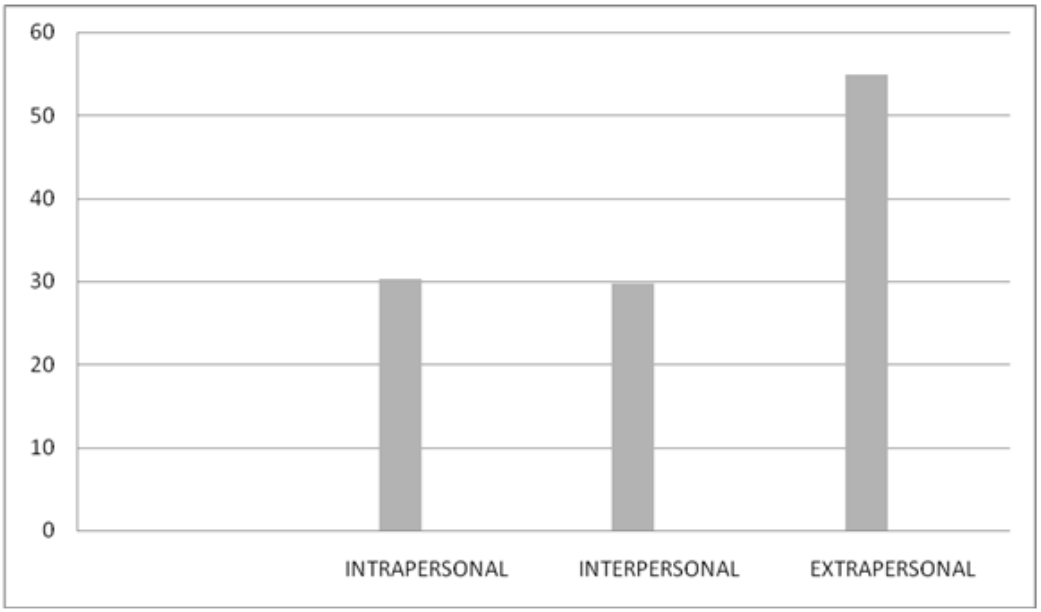

Figure 2: Summary of Stressors N=30

IV. Discussion

This section presents major findings of the study, discussion, implications, recommendations and limitations of the study.

4.1 Sample Demographics

On the demographics of the children the results showed a higher percentage of males (73.33%) compared to females (26.67%) which correlated with other studies where boys had significantly worse nutritional status than girls. Ayaya and colleagues (2004) did a study that looked at the social risk factors for a child being put on Protein Energy Malnutrition and; results included being a single mother and age of mother between 15-25years [10]. This study showed that a high percentage of women were in the 26-35years range followed by 18-25 years range. Malnutrition in their children could be due to HIV infection and poor socioeconomic conditions rather than young maternal age. Twenty percent of the caregivers never went to school and 60% went up to secondary school, while 16.67% went up to primary level. Previous studies done in the Phillipines showed that maternal education is one of the most important key elements in addressing child malnutrition [11]. A study done in South Africa examining the relationship between maternal education and malnutrition revealed that higher levels of maternal education were associated with lower levels of stunting, underweight and wasting in all age groups.

4.2 Factors Contributing to Malnutrition

This section discusses the factors contributing to malnutrition. They are classified under intrapersonal, interpersonal and extrapersonal stressors.

4.2.1 Intrapersonal Stressors

Malnutrition remains one of the most common causes of morbidity and mortality among children in Zimbabwe and it is estimated that malnutrition may contribute to nearly 12000 child deaths each year and Zimbabwe continues to experience one of the worst HIV infection rates in sub- Saharan Africa [8]. Majority of the children tested HIV positive from 13-24months age range but most of them where only tested for the virus as a result of the sickness which brought them to hospital.

Most of the children (63.33%) had once been admitted in hospital for diarrhea and tuberculosis. These conditions contribute to malnutrition because of the excessive nutritional demands on the body. In a study done by Bachou et al (2006) revealed 42% and 13% of malnourished children in a study they conducted had suffered

from diarrhea and TB respectively [12]. Though (70%) of the admissions were index admissions for malnutrition, 30% cases were readmissions. Malnutrition relapses among HIV positive children were on the increase [7]. This is probably due to recurrence of infections such as diarrhea and TB which continue to exert high nutritional demands on the body. Caregivers should therefore be educated on the importance of observing preventive measures such as good hygiene, prompt treatment of infections and early commencement of ART to prevent OIs that contribute to malnutrition. In this study though all the children were HIV positive, 50% children on ART. There is need to commence these children on ART. All children diagnosed with HIV at 12months and below should be commenced on ART irrespective of clinical or immunological state [13]. In this study, of the 14 children diagnosed of HIV in the 1-12months range only 7 of the children were commenced on ART. ART improves immunity and enables the body to fight opportunistic infections and reduces energy loss thus improving life expectancy and quality of life of the infected children [14].

Even though all the children in the study were malnourished, only 26.67% of the children were on the PEM scheme. It is essential to address nutritional needs of HIV infected children to optimize their health outcomes [14]. Nutritional supplementation should be integral to and budgeted for in HIV programmes. Findings of a study done by Sunguya et al (2011) revealed incidences of underweight and wasting among non-Ready to Use Therapeutic Feeds (RUTF) -receivers than in RUTF-receivers [14]. RUTF has a potential to improve nutrition among HIV positive children under ART thus there is need to thoroughly screen those children to be put on the PEM scheme and this can be done by critically analyzing the Road to Health Card of the child on the monthly weight checks.

Exclusive breastfeeding is recommended in children who are HIV positive for the first 6months of life and continual breastfeeding up to the age of 24 months or beyond [3]. In this study 76.67% of the children were breastfed and the majorities (60.87%) were breastfed to 13-18months, with the highest frequency (52.17%) of length of exclusive breastfeeding in the 5-6months range. Most caregivers (46.67%) introduced solid foods from 0-4months. For children who were not breastfed 85.71% of them received formula milk and one child fed on cow's milk. These results might have been due to the beliefs, norms and practices of most people in Zimbabwe who believe that breast milk is not sufficient enough for babies and early introduction of solids will help the child grow more. As reported in the Guidelines on HIV and Infant Feeding (WHO, 2010), exclusive breastfeeding reduces the risks of children being infected with other diseases and malnutrition which is associated with powdered milk and early introduction of solid foods prepared in unsafe setting [7, 13]. Systematic reviews indicated high infant morbidity and mortality associated with replacement feeds in countries such as Botswana, India, Malawi, South Africa, and Uganda.

4.2.2 Interpersonal Stressors

Most mothers (93.33%) of the children participating in the study were alive; two mothers had died because of AIDS. Six children were being taken care of by grandparents because either the parents were dead or the mothers were single and had to go to work to fend for the family. Kleynhans et al (2006) found that children that lived in households where grandparents were caregivers had the highest rate of stunting [15]. A study done in Limpopo, South Africa amongst children aged 12 to 24 months revealed that children cared for by their mothers had a lower risk of stunting[15]. Because most children in the study were being taken care of by their mothers, malnutrition could have been a direct result of infection with HIV and other opportunistic infections.

In this study 33.33% of mothers had had only one live birth (the child in the study), and 16.67% had 4 live births. Risks for malnourishment in children include having siblings and a high birth order (being the third born or more). In this study 26.67% of the children were third in the birth order. Among the 20 children with siblings in this study, 10 (50%) children had been spaced by more than 24months while 25% had been spaced by 18-24months. Babies are sometimes weaned too early because of another birth, causing the mother to cease breastfeeding of the first baby weaning them on a thin cereal with low quality protein, causing the older child to become ill when the new baby arrives and putting them at risk of malnutrition. A fifth of the children included in the study had their siblings suffering from malnutrition as well and the families concerned commonly had 3 or more siblings.

All caregivers were able to produce road to health cards even those mothers who had not delivered at a hospital or clinic. This might have contributed to the accurate diagnosis of malnutrition. Though 46. 67% had not completed the RtHC, even the 53.33% that had been completed were not necessarily interpreted correctly and malnutrition could have been picked late. It is essential to strengthen in service training for nurses in the primary care system so that they can record the weight and analyze it appropriately.

The study showed that 13.33% of the children still had outstanding immunizations. These children are more prone to illnesses and infections, which results in a higher chance of developing or worsening malnutrition and must not skip immunization [10].

4.2.3 Extrapersonal Stressors

Most of the mothers had received health education from the clinic on diarrhea (73.33%), healthy eating habits (70%), breastfeeding (73.33%), complementary feeding (50%), food fortification (36.67%), explanation of the growth chart (73.33%), hygiene (93.33%), PMTCT (70%) and information on HIV and malnutrition (10%). Though caregivers had this knowledge, children still suffered malnutrition because the majority (53.33%) of the households had a monthly income of less than US$100 which was insufficient to cater for family needs considering a large number (36.67%) of the participants had more than five dependents on the salary as well. Families will reduce their consumption and this puts the children at risk of malnutrition.

4.3 Anthropometric Measurements

Birth weight is a predictor of malnutrition and there is a direct link between maternal health and child nutrition [15]. Low birth weight babies have a higher risk of developing feeding problems and malnutrition [15]. In this study 20% of the children had a birth weight below or equal to 2500g and this could have contributed to malnutrition. In this study 60% of the children had a mid upper arm circumference of between 111mm and 125mm indicating moderate malnutrition, probably because the children were now being treated in hospital and recovering from the malnutrition.

V. Implications

5.1 Implications to Nursing practice

Screening of children that are at risk of malnutrition should be done at primary level during the monthly weight checks by the nurses and critical analysis of the growth chart implemented so that there is application of appropriate interventions before the child gets malnourished. Also more health education is needed regarding the importance of the growth chart. Follow ups on HIV-exposed infants has to be initiated from birth done before the children contract opportunistic infections, for early ART initiation.

5.2 Implications to nursing education

There is need to strengthen health education to nurses and public on malnutrition in HIV positive children. There is need for inservice training of nurses and ancillary staff so that they keep abreast with changes, technology and knowledge in care of HIV exposed infants.

5.3 Implications to nursing research

More research is needed to explore the contributing factors of malnutrition and looking at children who have just been initiated on ART so that interventions can be implemented earlier. The study needs to be replicated on a wider scale to include other central and district hospitals both in urban and rural areas in order to produce results that are generalizable to the entire population of HIV exposed infants.

5.4 Implications to nursing administration

Nursing administrators need to provide adequate material and human resources for proper management of HIV exposed infants.

VI. Conclusions

Contributing factors to malnutrition identified were presence other illnesses such as diarrhea, pneumonia, tuberculosis and kwashiorkor, 19 (63.33%), low socioeconomic status (earned less than USD$100 dollars per month), 16 (53.33%), coming from a family with more than 5 dependants 11 (36.67%), not being on ART 15 (50%), and birth weight below or equal to 2500g 6 (20%). This might highlight the need for mandatory counseling and testing of pregnant women and their partners to ensure early initiation of ART and reduction of risk of vertical transmission of HIV. nurses must also emphasize on family planning and proper child spacing as part of ART counseling to people of the reproductive age group. This helps to eliminate effects of stressors such as opportunistic infections in the child, lack of financial resources, and many dependants in the family. The major contributing factors to malnutrition were extrapersonal stressors (54.83 interpersonal stressors (30.28%) and intrapersonal stressors (29.76%).

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