

**KNOWLEDGE AND PRACTICES OF HEALTH CARE  
WORKERS IN KENYATTA NATIONAL HOSPITAL  
AS REGARDS NUTRITIONAL STATUS AND NEEDS  
OF HIV INFECTED CHILDREN**

**A Thesis Submitted In Part Fulfillment of the Degree of  
Master of Medicine (M.Med) in Paediatrics and Child  
Health**

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## DECLARATION

I hereby certify that this is my original work and that it has not been submitted in any other university or forum.

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## **DEDICATION**

I dedicate this thesis to my loving wife Brenda, our daughter Natalie-Rose and to our son Isaac for their support, Love and inspiration. I will be forever grateful.

Thank you my supervisors for your tireless and unrelenting effort and for your invaluable input towards this book. May God bless you abundantly for your mentorship as well.

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## **ABBREVIATIONS**

AIDS.....	Acquired Immunodeficiency Virus
ARV.....	Antiretroviral
CCC.....	Comprehensive Care Clinic
HIV.....	Human Immunodeficiency Virus
HCWs.....	Healthcare workers
IMCI.....	Integrated Management of Childhood Illness
KDHS .....	Kenya Demographic and Health Survey
KNH.....	Kenyatta National Hospital
MUAC.....	Mid Upper Arm Circumference
MDG.....	Millennium Development Goals
NASCOP.....	The National Aids and Sexually Transmitted Infections Control Programme
OI.....	Opportunistic infections
PMTCT.....	Prevention of Mother to Child Transmission
UNAIDS.....	United Nations Programme on HIV/AIDS
UNICEF.....	United Nations International Children's Emergency Fund
UNDP.....	United Nations Development Programme

## **ABSTRACT**

**Introduction:** Human Immunodeficiency Virus (HIV) infection and malnutrition are interlinked, both epidemiologically and physiologically. The synergistic effects of malnutrition and HIV on the immune system occur in a vicious cycle in which the decreased immunity associated with both conditions leads to increased susceptibility to infections which if not adequately met lead to more malnutrition. As a result, there has been the development and implementation of guidelines on how best to offer nutritional care to HIV-infected children.

**Objectives:** To Determine the Knowledge and Practices of Healthcare workers at Kenyatta National Hospital as regards the nutritional assessment, nutritional classification and indicators of increased nutritional needs in HIV infected children.

**Methods:** We conducted a Hospital based descriptive cross-sectional study in the paediatric wards, paediatric filter clinic and the comprehensive care clinic at the Kenyatta National Hospital (KNH). All Health Care Workers (HCWs) at KNH involved in the management of HIV infected children under the age of five years were eligible for inclusion in the study. These included doctors, clinical officers and nurses. The data was collected using questionnaires guided in-depth interviews administered to the Health workers as well as observation and a review of medical records of HIV infected children. Knowledge on the nutritional assessment, nutritional classification and the indicators of increased nutritional needs of HIV infected children was assessed based on the National Nutritional Guidelines on HIV. The assessment of practice was observed as a health worker completed seeing a child and by a review of the medical records

**Results:** Of the 104 health workers in the study, only 21/104 (20%) had full knowledge of the nutritional classification based on the standard WHO classification. As regards the nutritional

assessment, the results show that the prevalence of malnutrition among children was 15/100 (15 %) (Wasting), 32/100 (32%) (Stunting) and 24/100 (24%) underweight. Health workers were not familiar with all the indicators of increased nutritional needs and hence at risk of under nutrition in HIV infected children, where only 66/104 (64%) identified failing to gain weight as a risk factor for under nutrition and only 41/104 (40%) of HCWs reported that a recent poor appetite was a risk factor for under nutrition. Flattening of the growth curve was correctly identified as a risk factor for under nutrition by 91/104 (88%) of health workers whereas a dropping growth curve or weight loss was identified by 92/104 (89%) of HCWs as a risk factor for under nutrition in HIV. A change in caregiver was not identified as a risk factor for under nutrition by 62/104 (60%) of HCWs.

**Conclusion:** Knowledge and practice on the classification of the nutritional status of HIV infected children based on the current nutritional guidelines for HIV infected children was poor highlighting a lack of awareness of the current national nutritional guidelines in HIV infected children. Assessment of the nutritional status of HIV infected children was good in the use of height/length and weight but poor in the use of MUAC. Moreover, HCWs were not familiar with the identification of a child in need of increased nutritional intake in HIV infection.

**Recommendations:** In-service training to allow health workers to familiarize themselves with the current national guidelines on nutritional care of HIV infected children. This will increase skills, competencies and update knowledge in health workers as regards the nutritional assessment, the nutritional classification and early intervention as regards the indicators for increased nutritional needs.

## **LITERATURE REVIEW**

### **INTRODUCTION**

The Human Immunodeficiency Virus (HIV) /Acquired Immunodeficiency Syndrome (AIDS) epidemic poses an inescapable challenge to the world at large and to Africa in particular (1) and a massive effort is needed to cushion the impact of the epidemic and nutritional care and support should be integral elements of any action taken. HIV infection impairs the nutritional status of infected children from early in life (2). The World Health Organization (WHO) defines malnutrition as the cellular imbalance between the supply of nutrients and energy and the body's demand for them to ensure growth, maintenance, and specific functions (3)

The synergy between HIV and under nutrition is well documented (4, 5). Children infected with HIV are more vulnerable to undernutrition and growth failure whereas undernutrition weakens the immune system and increases vulnerability to opportunistic infections in HIV infected children. Adequate nutrition can help delay the progression of HIV if it starts early in the asymptomatic disease stage. Early nutritional intervention and follow up is hence key to improving outcomes in HIV infected children. Guidelines have been developed with an aim to provide a framework for integrating nutritional support into the routine care of HIV-infected children. These guidelines have been adopted locally through The Nutrition and HIV chart booklet (6).

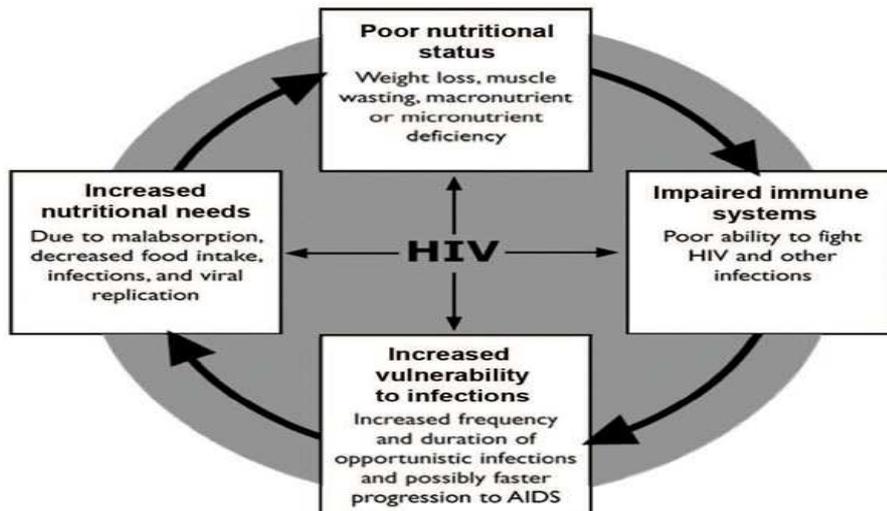
## **BACKGROUND:**

### **EPIDEMIOLOGY OF HIV AND MALNUTRITION**

In Africa undernutrition is a significant cause of morbidity and mortality in children under 5 and is endemic in sub Saharan Africa where approximately 10 percent of children under 5 suffer from moderate and severe wasting, 40 percent with moderate and severe stunting, and 29 percent with moderate to severe underweight (7). The Kenya Demographic and Health Survey, 2008-2009 found that 35 percent of children under five were stunted, while the proportion severely stunted was 14 percent (8). Stunting is an indicator of chronic malnutrition. The burden of undernutrition among young children has been compounded by HIV and AIDS. By the end of 2005, an estimated 2.3 million children worldwide were HIV positive, almost 90 percent of them in sub-Saharan Africa (9). A study conducted by UNICEF in 2008 in Kenya among HIV infected children found that 31 percent of children under five were stunted, while the proportion severely stunted was 20 percent (7). Another study done in 2010 in KNH (Kenyatta National Hospital) assessing the Nutritional status of HIV Infected Children under five on HAART at KNH-CCC found that 16 percent were stunted and 5.5 percent were severely stunted (10).

### **INTERACTION BETWEEN HIV AND MALNUTRITION**

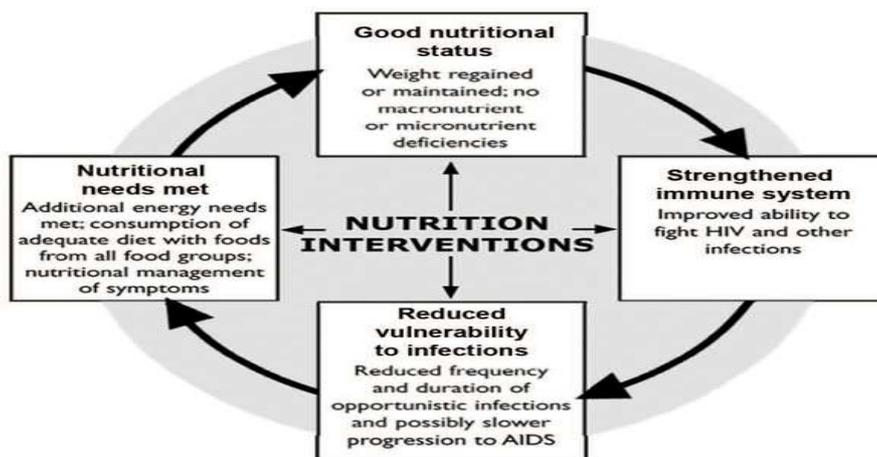
HIV and malnutrition are interlinked, both epidemiologically and physiologically. The synergistic effects of malnutrition and HIV on the immune system occur in a vicious cycle (Fig. 1) in which the decreased immunity associated with both conditions leads to increased susceptibility to infections which if not adequately met lead to more malnutrition(4,5). Malnutrition, specifically wasting, is an important predictor of HIV progression to AIDS (11).



**Figure 1: Vicious Cycle: HIV AND MALNUTRITION:**

Scrimshaw N, Taylor C & Gordon J (1968) Interactions of Nutrition and Infection. Geneva: WHO.(4)

Malnutrition and HIV have similar deleterious effects on the immune system (12-14). In both malnutrition and HIV there is reduced CD4 and CD8 T-lymphocyte numbers, delayed cutaneous sensitivity, reduced bactericidal properties and impaired serological response after immunizations (15).



**Figure 2: Effect of Nutritional Interventions on Immunity:Scrimshaw NS & SanGiovanni (1997) JP**

**Synergism of nutrition, infection and immunity: An overview. (5)**

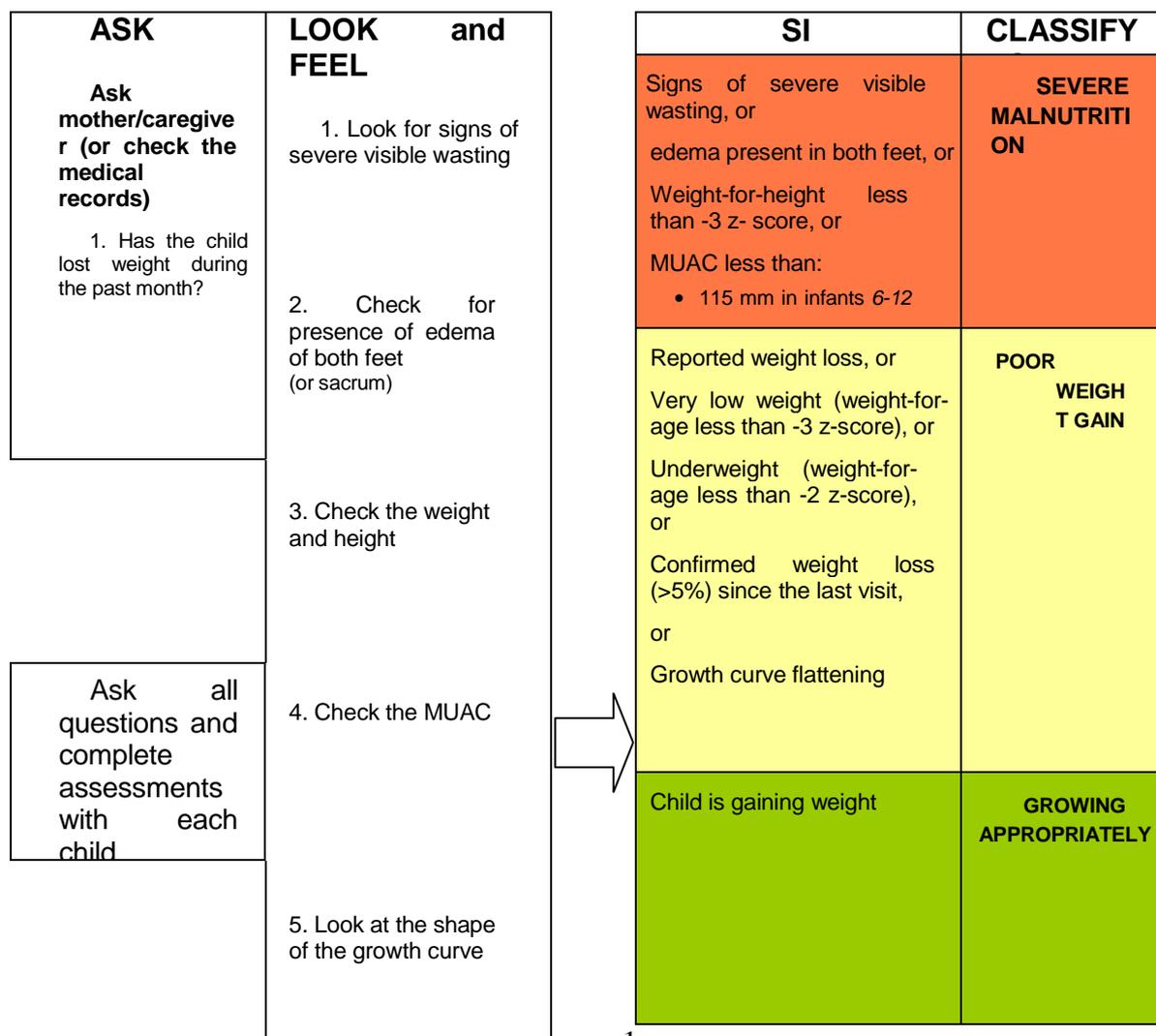
## **ASSESSMENT AND CLASSIFICATION OF THE NUTRITIONAL STATUS IN HIV INFECTED CHILDREN**

HIV-infected children deserve special nutritional attention because of their additional needs to ensure growth and development and their dependency on adults for adequate care including nutritional care and support for treatment. This is of particular importance because nutrition plays an important role in support of antiretroviral treatment. Monitoring length or height in children is a good indicator of a child's nutritional status. Another good indicator of a child's general nutritional status is their mid-upper arm circumference (MUAC) (3). Notably, growth faltering and reduction in length or height often occurs in HIV even before opportunistic infections in almost all infected children (11).

In 2004 WHO commissioned a technical review of the nutritional needs of children infected with HIV as an evidence-base for the development of nutritional care guidelines (16). This culminated in the development and adoption of guidelines as regards nutrition in HIV infected children in 2009(6). The guidelines propose a standardized assessment and classification of the nutritional status of infected children and the intervention necessary for each. In addition, the guidelines propose the early identification of a child at risk of under nutrition. The interventions proposed therein are aimed at being practical and feasible in resource poor settings while offering a prospect of clinical improvement. The Guidelines further aim at providing a framework for integrating nutritional support into the routine care of HIV-infected children. Moreover, the Nutrition and HIV guidelines are designed such that they can be used as a quick reference to the Health Care Workers (HCWs) on questions to be asked and measurements to be done when evaluating a HIV infected child and how these pieces of information should be used to assess, classify and manage children. Notably, these guidelines compliment the WHO guidelines developed in 2008 for the management of common illnesses. Contained in these guidelines is a classification system for the nutritional

status of children which is also applicable to HIV infected children (17). The locally adopted guidelines (6) on the nutritional care of HIV infected children recommend a 3 step approach to the management of nutrition in HIV infected children:

Assess and classify child's weight and growth: Regular and careful assessment of a child's growth helps monitor HIV disease progression, can identify complications early, and so offer the opportunity to intervene. This is outlined below:

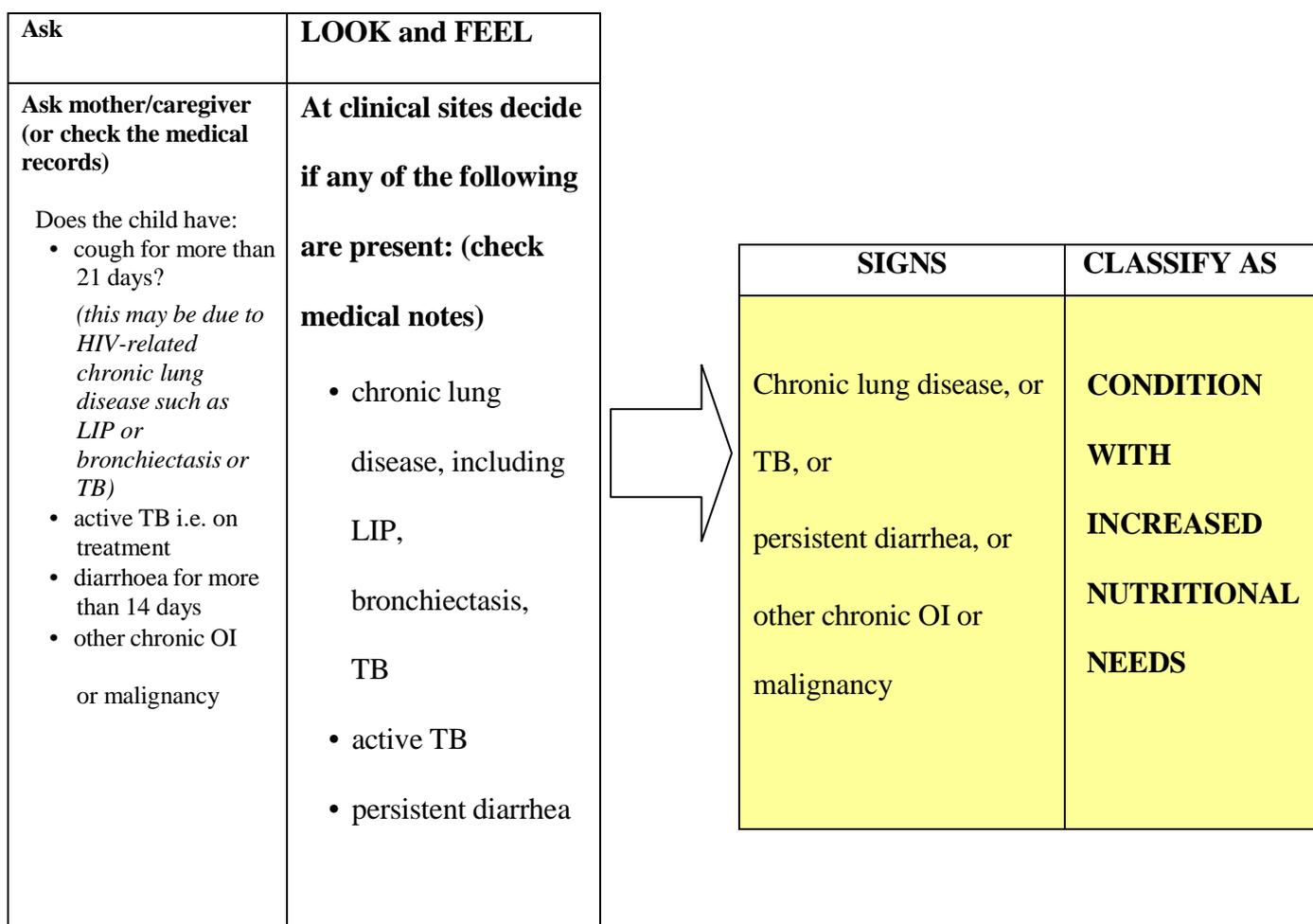


1.

**Figure 3: Classification of the Nutritional Status:**

Guidelines for an integrated approach to the nutritional care of HIV-infected children (6 months-14 years), 2009. (6)

2. Assess the child’s nutritional needs: The nutritional needs of HIV infected children for growth; development and immunological function depend on the stage of disease and history of recent complications such as persistent diarrhoea or opportunistic infections. The recommended approach is as shown below:



**Figure 4: Increased Nutritional Needs: Guidelines for an integrated approach to the nutritional care of HIV-infected children (6 months-14 years), 2009. (6).**

3. Decide on a nutritional care plan: Nutritional needs are best met through balanced and varied diets in adequate quantities. When these are not available, or demands are high, then additional support may be needed. The different nutritional plans are as outlined:

**Children that are growing well and asymptomatic or with mild symptoms only; (this may include children on ART >6 months following recovery of weight).**

The energy needs of these children are increased by about 10% (based on actual weight rather than expected weight for age). The child still needs appropriate energy intake according to his/her age and weight. The additional energy helps to maintain normal growth, development, and activity and body functions. The additional energy is best given via additional household foods, provided as part of a balanced, varied diet. If there is inadequate food for the child's entire household then Family Food Support may be required.

**Children with conditions with increased energy needs e.g. chronic lung disease or chronic infections e.g. TB or persistent diarrhoea. Children may, or may not, be on ART.**

Children with chronic illnesses may require extra 20-30% energy each day (based on actual weight rather than expected weight for age). These children also need ART and should be referred to a treatment site for assessment and exclusion of TB. The additional 20-30% energy is best given through additional household foods, provided as part of a balanced, varied diet. If this is not possible, then specific *nutritional supplements* should be offered until the underlying causes of poor weight gain, or causes of additional energy needs e.g. chronic lung disease, TB or HIV-related malignancy are effectively managed.

**Children with severe malnutrition i.e. signs of visible wasting, bilateral edema or severely impaired growth. Children may, or may not be, on ART.**

These children need 50 to 100% extra energy each day (based on actual weight rather than expected weight for age) for a limited period until weight is recovered. These children should be treated with *therapeutic feeding* which should continue until nutritional recovery is achieved (average ~6-10 weeks). They should also be referred to an ART treatment site for assessment and exclusion of TB.

These severely malnourished children with no medical complications can often be managed at home if they still have a good appetite. Children with a poor appetite, implying complications, should be referred for inpatient care. The nutritional management of HIV-infected severely malnourished children is largely the same as for children without HIV infection except that they should also be assessed for ART. Other opportunistic infections such as thrush, TB or cryptosporidiosis should also be excluded and treated.

## **IDENTIFYING THE CHILD AT RISK OF UNDERNUTRITION**

It is better to identify infants and children who are at risk of undernutrition, or who have poor growth, before they become severely malnourished.

Therefore if;

- A mother reports that her child is failing to gain weight, *or*
- The child has had a poor appetite recently, *or*
- The child is not gaining weight and his/her growth curve is flattening, *or*
- The child is losing weight and the growth curve is dropping downwards, *or*
- There are changes in caregiver or home circumstances.

Then the child should be examined for visible signs of malnutrition i.e. very little subcutaneous fat and muscle (particularly obvious on the upper arm and the thighs and buttocks sagging skin) with or without bipedal oedema. If signs of severe visible wasting are not present the child can be given nutritional support at home with early follow-up (5-7 days), and assessed for ART and/or other medical problems. If present, the child should be managed as having severe malnutrition.

### **RATIONALE:**

The HIV and AIDS epidemic is compounding the already poor nutritional status of children in the region. Among children, HIV infection causes growth faltering even before the onset of the infection's symptomatic phase. This hinders child development and is associated with increased risk of mortality.

In Kenya, the nutrition and HIV/AIDS strategy 2007-2010 (18) was developed with the aims of developing model strategies to be implemented by institutions and organisations that provide services involved in the national response to the epidemic and by policymakers who support such institutions. The nutrition and HIV/AIDS strategy 2007-2010 carried out an analysis of the strengths, opportunities and challenges of the sub sector focus on nutrition and HIV/AIDS revealed a set of gaps and attributable factors. Addressing these gaps was found to be crucial to the realisation of national goals and targets. Among the gaps identified were the lack of knowledge on nutrition in HIV and the lack of in-service and pre-service training to improve skills, competencies and update knowledge of health workers.

A study done in Ethiopia in 2011 aimed at assessing the integration of nutrition into HIV programmes to prevent malnutrition and improve child survival Identified gaps in nutrition assessment, counseling, and support (19). It was found that many facility-based providers lacked nutrition counseling skills and access to tools and materials to help them offer adequate support to mothers and children. Locally, despite implementation of the guidelines in 2010, malnutrition still presents a challenge in the management of HIV infected children (10). Integral in addressing this issue would be an

assessment on how the guidelines on nutritional care of HIV infected Children have been integrated in the care of HIV infected children.

## **OBJECTIVES:**

**Overall Objective:** To evaluate the Knowledge and Practices of Health Care Workers regarding the nutritional classification, nutritional assessment and the risk factors for increased nutritional needs of HIV infected children at Kenyatta National Hospital.

### **Specific Objectives:**

1. To evaluate the Knowledge and practice of HCWs as regards the nutritional classification of HIV infected children at Kenyatta National Hospital.
2. To evaluate the Knowledge and practice of HCWs as regards the assessment of the nutritional status of HIV infected children at Kenyatta National Hospital.
3. To evaluate the Knowledge of HCWs as regards the risk factors for undernutrition in HIV infected children at Kenyatta National Hospital.

## **MATERIALS AND METHODS:**

### **STUDY AREA:**

This study was conducted in the paediatric wards, paediatric filter clinic and the Comprehensive Care Centre at The Kenyatta National Hospital.

Kenyatta National Hospital is one of two national referral hospitals in Kenya. It is also a teaching hospital for the University of Nairobi and the Kenya Medical Training College involved in the training of HCWs, notably doctors, nurses and clinical officers.

Children infected with HIV are managed in the following units at the KNH:

- The Paediatric Emergency Unit: This is where all children who come to KNH requiring medical attention are attended. Patients in the unit are attended to at all times by a team that comprises a postgraduate student training in paediatrics(Registrar), who works with a consultant as the first on call. Other HCWs include clinical officers and nurses. Daily, an average of 150 children are seen with an average of 20 admissions.
- Paediatric Wards: There are 4 in number. Each has a team of HCWs that comprises on average 10 nurses, 2 clinical officer interns, 1 medical officer intern, 6 registrars and 5 consultants. On average there are about 100 patients admitted at any one time in each of the wards. The team is complimented by nutritionists from the nutritional department and a team from the CCC to provide voluntary testing and counseling for HIV.
- Comprehensive Care Centre: This unit is mainly charged with provision of outpatient HIV care. This encompasses issuing of antiretroviral therapy, nutritional support and psychosocial support. The staff comprises a team of consultants, registrars (who are at least 2 at any one time), clinical officers who are 6 on average and nurses who are at least 10 at any one time.

**STUDY POPULATION:** The study population comprised 104 HCWs and 100 children aged 5-59months infected with HIV who were used to assess practice of the HCWs. The HCWs included doctors, clinical officers, nurses and nutritionists.

**INCLUSION CRITERIA:** HCWs in KNH and caregivers involved in the care of HIV infected children who gave consent to participate in the survey.

**EXCLUSION CRITERIA:** Children who had incomplete data were excluded and HCWs who failed to fill in their qualifications. Unregistered HCWs were also excluded.

**STUDY DESIGN:** This was a hospital based descriptive cross sectional study.

**SAMPLE SIZE:** The number of HCWs and Children recruited was based on a convenient sample and included HCWs and children present at the study sites on days when data was collected. Children

**STUDY PROCEDURES:**

The data was collected using a questionnaire guided interview of HCWs, observation of practice and a review of medical records. See appendices 2 and 3 respectively. Research assistants were recruited and trained on how to administer the tools and to record responses. The study assistants recruited were clinical officer interns.

Knowledge on evaluation of the Nutritional status and needs of HIV infected children was assessed using a questionnaire containing closed and open-ended questions based on the National Nutritional Guidelines on HIV and sought to assess knowledge of HCWs as regards:

- Indicators of a child at risk of under nutrition.
- Physical parameters for assessment of nutritional status.
- Classification of nutritional status.
- Micronutrient Needs
- Increased Nutritional Needs due to co-morbidities
- Energy requirements.

The assessment of practice was also based on the National Nutritional Guidelines on HIV and was done in real-time by assessing the necessary documentation as follows:

- Identify Children with HIV between the ages of 6 months to 5 years.

- Check/Observe if a nutritional assessment was done.
- Check/Observe if an assessment of nutritional needs was done.
- Check/ observe if the correct nutrition was prescribed where indicated.

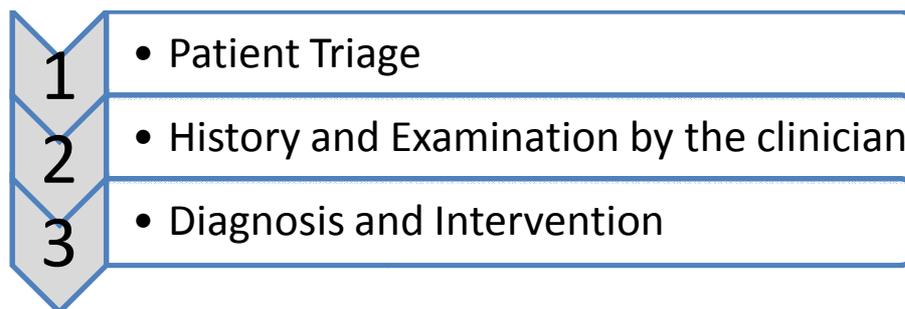
#### **SAMPLING, RECRUITMENT AND CONSENTING:**

A convenient sample of 104 HCWs was taken with an average of 35 HCWs from each of the study sites. The average was targeted at giving a near equal representation of the HCWs at each of the study sites. The HCWs were recruited consecutively based on who was present on the days that data was collected. The children recruited numbered 100. This was a convenient sample with consecutive inclusion of the children present at the study sites on the days that data was collected. To ensure minimum disruption of services, the interviews were conducted at the convenience of the participants as regards their various working schedules. Prior to administering the questionnaire, the participant was informed on the nature of the study and length of the interview. Written consent was obtained thereafter from each participant. See appendix 1. On completion, participants who wished to have the Nutritional Guidelines on HIV were assisted to do so with the help of The National Aids and Sexually Transmitted Infections Control Programme (NAS COP).

## **ASSESSMENT OF PRACTICE: OBSERVED AND MEDICAL RECORD MANAGEMENT**

Practice was observed in patients as they interacted with HCWs during their hospital visits and was also assessed through a review of medical records. The patients comprised children aged between 6-59 months who were HIV infected. The children numbered 100 in total. This was a convenient sample with consecutive inclusion of the children present at the study sites on the days that data was collected. A convenient average of 33 patients was further selected for an near equal representation of the different study sites. Data collected from these children included the age, MUAC, Length/ Height and Weight. The anthropometric measurements used for the nutritional assessment and nutritional classification were height-for-age (H/A), which indicates the level of stunting, weight-for-age (W/A), which indicates the level of underweight, and weight-for-height (W/H) which indicates the level of wasting.

Where practice was observed, the investigator would accompany the patient as they receive care from the various HCWs based on the patient flow during routine hospital visits as captured in the diagram below:



The investigator played a passive role by observing and recording the care given as per appendix 3. At the end of the medical consultation the investigator would go through the medical record to fill in any details that may have not been observed but were recorded.

Where practice was recorded, the investigator looked through the files and checked the relevant information as per appendix 3. Once the relevant information had been noted, the file was then handed back to the HCWs or re-filed appropriately.

### **CONFIDENTIALITY:**

Among the HCWs, confidentiality was maintained by ensuring that no names were recorded on the questionnaire sheets filled. In addition, the questionnaires were only accessible to the investigator and research assistants. Confidentiality amongst patients recruited for the study was maintained by ensuring that information collected was confidential. Names and file numbers were not recorded.

### **DATA MANAGEMENT AND ANALYSIS**

Each question had the various responses coded. For the open ended questions, the responses were coded based on the most common responses. The data was then entered into a database in MS Excel. The data was then analyzed using statistical package for social sciences software version 14.0. The data was then presented in tables and figures.

### **ETHICAL CONSIDERATIONS**

Consent was obtained from all study participants and information given was kept confidential. The study was conducted after approval by the Kenyatta National Hospital/ University Of Nairobi Ethics and Regulatory Commission. Ref: KNH-ERC/A/22.

## RESULTS

The study population was 104 HCWs were enrolled from the three study sites as shown in table 1 below. The HCWs enrolled included; 4 consultants, 36 registrars, 48 nurses, 6 nutritionists and 10 clinical officers. These numbers were dependent on the different numbers of the various HCWs at each of the study sites.

	Paediatric Emergency <b>(39.42%)</b>	Paediatric Wards <b>(45.19%)</b>	Comprehensive Care Clinic <b>(15.39%)</b>	Total
Consultants	0	4	0	4
Medical Doctor (Registrars)	29	5	2	36
Nurses	8	32	8	48
Nutritionists	0	4	2	6
Clinical Officers	5	0	5	10
Total	41	47	16	104

Table 1: Description of HCW study population

A total of 100 children were enrolled. From the Paediatric wards, 45 children were enrolled, 20 from the paediatric emergency unit and 35 from the HIV Comprehensive Care Clinic.

**KNOWLEDGE AND PRACTICE OF HCWs AS REGARDS THE  
NUTRITIONAL CLASSIFICATION AND NUTRITIONAL ASSESSMENT OF  
HIV INFECTED CHILDREN**

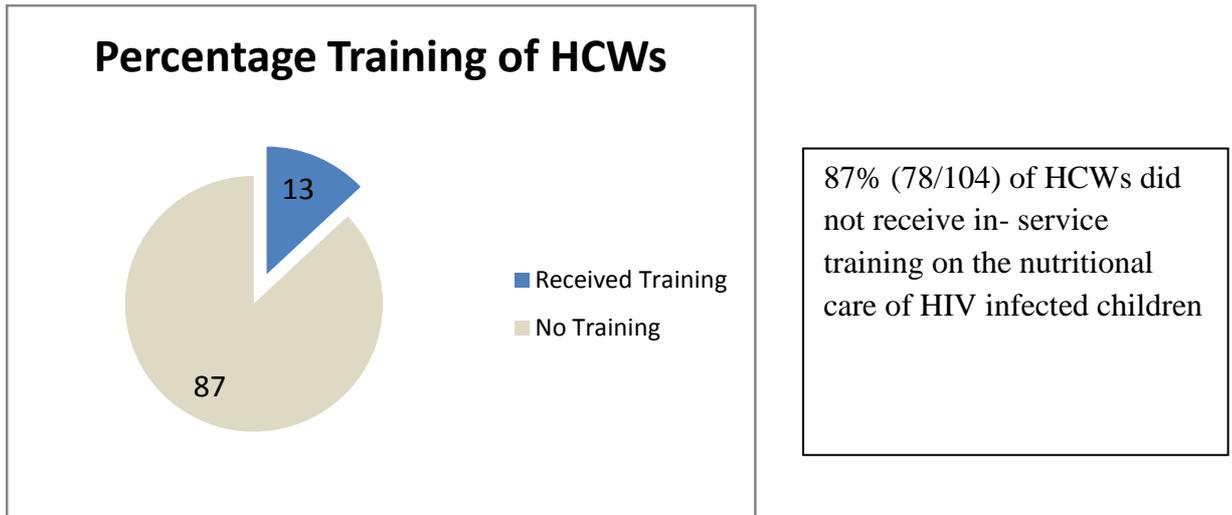
Notably, none of the HCWs were familiar with the classification of the nutritional status of HIV infected children as per the national nutritional guidelines of HIV infected children. Of the responses given, 40% (36/104) were in keeping with the WHO classification of the nutritional status in children as opposed to the classification of the nutritional status of HIV infected children as per the current national guidelines on the nutritional care of HIV infected children. Full knowledge was found in 20% (18/104) of the HCWs as per the standard WHO nutritional classification. Partial knowledge was found in 20% (18/104) of HCWs and 60% (56/104) reported that they were not aware of a nutritional classification system for HIV infected children. See table 2 below.

	HIV Nutritional Classification	Standard WHO Classification N=(90)
Full Knowledge	0	18(20%)
Partial Knowledge	0	18(20%)
No Knowledge	0	56(60%)

Table 2: Table Comparing Knowledge on Nutritional Classification.

In view of the lack of knowledge on the nutritional classification of HIV infected children; we further sought to establish if the HCWs acknowledged having received

training on the national nutritional guidelines on the care of HIV infected children. The training status on the national nutritional guidelines on the care of HIV infected children showed that 87% of the HCWs did not receive in-service training on the nutritional care of HIV infected children. Only 13% (12/104) had received the training as shown in figure 1 below.



**Figure 1: HCWs Who Acknowledge Training on Nutritional Care of HIV Infected Children**

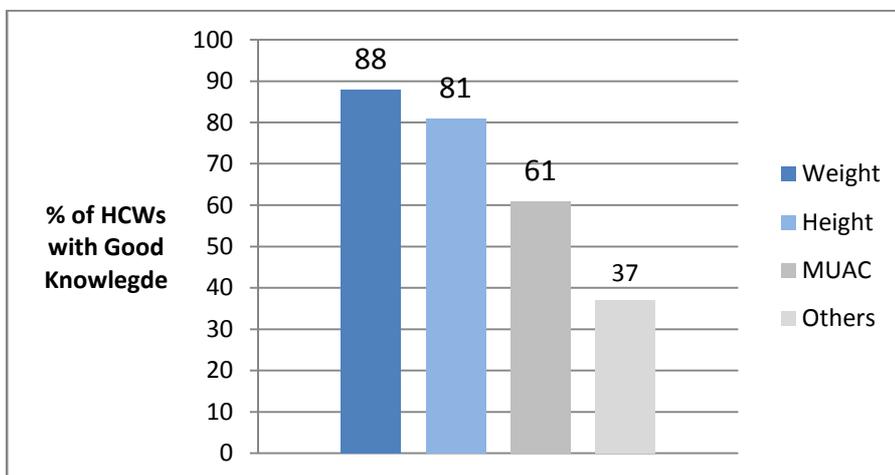
Of the HCWs who reported to have received training, they numbered 11 and the following were identified as the training courses attended and who they comprised:

1. Nutritional care of HIV infected children- 1 nurse.
2. Antiretroviral Therapy and Nutrition- 1 nurse.
3. Infant and Young Child Feeding-1 nutritionist.
4. Paediatric HIV Training- 8 Registrars.

In addition, the number of HCWs who had access to the national WHO adopted guidelines on the nutritional care of HIV infected children. Only 15% (14/104)

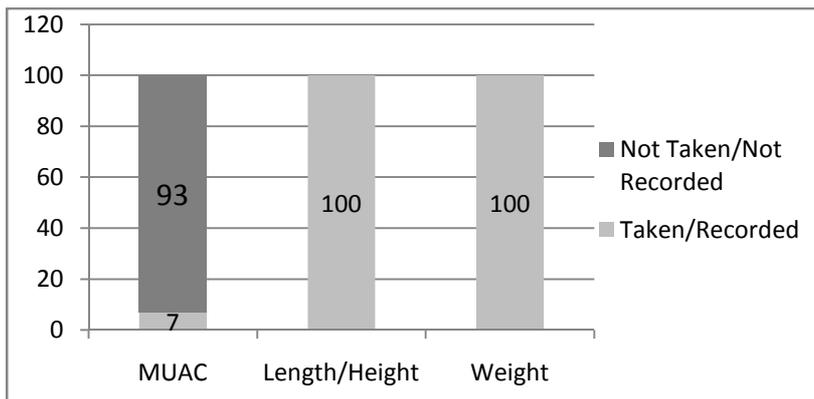
reported that they could easily access the guidelines whereas 85% (76/90) of the HCWs reported that they had limited access to guidelines on the nutritional care of HIV infected children. Lack of training and access to the nutritional care guidelines of HIV infected children were key to explaining the lack of knowledge on the nutritional guidelines of care for HIV infected children. In addition, they serve as potential avenues for intervention.

Regarding the knowledge of HCWs on the parameters used in assessment of the nutritional status of HIV infected children; 88 % ( 91/104) of the respondents reported that taking the weights was a useful assessment tool and 81%(84/104) reported that height/length was a useful assessment tool. Of 104 HCWs, only about 60 % (62/104) reported MUAC as an important parameter in the assessment of nutritional status. The responses termed as others included anemia, abdominal circumference, head circumference and oedema. See Figure 2 below.



**Figure 2: HCW Knowledge on the Anthropometric Parameters In Assessing the Nutritional Status Of HIV Infected Children.**

Only 40% (40/100) of the children attended to during the hospital visits had their nutritional status classified. Parameters key in determining the nutritional classification and assessment included the weight, height/Length and the MUAC. Only 7/100 children seen (7%) had their MUAC taken. However, all the children seen had their weights and heights/Lengths' taken.



**Figure 3: HCW Practice In Anthropometric Parameters In The Assessment Of The Nutritional Status Of HIV Infected Children.**

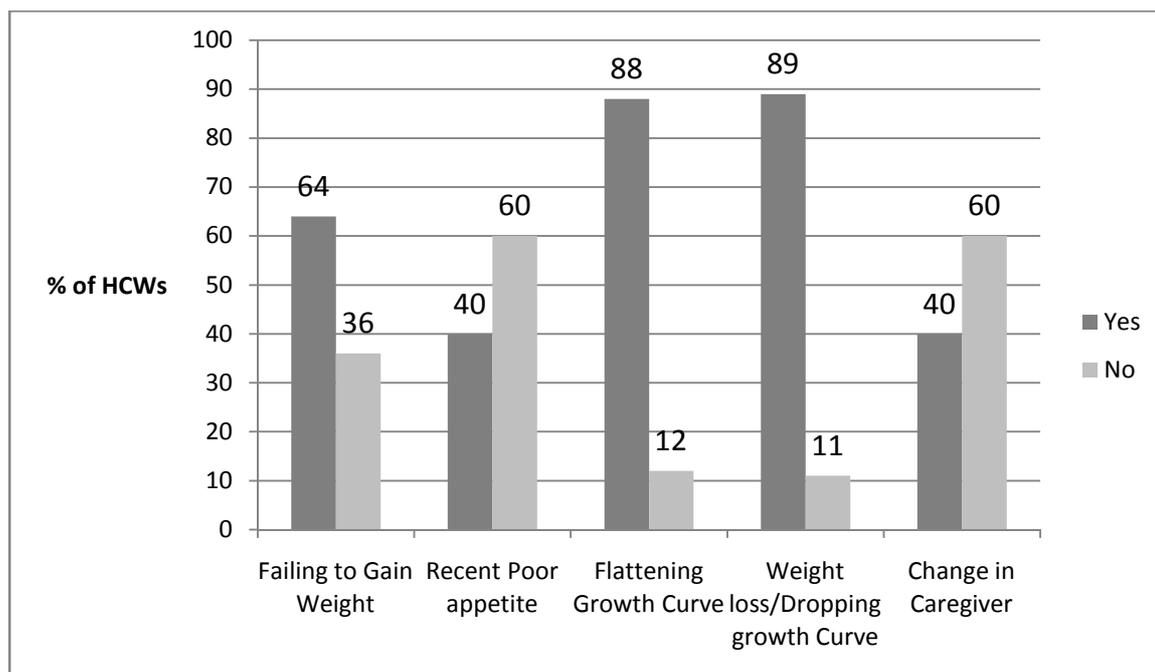
Growth charts serve as a quick reference and are also an objective assessment of how a child has been fairing over a given time. In this regard, 78.5% of HCWs did not ask/document on the growth charts during regular/ routine checks.

The level of malnutrition based on the three indicators (W/H, H/A, and W/A) is summarized in Table 4. The results show that the prevalence of malnutrition among children was 15 % (15/100) (wasting), 32% (32/100) (stunting) and 24 % ( 24/100) underweight.

Nutritional Status	Frequency n=100	% of population
Stunted	32	32
Underweight	24	24
Wasted	15	15

### **KNOWLEDGE OF HCWS AS REGARDS THE RISK FACTORS FOR INCREASED NUTRITIONAL NEEDS IN HIV INFECTED CHILDREN**

The identification of a child at risk of undernutrition is critical to timely nutritional intervention. Of the HCWs interviewed, 64% (66/104) identified failing to gain weight as a risk factor for under nutrition. In addition, 40% (41/104) of HCWs reported that a recent poor appetite was a risk factor for under nutrition. Flattening of the growth curve was correctly identified as a risk factor for under nutrition by 88% (91/104) of health workers. A dropping growth curve or weight loss was identified by 89% (92/104) of HCWs as a risk factor for under nutrition in HIV. A change in caregiver was not identified as a risk factor for under nutrition by 60% (54/90) of HCWs. See figure 4 below.



**Figure 4: Knowledge of HCWs on the Indicators of HIV Infected Children at Increased Risk of Under Nutrition.**

Regarding growth charts, 22% (19/90) of HCWs were noted not to be regularly checking/asking mothers for their growth charts during hospital visits. In addition, as regards the recognition of all HIV infected children as those requiring increased nutritional intake irrespective of no underlying co-morbidities, only 69% (62/90) of HCWs correctly recognised this.

## **DISCUSSION:**

### **KNOWLEDGE AND PRACTICE OF HCWs AS REGARDS THE NUTRITIONAL CLASSIFICATION AND NUTRITIONAL ASSESSMENT OF HIV INFECTED CHILDREN**

The level of malnutrition based on the three indicators (W/H, H/A, and W/A) showed that the prevalence of malnutrition among children with HIV was 15/100 (15%) (wasting), 32/100 (32%) (Stunting) and 24/100 (24%) underweight. A study done in 2010 in KNH on the prevalence of malnutrition in HIV infected children on HAART showed that the prevalence of the children stunted at 16.4% which was significantly lower and was attributable to bias as regards the access to health care and nutritional support as part of the HIV comprehensive care and was limited to only children been attended on an outpatient basis at the comprehensive care clinic. (10)

HIV infection impairs the nutritional status of infected children from early in life (2). Growth faltering and reduction in length or height often occurs even before opportunistic infections or other symptoms in almost all infected children (11). In these children, growth is a good reflection of a child's 'lean body tissue' - the total amount of muscle and non-fat tissue in the body. Another good indicator of a child's general nutritional status is their mid-upper arm circumference (MUAC). When children with HIV infection become malnourished they lose more muscle than malnourished children without HIV infection (11). Malnourished children can also lose fat reserves, irrespectively of their HIV-status. Children with severe growth failure and loss of muscle (lean body tissue) are at an increased risk of death (11). Measuring weight is routine and is helpful for monitoring progress. The routine assessment of length or height, is recommended in addition since in combination with

weight, it provides the most accurate way of assessing a child's nutritional status i.e. weight-for-height (3). Among the HCWs interviewed, 88/100 (88%) reported that taking the weight and 81/100 (81%) reported that height/length was a useful assessment tool and that these should be checked regularly. Measuring the mid-upper arm circumference is also a helpful way of screening children for malnutrition and helps to identify children at high risk of mortality. Of the health workers in the study, 60/100 (60%) reported MUAC as an important parameter in the assessment of the nutritional status. It can easily be performed at any level by trained health providers. These findings are similar to a study done in Ethiopia in 2011 aimed at assessing the integration of nutrition into HIV programmes to prevent malnutrition and improve child survival (19). This study Identified gaps in nutrition assessment. It was found that many facility-based providers lacked knowledge on the parameters used in the nutritional assessment whereby 65/100 (65%) of the HCWs did not have full knowledge on the parameters used in the assessment t of malnutrition (6).

Children who are well and healthy should gain weight and length/height. Children who are growing normally follow a growth curve parallel to one of the standard growth curves. When weight “falters” or the growth curve “flattens” and is no longer parallel to the chart line this indicates the need for clinical assessment, management and nutritional intervention and possibly ART (6). This can easily be assessed with the use of growth charts (3). Of the HCWs observed as they attended to patients during hospital visits, 78/100 (78%) were noted not to have asked/ documented on the growth charts. Weight loss or failure to gain weight can be identified by observing the child's weight over time. Weight loss or faltering weight gain has been identified as

an important predictor of mortality and hence the importance of frequent monitoring (11).

HCWs were not familiar with the classification of the nutritional status of HIV infected children as 47/100 (47%) of the incorrect responses were in keeping with the WHO classification of the nutritional status in children as opposed to the classification of the nutritional status of HIV infected children as per the current national guidelines on the nutritional care of HIV infected children. The classification of the nutritional status of HIV infected children is not known to many of the HCWs. The classification system known to the HCWs is the WHO classification as evidenced by the fact that 20/100 (20%) of the HCWs could correctly state the classification of the nutritional status of HIV infected children based on the WHO classification. The WHO classification is applicable to all children whether HIV infected or not. Notably, 87/100 (87%) of HCWs did not acknowledge having received training on the nutritional care of HIV infected children. The lack of awareness on the current national guidelines on the nutritional care of HIV infected children was evident. Locally, despite implementation of the guidelines in 2010, malnutrition still presents a challenge in the management of HIV infected children (10). This may largely be attributed to lack of in-service training on the launch of the current guidelines. As earlier alluded to, a study done in Ethiopia in 2011 aimed at assessing the integration of nutrition into HIV programmes to prevent malnutrition and improve child survival Identified gaps in nutrition assessment, but moreover lacked access to tools and materials to help them offer adequate support to mothers and children (19). This highlights the need to continuously educate HCWs on policy changes as regards the management of HIV infected children if the quality of care is to be maintained and

standardized. Of the HCWs who reported to have received training, they numbered 11 and the following were identified as the training courses attended:

1. Nutritional care of HIV infected children- 1 nurse.
2. Antiretroviral Therapy and Nutrition- 1 nurse.
3. Infant and Young Child Feeding-1 nutritionist.
4. Paediatric HIV Training- 8 Registrars.

These courses each highlight the importance of nutritional support in the care of HIV infected children with reference to the locally adapted WHO guidelines. (6)

### **KNOWLEDGE OF HCWs AS REGARDS THE RISK FACTORS FOR INCREASED NUTRITIONAL NEEDS IN HIV INFECTED CHILDREN**

The recognition of children at risk of under nutrition is key to the timely nutritional intervention. The indicators that put a child at risk of under nutrition include:

1. A mother who reports that her child is failing to gain weight.
2. A child that is not gaining weight and his/her growth curve is flattening.
3. A child that is losing weight and the growth curve is dropping downwards.
4. A child who has had a poor appetite recently.
5. Changes in caregiver or home circumstances.

HIV-infected children, like any other children, need energy, protein, vitamins and minerals to grow, play, maintain a good immunity and develop normally. These needs change with time and additional energy may be required to fight infections and recover lost weight. The nutrition and HIV/AIDS strategy 2007-2010 carried out an analysis of the strengths, opportunities and challenges of the sub sector focus on nutrition and HIV/AIDS revealed a set of gaps and attributable factors (18). Among

the gaps identified is the lack of knowledge on identification of a child in need of increased nutritional needs/ intake in the background of HIV infection. The findings on the knowledge and practice of HCWs on the risk factors in KNH were similar in this study as follows; 69/100 (69%) of HCWs recognised HIV infected children in need of increased nutritional intake. When children first become infected with HIV and have only mild symptoms, they need a small amount of extra energy - about 10% more.

Notably, 40/100 (40%) of HCWs reported that a recent poor appetite was a risk factor for under nutrition. It is important to note that, as with other diseases, when HIV-infected children suffer episodes of diarrhoea, fever, oral thrush or other infections, their appetites decline while their nutrition needs increase. In this regard, a poor appetite is a good indicator of a child at risk of under nutrition. The result of a poor appetite is a poor intake which ultimately results in weight loss and growth faltering. It is, therefore, important for HCWs to ensure that children maintain a good appetite and hence their food intake as much as possible during times of acute infection to prevent under nutrition.

A change in caregiver was not identified as a risk factor for under nutrition by 60/100 (60%) of HCWs as recommended by the locally adopted WHO guidelines on nutrition in HIV infected children (6). Children are dependent on other people to provide food; they also need guidance and support to eat well. Young children in particular, need someone who is able and willing to feed them. For many reasons HIV can result in children being cared for by someone other than their mother or father. One parent may have died and the other parent needs to work in order to obtain money for food and other essentials. The parents may themselves be unwell physically or mentally e.g. depression and may not, therefore, be able to look after the child effectively.

When an HIV-infected or HIV-exposed child loses his/her mother or both parents, he/she is sometimes moved between homes and cared for by other members of the family or within the community for short periods of time; at these times he/she may not receive a regular supply of adequate and appropriate foods. Each of these situations may put the child at risk of undernutrition. A change in caregiver is hence important in identifying a child at risk of under nutrition. For these reasons, it is essential that the primary caregiver i.e. the person that is responsible for feeding the child throughout each day is identified at each visit so that nutritional advice can be given to the most relevant person and vulnerability to poor access to food identified. In addition, feeding a young child can be difficult even if both the caregiver and child are healthy. It requires patience, skill, attention and time.

**CONCLUSION:**

Knowledge and practice on the classification of the nutritional status of HIV infected children based on the current nutritional guidelines for HIV infected children was poor highlighting a lack of awareness of the current national nutritional guidelines in HIV infected children. Assessment of the nutritional status of HIV infected children was good as regards the use of height/length and weight but was poor regarding the use of MUAC. Moreover, HCWs were not familiar with the identification of a child in need of increased nutritional intake in the background of HIV infection.

**RECOMMENDATIONS:**

In-service training to allow health workers to familiarize themselves with the current national guidelines on nutritional care of HIV infected children. This will increase skills, competencies and update knowledge in health workers as regards the nutritional assessment, the nutritional classification and early intervention as regards the indicators for increased nutritional needs.

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## **LIST OF APPENDICES**

### **APPENDIX 1:1- CONSENT AND EXPLANATION FORM FOR HEALTHCARE WORKERS.**

**STUDY TITLE: The Knowledge and Practices of Health Care Workers in Kenyatta National Hospital as Regards Nutritional Status and Needs of HIV Infected Children.**

**Principal Investigator: Dr. John Njogu Kamenwa- 0721401208.**

**Department of Paediatrics and Child Health,  
University of Nairobi.**

**Supervisors: Prof. E. Maleche Obimbo- 0722720402.**

**Prof. Nimrod Bwibo-0722375285.**

**Prof. Rachael Musoke-0721307160.**

#### **Researcher statement:**

Human Immunodeficiency Virus (HIV) infection and malnutrition are interlinked, both epidemiologically and physiologically. The synergistic effects of malnutrition and HIV on the immune system occur in a vicious cycle in which the decreased immunity associated with both conditions leads to increased susceptibility to infections which if not adequately met lead to more malnutrition. As a result, there has been the development and implementation of national guidelines on how best to offer nutritional care to HIV-infected children.

#### **Purpose of the study:**

The purpose of the study is to assess the knowledge and practices of health care workers in Kenyatta National Hospital as regards the nutritional status and needs of HIV Infected Children based on these guidelines given that the prevalence of malnutrition remains relatively unchanged in HIV infected children despite the implementation of these guidelines.

#### **Risks and Benefits:**

There are no known risks to your child. The benefits that may arise from the study will translate to better quality of Health care as any deficient aspects will be highlighted.

**If you have any question regarding the study you can contact the above named persons or the Kenyatta National Hospital Ethics and Scientific committee chairperson Tel 2726300.**

**Declaration**

I, \_\_\_\_\_ of \_\_\_\_\_ has understood the study aim and procedures and do hereby give permission to participate in this study.

Signed \_\_\_\_\_ Date \_\_\_\_\_

Witness \_\_\_\_\_

**APPENDIX 1:2-CONSENT AND EXPLANATION FORM FOR CAREGIVERS/PARENTS**

**STUDY TITLE: The Knowledge and Practices of Health Care Workers in Kenyatta National Hospital as Regards Nutritional Status and Needs of HIV Infected Children.**

**Principal Investigator: Dr. John Njogu Kamenwa- 0721401208.**

**Department of Paediatrics and Child Health,  
University of Nairobi.**

**Supervisors: Prof. E. Maleche Obimbo- 0722720402.**

**Prof. Nimrod Bwibo-0722375285.**

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**If you have any question regarding the study you can contact the above named persons or the Kenyatta National Hospital Ethics and Scientific committee chairperson Tel 2726300.**

**Declaration**

**I, \_\_\_\_\_ of \_\_\_\_\_ has understood the study aim and procedures and do hereby give permission for my child to participate in this study.**

**Signed \_\_\_\_\_ Date \_\_\_\_\_**

**Relationship to Child (Parent /Guardian) \_\_\_\_\_**

**Signed (witness) \_\_\_\_\_**

## **APPENDIX 1:3 (KISWAHILI)-KIBALI NA KIELELEZO KWA WAZAZI KUSHIRIKI KATIKA UTAFITI.**

### **SWALA KUU LA UTAFITI:**

**Kuchunguza ujuzi na utendaji kazi wa wauguzi katika Hospitali Kuu Ya Kenyatta kuhusu afya na lishe bora ya watoto wanaouguwa ugonjwa wa Ukimwi.**

**Mpelelezi Mkuu: Dkt. John Njogu Kamenwa- 0721401208.**  
**Department of Paediatrics and Child Health,**  
**University of Nairobi.**

**Wasaidizi Wakuu: Prof. E. Maleche Obimbo- 0722720402.**  
**Prof. Nimrod Bwibo-0722375285.**  
**Prof. Rachael Musoke-0721307160.**

### **Ujumbe Mfupi Kutoka Mchunguzi Mkuu:**

Virusi vya HIV na kuzorota kwa afya kuna uhusiano wa karibu. Zaidi ni kuwa Virusi vya HIV vinasababisha kinga ya mwili kupungua na vilevile afya duni inachangia katika kupunguza uwezo wa mwili kupambana na magonjwa. Kwa sababu hii, ni muhimu katika kutibu UKIMI kuhakikisha kuwa swala la afya pia linapata umuhimu. Kwa minajili ya kuhakikisha mawsala yote mawili yanazingatiwa, vielelezo kwa wauguzi vimechapishwa ili kuhakikisha maswala yote mawili yanazingatiwa kila watoto wenye virusi vya HIV wanapohudumiwa hospitalini.

### **Umuhimu:**

Umuhimu wa utafiti huu ni kuweza kutambua ujuzi ambao wauguzi katika Hospitali Kuu ya Kenyatta walio nao kuhusu afya na lishe bora kwa watoto wanaouguwa ugonjwa wa UKIMWI haswa kuambatana na maelelezo yaliochapishwa kuhusu afya na lishe bora kwa watoto walioathiriwa na UKIMWI. Zaidi ni kuwa afya ya watoto wanaoathirika na UKIMWI haijaimarika kutokana na utafiti uliofanywa ingawa maelelezo ya kuimarisha afya yao yapo.

### **Madhara na Manufaa ya Kushiriki:**

Hakuna madhara yoyote amabayo yatatokana na utafiti huu kwa afya ya mtoto wako. Umuhimu wa utafiti huu ni kuimarisha matibabu yanayopatikana katika Hospitali Kuu ya Kenyatta. Baada ya utafiti hakuna mailipo utakayoyapata bali shukrani kwa kukubali kushiriki katika uatafiti huu.

**Ikiwa ungetaka kupata maelezo zaidi, tafadhali wasiliana na mpelezi mkuu kupitia nambari iliopo ama Hospitali Kuu ya Kenyatta department ya utafiti kwa nambari ifuatayo 02726300.**

**Mimi, \_\_\_\_\_ nimeelewa maana na jinsi utafiti huu utakavyo fanywa na nimepatiana idhini ya mtoto wangu/mtoto ninaye msimamia kushiriki.**

**Sahihi \_\_\_\_\_ Tarehe \_\_\_\_\_**

**Sahihi (Shahidi) \_\_\_\_\_**

## **APPENDIX 2:**

**STUDY TITLE: The Knowledge and Practices of Health Care Workers in Kenyatta National Hospital as Regards Nutritional Status and Needs of HIV Infected Children.**

**Principal Investigator: Dr. John Njogu Kamenwa**

**Department of Paediatrics and Child Health,**

**University of Nairobi**

**Mobile no. 0721401208**

**Email: kamenwajohn@gmail.com**

### **Introduction:**

- 1. The questionnaire that follows contains 15 questions.**
- 2. Health Care Workers are not required to fill in their names.**
- 3. The responses given herein are confidential.**
- 4. Ask for clarification where needed.**
- 5. This interview will take approximately 20 minutes.**

### **Instructions:**

- 1. One questionnaire to be administered to ONE Health Care worker.**
- 2. The investigator/study assistant should seek written consent prior and attach consent form to questionnaire.**
- 3. The responses should be filled by the Investigator/ study assistant.**

**QUESTIONNAIRE TO BE ISSUED TO HEALTHCARE WORKERS:**

**Date:**

**Qualification:** \_\_\_\_\_

1. How would you determine that a child is HIV infected?
  
2. What physical parameters do you look for when assessing the nutritional status of a HIV infected child?
  
3. What is the classification of the nutritional status of HIV infected children?
  
4. Does the management of HIV positive children differ from those who are HIV Negative?  
Yes \_\_\_\_\_  
No \_\_\_\_\_  
If yes, explain \_\_\_\_\_
  
5. What signs may indicate that a HIV infected child may have increased nutritional needs?
  
6. As regards increased nutritional needs, the following are/is true:
  - a.** Mother reports that her child is failing to gain weight.
  - b.** The child has had a poor appetite recently.
  - c.** The child is not gaining weight and his/her growth curve is flattening.
  - d.** The child is losing weight and the growth curve is dropping downwards.
  - e.** Changes in caregiver or home circumstances.

7. What are the physical parameters useful in assessing the Nutritional Status of a HIV infected Child?
  
8. How often do you classify a HIV infected child based on the nutritional status?
  - a. Always
  - b. Often
  - c. Rarely
  
9. How often do you enquire on who feeds the child?
  - a. Always
  - b. Often
  - c. Rarely
  
10. How often do you counsel caregivers as regards nutrition in HIV Infected Children?
  - a. Always
  - b. Often
  - c. Rarely
  
11. What criteria would necessitate admission in a HIV infected Child with malnutrition?
  
12. What are the signs of recovery from malnutrition in a child infected with HIV?
  
13. Have you had any training on the nutritional care of HIV infected children?
 

Yes\_\_\_\_\_

No\_\_\_\_\_

If yes, Specify\_\_\_\_\_
  
14. Do you have access to any material/ Guidelines on the nutritional care of HIV infected Children?
 

Yes\_\_\_\_\_

No \_\_\_\_\_

If yes, specify\_\_\_\_\_
  
15. What are the barriers to good nutritional care of HIV infected Children?

### **APPENDIX 3:**

**STUDY TITLE: The Knowledge and Practices of Health Care Workers in Kenyatta National Hospital as Regards Nutritional Status and Needs of HIV Infected Children.**

**Principal Investigator: Dr. John Njogu Kamenwa**

**Department of Paediatrics and Child Health,**

**University of Nairobi**

**Mobile no. 0721401208**

**Email: kamenwajohn@gmail.com**

#### **Instructions:**

- 1. Fill in one questionnaire per patient**
- 2. The investigator/study assistant should seek written consent from both the HCW and Patients' caregiver prior and attach consent forms.**
- 3. The questionnaire should be filled by the investigator/ study assistant.**
- 4. Investigator/Study assistants should accompany the patient (6 months to 59 months) as outlined in each section.**
- 5. The investigator/ study assistants should OBSERVE what is done and fill the appropriate responses as outlined.**
- 6. The information filled herein is confidential and as such should not be shared with either the HCW or caregiver.**
- 7. No names should appear on the questionnaires**
- 8. Each of the 3 sections should include the cadre of the HCW involved.**

**UNIT:**

**Date:**

**SECTION 1: TRIAGE**

**Observe/ Check through the medical records for the following:**

1. Was the age of the child recorded?  
Yes \_\_\_\_\_  
No \_\_\_\_\_
2. Was the MUAC taken/ recorded?  
Yes \_\_\_\_\_  
No \_\_\_\_\_
3. Was the LENGTH/HEIGHT taken/ recorded?  
Yes \_\_\_\_\_  
No \_\_\_\_\_
4. Was the WEIGHT taken/recorded?  
Yes \_\_\_\_\_  
No \_\_\_\_\_
5. Any immediate action?  
Yes \_\_\_\_\_  
No \_\_\_\_\_  
If yes, what was the action taken?

## SECTION 2: CLINICIAN ASSESSMENT

**A: Did the clinician Ask mother/caregiver (or check the medical records) for the following:**

1. Has the child lost weight during the past month?

Yes \_\_\_\_\_

No \_\_\_\_\_

2. Has the child had a cough for more than 21 days (*this may be due to HIV related Chronic lung disease such as LIP, bronchiectasis or TB*)

Yes \_\_\_\_\_

No \_\_\_\_\_

3. Does the child have active TB or is the child on treatment

Yes \_\_\_\_\_

No \_\_\_\_\_

If yes, what is the response? \_\_\_\_\_

4. Has the child had diarrhea for more than 14 days?

Yes \_\_\_\_\_

No \_\_\_\_\_

5. Has the child had another chronic OI or malignancy?

Yes \_\_\_\_\_

No \_\_\_\_\_

**B: Did the clinician LOOK and FEEL for the following:**

1. Signs of severe visible wasting (loss of muscle bulk, sagging skin/buttocks)

Yes \_\_\_\_\_

No \_\_\_\_\_

If yes, what was the comment? \_\_\_\_\_

2. Presence of oedema of both feet (and/or sacrum)

Yes \_\_\_\_\_

No \_\_\_\_\_

If yes, what was the comment? \_\_\_\_\_

3. Weight and height

Yes \_\_\_\_\_

No \_\_\_\_\_

If yes, what was the comment? \_\_\_\_\_

4. MUAC

Yes \_\_\_\_\_

No \_\_\_\_\_

If yes, what was the comment? \_\_\_\_\_

5. Shape of the growth curve

Yes \_\_\_\_\_

No \_\_\_\_\_

If yes, what was the comment? \_\_\_\_\_

### SECTION 3: CLASSIFICATION AND TREATMENT PLAN

1. Check if a classification of the nutritional status was done according to either of the following:-

- Severe Malnutrition
- Poor weight gain
- Growing appropriately
- Condition with increased nutritional needs

Yes \_\_\_\_\_

No \_\_\_\_\_

2. Check if a nutritional care plan was instituted.

Yes \_\_\_\_\_

No \_\_\_\_\_

If yes, what was the plan? \_\_\_\_\_