Effectiveness and challenges of Insta Prescribed Porridge on Nutritional Status of Under 5 Malnourished HIV/AIDS Children at Lea Toto, Kangemi, Nairobi, Kenya

By

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DECLARATION

This research thesis is my original work and has not been presented for a degree in any other university.

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This work is dedicated to my husband Dr. Siro Masinde for his overwhelming support and encouragement throughout the course.
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OPERATIONAL DEFINITIONS

**Asymptomatic:** A person infected with a disease but without clinical signs and symptoms.

**Diet:** Amount and kind of food/drink taken by a person.

**FF:** Foundation Plus is a complimentary nutrient dense food prescribed for HIV malnourished children between 6 months and 10 years to ensure healthy growth.

**F+:** First Food is a nutritionally dense supplemental food with additional energy (450kca per 100 g) prescribed for older HIV malnourished children.

**Food by Prescription:** A food item or a combination of food items that are prescribed for a patient to meet the nutritional needs.

**HAZ:** Height for Age Z score, (a measure for stunting)

**HIV:** The Human Immunodeficiency Virus that causes AIDS.

**Malnutrition:** A condition in the body brought about by inadequate or excess intake of required nutrients, or mal-absorption.

**Moderately malnourished:** Weight for height of less than 2 standard deviation from the normal WHO/NCHS standard reference.

**Morbidity:** Sickness or illness

**Mortality:** Death, usually expressed as rate of mortality, e.g. rate of death over a period of time.

**Nutrition:** Process of food ingested, digested and absorbed to provide the body with required nutrients.

**Nutritional status:** A measurement of the extent in which an individual’s physiological needs for nutrients are being met.

**Opportunistic infection:** A serious infection caused by micro-organisms which normally have little or no pathogenic activity but causes diseases where host resistance is reduced by a serious disease such as HIV.

**Symptomatic:** A person infected with a disease and shows signs and symptoms.

**WAZ:** Weight for Age Z score, (a measure for underweight).

**WHZ:** Weight for Height Z score (a measure for wastage).

**Z score:** A standard deviation score that has reference to WHO reference values for Height for Weight for Age.

**NCHS/WHO Referral Charts:** US National Center for Health Statistics and World Health Organisation referral charts that represent health population used for comparison.
ABBREVIATIONS AND ACRONYMS

AIDS Acquired Immuno Deficiency Syndrome
AMPATH Academic Model for Prevention and Treatment of HIV/AIDS
ART Anti Retroviral Therapy
CSB Corn Soy Blend
F+ Foundation Plus
FF First Food
FANTA Food and Nutrition Technical Advisory
FBP Food by Prescription
HIV Human Immunodeficiency Virus
HAZ Height for Age standard deviation score
KDHS Kenya Demographic Health Survey
LTP Lea Toto Program
MUAC Mid Upper Arm Circumference
NAIDS Nutritionally Acquired Immune Deficiency Syndrome
NASCOP National AIDS/STI Control Program
NCHS National Centre for Health Statistics
PEPFAR Presidential Emergency Plan for AIDS Relief
PLWHHA People Living with HIV/AIDS
PPB Prescribed Porridge Blend
RUTF Ready to Eat Therapeutic Food
UNDP United Nations Development Program
UNICEF United Nations Children & Education Fund
USAID United States Agency for International Development
WFP World Food Program
WAZ Weight for Age standard deviation score
WHZ Weight for Height standard deviation score.
WHO World Health Organisation
ABSTRACT

A lot is published on the role of good nutrition in mitigating the effects of HIV/AIDS, but little is known about the effectiveness of prescribed diets (Food by Prescription (FBP)) in malnourished HIV infected children. The aim of the study was to determine the effectiveness of a prescribed porridge blend, branded ‘Insta First Food (FF)’, in improving the nutritional status of malnourished HIV infected children below 5 years attending Lea Toto comprehensive care centre, Kangemi slum, Nairobi. FF is a combination of whole maize (Zea mays L.), millet (Eleusine coracana (L.) Gaertn.), sorghum (Sorghum bocolor (L.) Moench), soya (Glycine max (L.) Merr.), sugar (Saccharum officinarum L.), oil, with added vitamins and minerals.

The study was a quasi experimental design that compared nutritional status at baseline (entry) and final (exit). 234 HIV infected children aged 6–59 months with a Z score < -2 were eligible. The children completed the study when they attained a Z score > -1, relapsed, died or failed to achieve a Z score > -1 after 3 months. (July – October 2008). A questionnaire on socio-demographic/economic factors was administered to the caregivers and supplementary data such as infections suffered from were derived from medical records at the study centre. Chi-square was used to test associations between dependent variables (Z scores), and independent variables. A paired T-test was performed to test for mean difference between baseline and after intervention. Frequency distribution on individual variables was undertaken and cross tabulations between all categorical variables and Z-scores performed to uncover the distribution patterns. Pearson chi-square test was performed to test for association between Z-scores and individual categorical variables.

81.2% attained a Z score of > -2 in 2 or 3 indicators (WAZ, HAZ and WHZ) whereas only 18.8% had 0 or 1 indicator showing > -2 after 3 months period. Weight gain was significant (p<0.05). Inconsistency in improvement of Z scores was significantly linked to socio-demographic/economic factors especially age of child (P=0.002), relationship of caregiver to child (P=0.072), correct porridge preparation (P=0.020) and age of care giver (P=0.071). There was significant association between training and correct porridge preparation (p<0.001). Children aged 0.5 – < 2 years were 3.3 times more likely to improve their nutrition status as compared to those above 2 years; correct food preparation placed a child at 2.6 fold better than wrong preparation; children with caregivers aged ≥30 years were 1.9 times more likely to improve.

Addressing malnutrition in HIV infected children should entail an integrated programme that addresses nutrition and socio demographic/economic factors such as age of child and caregiver, training on food intervention, family planning, medical and child care.
CHAPTER I

INTRODUCTION

1.1. Background

The world faces the deadliest epidemic in contemporary history since the first cases of Acquired Immuno Deficiency Syndrome (AIDS) were diagnosed in 1981. Malnutrition and HIV/AIDS in their many forms persist in all countries of the world, but the worst affected are the developing countries where an estimated 174 million children below five years of age are malnourished as indicated by low weight for age (Kikafunda and Namusoke 2006). Research has shown that malnutrition is a major predictor of mortality in HIV infected individuals as they act synergistically to worsen patients’ conditions (Fawzi et al 2005, Mangili et al 2006). HIV causes malnutrition by negatively affecting food intake, absorption and utilization of nutrients whereas malnutrition complicates HIV status due to lack of nutrients that boost immunity thus making treatment and management difficult (Byron et al 2006, NASCOP/MoH 2007). Proper nutrition is critical for people living with HIV and AIDS and should be a co-therapy that maximizes management of the disease (Anonymous 2004). Good diet will help prevent or delay wasting, strengthen the immune system, decrease viral mutations, decrease the incidence and severity of opportunistic infections and lessen the debilitating symptoms of HIV/AIDS (NASCOP/MoH 2007, Nakaya 2004). Symptomatic HIV children have increased energy uptake of up to 50 to 100 percent; and people in resource poor settings may lack sufficient quantity and quality of food (WHO 2003). Food assistance is therefore one of the most critical needs of people living with HIV/AIDS.
In Africa where food shortages are rampant, malnutrition is a significant cause of mortality and morbidity among HIV patients. Out of an estimated 17.4 million people who were living with HIV in Africa in 2005, 1.4 million were children below five years (WHO/UNICEF 2007). In Kenya, almost 6% of children are malnourished with increased cases of one out of five in families of lower socioeconomic status (KDHS 2003). Having acknowledged the profound effect of HIV and AIDS pandemic on the nutritional status of HIV patients, the World Health Assembly (WHA) and the Global Fund for AIDS (GFA) came up with resolutions to its member states to integrate nutrition into the essential package of care, treatment and support of people living with HIV/AIDS (WHO 2006). African countries are currently grappling with a range of food programs as interventions for dealing with malnutrition in HIV infected children and Kenya is not an exception (Abdale and Kraak 1995). Organizations such as WHO, WFP, USAID, and PEPFAR are funding many of the food programs in Africa.

Kenya’s 2008 health statistics showed that AIDS infection was on the increase in most parts of the country. An estimated 1.4 million Kenyans living with HIV/AIDS had some form of malnutrition. Kenya’s HIV prevalence rate increased from 6.7% in 2003 to 7.8% in 2008 with a high malnutrition rate of 30% stunting and 20% underweight. Combined with high levels of poverty in the country, at 52%, many Kenyans living with HIV/AIDS are burdened with poor access to quality food and suffer malnutrition (KAIS 2008). To date, it is estimated that between 20 and 50% of PLWHA require supplemental food and therapeutic nutritional interventions. HIV is a silent health killer with about 150,000 to 180,000 HIV infected children and 34,000 new cases occurring annually. Most parents in Kenya are however apprehensive about
subjecting their children to HIV tests. This trend increases the rate of HIV related malnutrition in these children as nutrition intervention is not started early enough. Food by prescription then becomes the option of intervention as many of the children are brought to health care centres when they are severely malnourished. Apart from children being most vulnerable to HIV infection, the prevalence rates are higher in urban areas with 9.6% as compared to rural areas with 4.6%. (Orago and Lauler 2008). Nairobi Province is the second worst affected province by HIV infections in Kenya with a prevalence rate of 9%, coming after Nyanza Province with a rate of 15.3% (KAIS 2008). Children from urban slum areas tend to be more vulnerable to HIV infections due to high poverty levels and promiscuity that exist in such environments. This is the reason why the present study was carried out in Kangemi, a Nairobi slum. The Government of Kenya in its 2005 – 2010 Kenya National Strategic Plan identified optimal nutrition as a key component of the national response to HIV/AIDS epidemic. This is in keeping with the global recognition that good nutrition is essential for the promotion of health of all people, particularly those living with HIV/AIDS. Kenya has made significant progress in increasing HIV care and treatment; however, nutritional support has not attained the same levels of coverage (Mohammed 2008).

The Kenyan PEPFAR, a USAID funded Food by Prescription (FBP) program which began in January 2006 provides specially formulated food products which are prescribed to malnourished HIV infected children in selected comprehensive care centers in the country. The foods are supplied by Insta Products Ltd, a Kenyan company in collaboration with the Ministry of Medical Services, previously Ministry of Health. They manufacture and provide among other products Insta porridge flours
for nutritional improvement. These include First Food (FF) for 6 months to 5 year children (used in this study), Advantage for pregnant and postpartum mothers and Foundation Plus (F+) for children above 5 years. All the types of porridge are prescribed for three months. For details and nutritional value of PPB (FF), see Appendix 4.

By March 2006, approximately 10,000 beneficiaries in 60 trial sites including Lea Toto Program (LTP) Kangemi had been enrolled into the feeding program (FANTA-AED, 2007). Lea Toto Program serves one of the largest slums in Nairobi (Kangemi), where food items are prescribed to children aged between 0 to 17 years who are categorized in age groups for feeding purposes as shown in Table 1. The scale up of FBP to 250 sites by 2013 was inaugurated on 15th August 2008 however the effectiveness of the Insta Prescribed Porridge Blend (FF) in HIV malnourished children in Kenya is yet to be documented (Mohammed 2008). An analytical framework is still needed to provide reliable information for policy and program design.
Table 1. Age group categories for feeding purposes at Lea Toto Program.

<table>
<thead>
<tr>
<th>Age</th>
<th>Nutritional status</th>
<th>Food given</th>
<th>Reason for giving food</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6 Months</td>
<td>Normal</td>
<td>Acidified formula milk (NanPelagon)</td>
<td>Supplementary feeding for those not on breast milk</td>
</tr>
<tr>
<td></td>
<td>Malnourished</td>
<td>Acidified formula milk (more quantity)</td>
<td>To improve malnutrition</td>
</tr>
<tr>
<td></td>
<td>Severely malnourished</td>
<td>RUTF</td>
<td>Therapeutic feeding.</td>
</tr>
<tr>
<td>6-24 Months</td>
<td>Normal</td>
<td>CSB</td>
<td>Weaning</td>
</tr>
<tr>
<td></td>
<td>Moderately malnourished</td>
<td>PPB (FF)</td>
<td>To improve nutritional status</td>
</tr>
<tr>
<td></td>
<td>Severely malnourished</td>
<td>RUTF</td>
<td>Therapeutic feeding.</td>
</tr>
<tr>
<td>24 Months - 5 years</td>
<td>Normal</td>
<td>CSB</td>
<td>Weaning</td>
</tr>
<tr>
<td></td>
<td>Moderately malnourished</td>
<td>PPB (F+)</td>
<td>To improve nutritional status</td>
</tr>
<tr>
<td></td>
<td>Severely malnourished</td>
<td>RUTF</td>
<td>Therapeutic feeding.</td>
</tr>
<tr>
<td>5 yrs and above</td>
<td>Normal</td>
<td>WFP food baskets (maize, peas, oil &amp; CSB).</td>
<td>To improve nutritional status</td>
</tr>
<tr>
<td></td>
<td>Moderately malnourished</td>
<td>PPB (FF)</td>
<td>Supplementary feeding for the food insecure</td>
</tr>
<tr>
<td></td>
<td>Severely malnourished</td>
<td>RUTF</td>
<td>Therapeutic feeding.</td>
</tr>
</tbody>
</table>

CSB = Corn-Soy Blend  
PPB (FF) = Prescribed Porridge Blend used in the study  
F+ = Foundation Plus  
FF = First Food  
RUTF = Ready to Eat Therapeutic Food

1.2. Problem Statement

Evidence from research has shown that HIV interferes with nutritional well being of the body and therefore these patients need specially designed diets. However prescribed diets in Kenya are still at experimental stage. There is minimal knowledge such as use of FBPs in varied scenarios of increased metabolic demands and varied social circumstances as seen in malnourished HIV infected children as compared to HIV negative malnourished children. An assessment of the nutritional effectiveness of PPB (FF) in under 5 years HIV malnourished children is important in order to find out whether there is improvement and if so to what extent. The results of the assessment can assist in the formulation of best FBPs. This would support informed decision
making and the development of a national policy framework on Food by Prescription Programs.

1.3. Research Questions

1. What is the nutritional status of the HIV infected children between 6 and 59 months during and after 3 months into the PPB program at Lea Toto?
2. What are the socio-demographic factors that influence the nutritional status of HIV children on PPB (FF Insta)?

1.4. Hypotheses

1.4.1 Null Hypothesis

The PPB (FF Insta) is not effective in improving the nutritional status of children living with HIV/AIDS aged 6 – 59 months.

1.4.2 Alternative Hypothesis

The PPB (FF Insta) is effective in improving the nutritional status of children living with HIV/AIDS aged 6 – 59 months.

1.5. Broad Objective

The broad objective of this study was to assess the effectiveness of the PPB (FF Insta) on the nutritional status of children living with HIV/AIDS aged 6 – 59 months.

1.6. Specific Objectives

1. To determine the current and subsequent nutritional status of children between 6 and 59 months enrolled in the PPB program at Lea Toto clinic.
2. To establish the socio-demographic factors that influence the nutritional status of HIV children on PPB.

1.7. Justification of the Study

HIV and malnutrition often co-exist and influence the health outcome of an individual. While Insta porridge is one of the prescribed therapies in HIV infected children, there is limited information on the actual impact on growth and reversal of malnutrition. As implementation and demand for FPB increases in Kenya and elsewhere, there is need to expand, adapt and replicate the FBP approach. However, a comprehensive assessment of FBPs effectiveness in malnutrition is needed beyond what is collected through general observations in the clinics. This study attempted to look into the challenges that may have hindered the effectiveness of PPB program so as to achieve better planning, management and replication of the same at Lea Toto children’s clinics in Nairobi and by extension countrywide. Paediatric HIV is under-researched and is also given much less coverage compared to HIV/AIDS in adults, thus leaving HIV children vulnerable to the fatalities of the disease.

1.8. Assumptions

The study assumed that all PPB (Insta) given to Lea Toto clients was the same in nutritional content as given in Appendix 4, and that the living conditions of the clients were similar, though it is known that even in a slum setting there could be variations. Further, that the porridge blend was given as prescribed to the patients and that food utilization in the body is the same. Finally, that child patients were not registered in
any other program that provide supplementary feeding, and that children received appropriate health care for any illnesses occurring during the course of the study.

1.9. Limitations

It was not possible to control other feeds given to the children during the study. The study was limited to HIV children registered at Lea Toto program; hence generalization of the findings to other HIV children should be done with caution.

1.10. Conceptual Framework

Figure 1 illustrates the conceptual framework used in this study. The main issues that arise from the framework are that, nutritional deficiency emanates from a complex set of elements. Poor nutritional status or malnutrition cannot be overcome by simply improving access to a prescribed diet, since, infections, health care services, care of children, economic status, level of education and government policies are equally important causes of malnutrition. These factors work simultaneously to impact on the nutritional status of HIV malnourished children. The size of the family members influence nutritional status of HIV children as the prescribed food may be shared with other members of the family denying the child the quantity and quality of the prescribed food. Limited health services and inadequate care for children and mothers lead to poor health status of the children aggravating the occurrence of opportunistic infections that impact on the intake and absorption of food. Some parents may not prepare the food prescribed as per the instructions due to limited knowledge, therefore destroying the nutritional content of the food. Others may deny their children the prescribed food due to socio cultural factors, especially stigmatisation. All these
problems may arise from poor economic status, poor policies on prescribed food interventions and unequal distribution of resources nationally. Therefore different aspects need to improve concurrently in order to realize the effectiveness of an intervention like the prescribed foods. An assessment of a nutritional intervention should be broader than just a specific prescribed diet but also provide information on the total number of people affected and in particular vulnerable groups, general health, environmental conditions, public health risks, immunization status, dietary habits, local availability of foods, fuel and cooking facilities. Combined with other factors, this information provides a basis for food distribution, modification and continuation (WHO 2000).
Malnutrition in HIV infected children

Lack of prescribed diet

Infections

Food preparation

Care for children

Health Services

Size of the family and Socio-cultural factors

Living environment

Economic structure

Government policies

Figure 1. The vicious cycle of malnutrition in HIV infected children. Adapted from UNICEF (1990)
CHAPTER II

LITERATURE REVIEW

2.1. Global Overview

Like all other health epidemics, HIV has threatened public health, resulting in malnutrition and food shortages (WHO 2000). One of the major consequences of HIV/AIDS epidemic on patients is malnutrition which sets in due to inability of the body to digest food, loss of nutrients due to constant diarrhoea and vomiting, less intake of food due to oral sores and depressed appetite, increased energy demand and inability of adults to fend and get enough food (Quick 2007). It is estimated that between 50% and 90% of patients infected with HIV will experience some form of malnutrition. WHO indicates that 28% of all children below 5 years of age are underweight, 35% are stunted and 8% are wasted, affecting a variety of disease management. However, maintenance and restoration of nutritional status is emerging as the foundation for HIV disease management (McDermott et al 2003). In Africa where more than 25 million people are living with HIV and AIDS, malnutrition and food insecurity are endemic. Nearly 40% of the African children less than 5 years are stunted due to chronic nutritional deprivation. Children below 5 years are most affected with malnutrition and disease due to greater nutrient demand at this stage. Research by Administrative Committee on Coordination /Subcommittee on Nutrition of United Nations noted that, infection with HIV can be reduced by good nutrition which is micronutrient dense (SCN 1998)
2.2. Malnutrition in Children

Malnutrition is defined as unintentional weight loss of more than 10% of an individual’s body weight. It is classified as mild, moderate, or severe malnutrition based on the body measurements to see if growth has been adequate (Medecins Sans Frontieres 1995). The etiology of malnutrition can be subdivided into decrease in nutrient intake due to poor diet and eating difficulty, excessive losses due to long term infections such as diarrhea, abnormal bleeding, large draining wounds, nutrient store depletion, increased metabolic demand, and cell/tissue damage or by ignorance, or faulty feeding habits even when there is sufficient food. Unfortunately all the mentioned factors are complications of HIV/AIDS infection (WHO 2000, Keithley et al 2000, Hellerstein and Kotler 1998).

The fourth report on global nutrition shows that the scope of malnutrition is still unacceptably high and the progress to reduce it in most of the developing world is slow. It was estimated that in the year 2000, 182 million children less than 5 years old in developing countries were stunted, reflecting long term cumulative inadequacies of health and nutrition. Approximately 27% were estimated to be underweight (ACC/SCN 2000). About 10 million children worldwide are estimated to suffer from severe malnutrition (defined by the presence of severe wasting, bipedal edema or both), which is an important cause of death in infants and young children less than 5 years of age in Africa malnutrition underlines two thirds of childhood deaths, (1 out of 3 children is severely undernourished). It has therefore become evident that HIV infected children have an increased vulnerability to malnutrition even with expanded food programs (UNAIDS 2003). While the overall trend in nutritional status in developing countries is one of improvement, United Nations region of eastern Africa
of which Kenya belongs, the trend has been in the opposite direction with a prevalence of 48% stunting and 36% underweight respectively (ACC/SCN 2000).

2.3. Prevalence of HIV and Malnutrition in Kenya

In Kenya, the prevalence of stunted and underweight children shows large variation by province reflecting variability in environmental and socioeconomic risk factors as demonstrated by the following data from studies carried by KDHS (1998). In Nyanza province western Kenya for example the estimates were approximately 33% (stunting), 22.1 (underweight), and 6.1% wasting. Ngare and Mutunga (1999), in a cross sectional study on malnutrition prevalence done in 14 districts in Kenya revealed similar results indicating that there is still a serious malnutrition problem in Kenya. The prevalence of stunting, underweight and wastage were 37%, 27% and 6% respectively with the boys more stunted compared to girls, 29% and 20% respectively.

Kwena et al (2003) study of the prevalence of malnutrition in pre-school children in western Kenya revealed similar results as well. The prevalence of stunting underweight and wasting $<-2$ $Z$ scores was 30%, 20% and 4% respectively. These studies showed that malnutrition interacts with infectious diseases, placing children under 5 years of age at a high risk of premature death. The studies recommended in depth monitoring and assessment of food programs being offered in high malnutrition areas.

Children in Nairobi’s slums bear excessively high burdens of ill health and death with close to 1 in 10 children dying before age one due to malnutrition. Despite being more sick, children living in slums are less likely to receive medical care when sick which
complicates their nutritional status. Immunization coverage in Nairobi’s slums is very low, standing at 44% in 2005. This too complicates malnutrition and HIV status of the children. Nairobi’s poorest live in deplorable conditions with poor or no basic facilities such as water and sanitation. Without decisive commitment to improve the conditions in which slum dwellers live, their poor health status, malnutrition and HIV/AIDS will continue to frustrate Kenya’s food intervention efforts. (APHRC 2006).

2.4. Interaction Between HIV and Nutrition

HIV/AIDS and malnutrition have a synergistic relationship (Hellerstein and Kotler 1998, Piwoz and Preble 2000, Byron et al 2006; NASCOP/MoH 2007, cf. Fig. 2). Malnutrition increases the progression of HIV and AIDS while HIV infection exacerbates malnutrition through its impact on nutrient intake, absorption and utilization. Nutritional deficiencies may lead to oxidative stress and immune suppression which, in turn, lead to increased HIV replication and hastened diseases. HIV infected children have frequent episodes of infections that make them vulnerable to malnutrition, due to oral candidiasis, dental problems and loss of appetite which increase difficulties in eating. Subsequent loss of nutrients is brought about by episodes of vomiting, diarrhea and gastrointestinal bleeding secondary to mucosal ulcerations. Changes in mucosal membrane lead to malabsorption of nutrients.

Infections increase basal metabolic needs placing high energy demand on the body. Therefore HIV children need 150% of the recommended daily allowances (RDA) for their age and sex. Lack of adequate food and poor diets can speed up the progression
from HIV to AIDS, and increase the risks of opportunistic infections such as tuberculosis worsening the problems of infected children.

Other areas that impact on nutrition in HIV include worm infestation, untreated water and poor hygienic practices. Improving and maintaining good nutrition on the other hand prolongs health and delays HIV disease progression. Food supplements, particularly antioxidant vitamins improve immune function slowing down infections and fatalities of HIV/AIDS. Individuals with improved health are much more likely to work and contribute to food security.

![Figure 2. The cycle of poor nutrition and infection in the context of HIV/AIDS. (NASCOP/ MoH 2007).]

2.5. Nutritional Interventions in HIV and Malnutrition

About 60% of the Kenyan population does not have access to food resources due to poverty and reduction in agricultural production. HIV/AIDS has contributed immensely to food scarcity as HIV adults are less able to work to produce food. Food
intervention in malnutrition is a common phenomenon in the developing countries that grapple with food shortages throughout the year. Castleman et al (2004) in their evaluation study of PEPFAR, which was initiated in 2003 to fight AIDS worldwide, singled out food as the most urgent need for PLWHA among other services offered by PEPFAR.

During nutritional intervention, foods may be scarce and may need to be provided preferentially (targeted) to people in greatest need. Food interventions should therefore be planned and implemented on the basis of nutritional assessment. To effectively administer food interventions the community and the target individuals must be assessed to determine the extent and severity of malnutrition, to decide whether and what type of feeding programs are needed and to ensure that fuel and cooking facilities are available in order to monitor changes of nutritional status (WHO 2000). Children under 5 years of age are particularly susceptible to malnutrition and must be a priority target group for nutritional assistance in any food intervention. Their nutritional status is a good indicator of the overall nutrition situation in most societies. A study by Tomkins (2005) on the nutritional interventions for orphans and vulnerable children in Kenya revealed among other things that HIV children have increased vulnerability to malnutrition. The study further observed that the many food programs run by the government, NGOs and faith organization as intervention of malnutrition had no peer reviewed publications on their impact. The study also noted that increasing household food security of vulnerable families can be effective in reducing rates of malnutrition. Allard et al (1998) in their study on the effects of vitamin E and C supplementation on oxidative stress and viral load in HIV infected adults showed that the vitamin group had an increase in plasma concentration and
reduced viral load than the controls after 3 months of intervention. Research done in Malawi, Sudan, Niger, Ethiopia and Bangladesh revealed that malnourished HIV negative children responded better to food programs with RUTF than the HIV infected children (Prudhon et al 2006). The study revealed that the differences in response were due to high rate of infection and loss of appetite in the HIV infected children. Early identification of malnutrition was also cited as a major contributor to easier management. However the researchers emphasized that the efficacy of the same should be tested clinically. The anti-nutrient content of some foods (e.g., phytates) was a limiting factor in the efficacy.

A study done in Malawi which was to test the hypothesis that supplementary feeding with RUTF would result in better growth in Malawian children at risk of malnutrition, showed that recovery rates among severely malnourished children using RUTF (energy dense lipid paste of peanut butter, sugar, full cream, vegetable oil, vitamins and minerals) were 78% compared to 46% using the standard fortified corn/soy blend with supplemented vitamins and minerals. (Ciliberto et al 2005). Caretakers and children returned to the clinic for reassessment every 2 weeks and all children were discharged after 8 weeks. Yet another study still in Malawi that compared ready to use fortified spread (Fs) and micronutrient fortified maize-soy flour (LP) revealed that FS does not have a significantly larger effect than LP on mean gain weight in all 6 month old infants (Phuka et al 2008).

Another study done on the nutrition treatment for HIV wasting at Tufts University, Boston, by McDermott et al (2003) revealed that unintentional weight loss in HIV-infected adults is episodic, frequent and associated with opportunistic infections. The
study observed two groups of adults who met the wasting criteria of >10% loss of body weight from pre-morbid weight loss of >5% in the previous 6 months or body mass index of < 20 kg/m². One group was put on nutrition supplementation and another was not. The goal of the nutrition supplement was to reverse the HIV associated weight loss. The supplement was a high-protein liquid with a total of 240 kcal, 15 g protein, 33 g carbohydrate, 6 g fat plus varying micronutrients. The group on the supplement increased their weight both during and after intervention in 12 weeks. Matusessy et al (1997) in an experiment done in Indonesia to assess the effectiveness of specific menus on the nutritional status of HIV positive people indicated that a specific menu based on coconut fermented soybean and carrots was able to treat diarrhoea probably due to the bacteriostatic agent from fermented Soy bean. The micronutrients such as iron, Zinc, Selenium, vitamin A and B delayed the process of HIV infections.

Ireton-Johns and Stiller (1998) in their study in Minnesota, USA, evaluated the outcome of specific Home Total Parenteral Nutrition (HTPN) in HIV patients which showed that patients on this specific nutrition gained weight of 5 kg whereas those not on the program lost similar amounts in weight. Abdale and Kraak (1995) in their assessment study on the impacts of nutrition on HIV in New York showed that nutritional status is a major determinant of survival for people living with HIV/AIDS. This revelation implied that HIV patients be put on specially designed food programs or prescribed therapeutic diet (FBP) which, like any prescribed medication should meet the nutritional needs of the individual. At the Durban South Africa Consultation, the World Health Assembly urged member states, as a matter of urgency, to integrate nutrition into comprehensive response to HIV and AIDS (WHO 2006). The
consecutive meetings at the same place revealed that many actions aimed at combating HIV food insecurity are isolated and were rarely monitored and evaluated (Gillespie and Kadiyala 2005).

Piwoz and Prebble (2000) in their assessment of nutritional support for people with HIV and AIDS in sub-Saharan Africa revealed that nutritional support should be provided in a holistic manner that strengthens the preconditions of good nutrition, namely food security, and health environments. Patel et al (2005) in his comparative study of prescribed food products for malnourished children in Africa showed that most prescribed foods are micronutrient-fortified combinations of cereals and legumes. The one that is most commonly used is the porridge blend. Children at risk of malnutrition are identified by low weight for height less than 85% but greater than 80%. However the results of such programmes have been disappointing with over 50% of the programmes in sub-Saharan Africa reporting no significant improvement. In Lesotho for example, an analysis of supplementary feedings found no improvement in weight gain but improvement in clinic attendance and a complementary feeding did not identify any efficacy of fortified corn/soy blends. A comparative study conducted in Malawi on two groups of malnourished children receiving corn/soy blend and RUTF respectively documented that RUTF resulted in better growth in Malawian children at risk of malnutrition.

Siika et al (2005) in their study to assess the effectiveness of the Academic Model of Prevention and Treatment of HIV (AMPATH) joint project of Indiana University and Moi University which started in 2001 to care for HIV/AIDS patients in 19 sites (30,000 people) in both rural and urban areas of western Kenya; revealed that the
majority of HIV/AIDS patients were malnourished. With the food aid from WFP and Harvest Initiative (HHI), AMPATH intensified their food program by initiating nutritionist prescribed food (eggs, milk, fresh fruits and vegetables). Eligibility into the program included among other factors, a BMI of less than 19, income of less than 3000 Kenya shillings (c. US $ 40) per month, a CD4 count of less than 200, and insufficient household food. The exit criterion was three months as observations showed that majority of patients gained nutritional status after three months.

WFP/AMPATH (2006) in their evaluation study in western Kenya to determine the effectiveness of FBP programs at the six AMPATH sites revealed among other challenges, incorrect inclusion and exclusion criteria, lack of staff, only (one social worker who could take up to 3 months to verify a patients entry criteria), irregularities in food ratios, sharing of patient’s food, stigma and discrimination, dilution of ratios, non consumption, insufficient home visits assessment and selling of the food among others, which impacted negatively on the nutritional status of the patients. Oyuga (2007) in his assessment done in the 28 Family Aids Care and Education Services (FACES), which is an HIV program that utilizes the USAID/PEPFAR funded FBP Program in western Kenya, revealed that patients on FBP (corn soy blend) improved tremendously. However the project cited the challenges faced from multiple providers making assessment difficult. Poor record keeping and low uptake of FBP was also a problem due to busy clinicians. Catholic Relief Services (2007) in its report on PEPFAR funded food by prescription in Kenya noted that food prescribed to HIV patients is usually shared with the rest of the household therefore diminishing the intended benefit to the individual. CRS therefore strived to distribute basket ratios to families and households affected by HIV.
Malnutrition in a person with HIV and AIDS is therefore a multifaceted problem requiring multiple interventions. Most of the food interventions researched on have faced challenges which in turn impact on nutritional status of HIV individuals necessitating a more integrated approach to nutrition interventions other than just prescribed diets. The commonly used cereal blends in FBPs have had inferior results with 50% of programs reporting no significant improvement.

2.6. Summary of Literature Reviewed and Identified Gaps

Literature indicates that studies on nutritional efficacy of prescribed diets in reversing malnutrition in HIV infected children has been inadequate. Studies done have mainly focused on malnourished children without HIV infection. Literature also demonstrates an existence of synergistic relationship between HIV/AIDS and nutrition in PLWHA. HIV/AIDS causes malnutrition and improved nutrition such as prescribed diets can reverse the same. However, challenges in such programs and information on the nutritional efficacy are yet to be addressed. Without this essential knowledge, management, replication and rollout of FBP programs will be hampered.

This gap has been addressed in the study by determining the socio-demographic factors and the actual feeding practices that may be associated with the efficacy of prescribed diets in HIV malnourished children.
CHAPTER III
MATERIALS AND METHODS

3.1. Study Design
The study adopted a quasi-experimental design with pre- and post-intervention comparison. This study uses time series analysis and allows the experiment to assign treatment to those who deserve it.

3.2. Variables

3.2.1. Independent Variable
PPB (Insta actual practice)
Socio-demographic/economic data

3.2.2. Dependent Variable
Nutritional status: Weight for Height (wasting), Weight for Age (underweight), Height for Age (stunting).

3.3. Study Area
The study was carried out at Lea Toto Program which is an out patient satellite clinic of Nyumbani (founded by the late Fr. Angelo D’Agostino in 1992 and registered under the name “Children of God Relief Institute” (COGRI).), situated in Kangemi slum, along Waiyiaki Way in Nairobi. It is approximately 12 km NW of Nairobi City centre (Appendix 1). The Lea Toto program serves Kangemi and its adjacent areas of Mutuini, and Ruthimitu locations. Kangemi alone covers an area of 0.0486 km² and
has a population of more than 100,000 people, of mixed ethnic communities. The slum is characterised by overcrowded informal settlements without adequate water, sanitation and other essential services. There is over 40% unemployment rates and one in seven people are infected with HIV (Swan 2006).

The clinic cares for HIV infected orphans from neonates to 17 years and by June 2008 it had more than 5000 children of whom 2972 were below 5 years. Services provided by Lea Toto include medical, food supplements, counselling and home care. The program is sustained by donations from USAID among other well wishers.

Nairobi has an HIV prevalence rate of 9%, the second largest in the country, with most of the HIV patients residing in the slum settlements of Nairobi. It is estimated that out of 474,468 children below 5 years in Nairobi, 100,000 are living with HIV and AIDS. (NASCOP/MoH 2007)

3.4. Target Population

The study targeted HIV infected malnourished children aged between 6 – 59 months with < -2 Z score (WAZ, WHZ or HAZ), registered at Lea Toto Program and on Prescribed Porridge Blend. 234 children were recruited after meeting other inclusion criteria. While at Lea Toto program, the children received medical treatment for infections and metabolic complications. Children between 0.5 – 24 months received 5 kg packet of Insta flour to last for 1 month with a consumption of 100 g per day, whereas children between 25 – 59 months received 10 kg Insta flour for 1 month with a consumption of 200 g per day. Assessment was done at the clinic after one month for three consecutive months, to evaluate nutritional improvement. Children also
visited the clinic any other time if they experienced metabolic or medical complications.

3.5. Sampling Techniques and Sample Size

3.5.1. Sampling Technique

Purposive sampling technique which allows a researcher to use cases that have required information (Fisher et al 1998) was applied to get the patients to be examined. All children aged 6 – 59 months and on the prescribed Insta porridge program were included in the sample. A nutritionist assisted research assistants in identifying the children on FBP Insta porridge either physically or by use of records.

3.5.2. Sample Size

A recommended statistical method for getting a representative sample size in a population of less than 10,000 was used (Fisher et al 1998).

Lea Toto has a total of 2,972 HIV infected children less than 5 years of age. The sample size was calculated as follows

\[ n = \frac{Z^2pq}{d^2} \]

Where:
- \( n \) = sample size
- \( Z \) = standard normal deviate (1.96) which corresponds to 95% confidence interval
- \( p \) = proportion of the target population estimated to have the desired characteristics (an estimated 100,000 children below 5 years are infected with HIV/AIDS)

\[ \frac{100,000}{474,468} = 0.21 \]
\( q \) is \( 1 - p = 0.71 \)

\( d = \) degree of accuracy usually equal to 0.05.

\[
n = \frac{1.96^2 \times 0.21 \times 0.79}{0.05^2} = 254
\]

Therefore a population less than 10,000

\[
N_f = \frac{n}{1 + \frac{n}{N}}
\]

Where \( N_f \) is the desired sample size when population is less than 10,000

\( n \) is the desired sample size when the population is more than 10,000

\( N \) is the estimate of the population size

\[
N_f = \frac{254}{1 + \frac{254}{2972}} = 234
\]

\( \approx 234 \)

Therefore 234 children formed the sample size

**3.5.3. Inclusion Criteria**

a) Malnourished HIV infected children between the ages of 6 – 59 months.

b) \( Z \) score of \( \leq -2 \) at commencement of PPB intervention.

c) Children whose caregivers consented to participate in the study.
3.5.4. Exclusion Criteria

a) Children with established severe acute infections such as TB or any other severe infections and requiring admission during the study.

b) Any child who had severe congenital defects such as hump or downs syndrome.

3.6. Data Collection and Research Instruments

Research assistants consisted of staff employed at Lea Toto so as to maintain the confidentiality and validity of this study.

A clinical officer provided clinical information, a nurse provided information on infections, an assistant nurse for anthropometric measurements, a nutritionist for nutritional information, a laboratory technician for laboratory information and a social worker for socio-economic data and actual PPB practice. The mentioned enumerators were further trained on how to interview and fill out structured questionnaires, make observations using a study checklist and take measurements using instruments such as electronic weighing scales, heightometers and measuring mats. Same instruments were consistently used to avoid inter-scale variations. Caregivers received Insta flour monthly and were encouraged to feed the children 3 to four times daily according to the instructions. Caregivers returned to the clinic for reassessment every month or when the child was ill. A period of 3 months was chosen for exit as this is the length of time patients stayed on prescribed porridge blend at Lea Toto Program. Anthropometric measurements were taken to establish the nutritional status of the child and their Z scores. The measurements performed included height, length and weight. Age of the child was established from immunization or child health cards, or
from birth notification forms (Appendix 5). From the readings of height, weight and age, Z scores were established from NCHS/WHO referral charts (Appendix 3).

3.7. Data Collection Techniques

3.7.1. Height and Weight Measurements

A child aged above 24 months or taller than 85 cm was measured while standing, using a combined weight and height measuring scale. A measuring board was held upright against a wall in the observation room. Clients removed shoes, sandals, socks, headgear or any other heavy items. The child was assisted to stand with its back against the measuring board and kept calm. The headpiece was lowered until it was firm on top of the head then pressed gently to ensure that it was in contact with the head. The height was measured twice to the nearest 0.1 cm. An average of the 2 readings was then recorded immediately in the child’s form. The digital scale was adjusted to 0, and the weight readings (to the nearest 0.1 kg) recorded when the child was calm.

3.7.2. Length Measurement

For children less than 24 months, or those unable to stand firmly, a horizontal measuring mat was used. The child was laid at the centre of the board with the knees straight and footboard firmly against the heels so that the feet are at right angles. Measurements were read twice to the nearest 0.1 cm and the average of the 2 readings recorded in the child’s form.
3.7.3. Weight Measurement

Children less than 24 months were undressed completely and gently put on the electronic pan scale. The child’s weight when the child is stable was read to the nearest 0.1 kg using a 136 kg digital scale (Seca USAID).

3.7.4. Physical Examination

Thorough physical examination was done by enumerators (Clinical officer) to rule out exclusion. The physical examination included a general examination of hair (for any thinning, brittle or lightening), teeth for (any mottling), gums (for any swelling), glands (for any enlargement), oedema (at ankles or feet), bones (for any deformities), skin (for any lesions or infections), mouth (for oral thrush) and any fever, anaemia, dehydration and dimorphic features. Systematic examination was then done (by Lea Toto clinician) to exclude serious infections such as gastroenteritis, pneumonia, meningitis, tuberculosis and ear infections. Patients’ health record were used to establish previous infections and immunisation status.

3.7.5. HIV/AIDS Status of Children

Children’s HIV status was reconfirmed at Nyumbani diagnostic Laboratory using HIV 1 and II (DNA) Polymerase chain Reaction (PCR) method of testing, which was done twice for confirmation. Besides this study, routine testing is undertaken at Nyumbani diagnostic laboratory every 6 months to check among other things, liver and kidney function, viral load and hemoglobin levels.
3.7.6. Socio-demographic Information

A structured questionnaire was used to gather demographic, social and environmental data of the caregiver of each client child. Data documented included the level of knowledge about Insta porridge feeding practices, family size, preparation methods as well as other challenges that hinder effectiveness of PPB. The researchers interviewed key informants using a pre-set questionnaire. The key informants included, nurses, nutritionists and clinical officers who gave information on the health status, infections and immunizations of the children since inception into the FBP program. The researchers visited the client’s residences to establish the environmental, hygiene and socio-demographic characteristics of the caregivers that impacted on the effectiveness of Insta porridge.

3.8. Pilot Study

The research instruments were tested at Kawangware Lea Toto program of which is also a program of Nyumbani Children’s Home. Those involved in pre-testing were not to participate in the actual study even if they transferred to Kangemi Lea Toto. This was to avoid sensitization that would affect the reliability of the data (cf. Ostle and Malone 1988, Mugenda and Mugenda 2003). After pre-testing, the questions and research instruments were modified appropriately.

3.9. Ethical Considerations

Permission from Lea Toto Program administration (Appendix 6) and research clearance from the Ministry of Science and Technology (Appendix 7) were obtained. Written informed consent (Appendix 2) was sought from caregivers of the selected
children for study and no loss or benefit was to be extended to those who withdrew from the study at any stage. Strict confidentiality of the information obtained was maintained.

3.10. Data Management and Analysis

Data collected was edited during and after collection, coded, classified, tabulated and explored to adjust for any missing information and correcting for outliers. Epi-Info (version 6.14) was used in the statistical analysis of anthropometric data while Statistical Package for Social Scientists (SPSS version 10.0) was used for analysis of descriptive data. Two types of variables were considered in the analysis, namely; Continuous and categorical variables.

3.10.1. Continuous Variables

Continuous variables used included; age, weight, height, WAZ, HAZ and WHZ. Descriptive statistics that were used included Mean, Standard deviation, Median and Range. Paired T-test was used to test for mean difference between baseline and after intervention on continuous variables. To measure relationship between two continuous variables, e.g., age and WAZ, Pearson correlation was performed.

3.10.2. Categorical Variables

Categorical variables used included; gender, education level, marital status, source of income, range of monthly income, categorized age, categorized WAZ, categorized HAZ and categorized WHZ. Frequency distribution on individual categorical variables was performed. Cross tabulations between all categorical variables and the Z-scores (WAZ, HAZ, WHZ) was also performed to uncover the distribution patterns.
Pearson chi-square Test was used to test for association between Z-scores and individual categorical variables.

Chi-square was used to test for associations between the dependent variable (Z-scores) and the Insta porridge preparation and the socio-demographic variables. A p-value of 0.05 or less was considered to be significant. Multivariate analysis was performed on variables that significantly associated with Z-scores. Binary logistic regression technique was employed to come up with true predictors of nutritional status. For all significant tests that were performed, P values or odds ratio were used to interpret the results.
CHAPTER IV
RESULTS AND DISCUSSION

The results and discussions are presented in the following general sequence: Characteristics and profile of both children and their caregivers; nutritional changes after PPB administration and a combined table showing results from analyses of the important socio-demographic/economic factors that influenced the nutritional status of the children is presented (Table 9). The table is referred to several times in the subsequent sections. Results from the multivariate analysis on variables that significantly associated with nutritional status as well as results from the binary logistic regressions performed to help identify the true predictors of nutritional status are finally presented.

4.1. Characteristics of the Children

4.1.1. Malnutrition Distribution Among Children

234 children aged 6 – 59 months were recruited in the study after meeting the entry criteria. Malnutrition distribution revealed that a high proportion of the children were stunted 63.8% (HAZ) at entry point, followed by underweight 36.2% (WAZ) and the least malnutrition score was wastage 10.1% (WHZ) (Table 2). This malnutrition prevalence is almost double the malnutrition studies undertaken in Kenya (KDHS 1998, Ngare and Mutunga 1999, Kwena et al 2003). This is evidence that HIV increases malnutrition (Byron 2006). Children were further categorized in ages of 0.5 – < 2 years and 2 – 5 years to uncover distribution of malnutrition by age. This was evenly distributed with no particular age showing significant difference in malnutrition prevalence.
Kwena et al (2003) arrived at a similar trend in a study done in western Kenya on the prevalence of malnutrition for children with HIV where they had HAZ of 30%, WAZ of 20% and WHZ of 4%. In contrast, studies in adults have shown that HIV is highly associated with wasting and disproportionate loss of lean tissue (McDermott et al 2003, Mulligan et al 1997).

Table 2. Distribution of malnutrition by age of children.

<table>
<thead>
<tr>
<th>Malnutrition index</th>
<th>Age categories</th>
<th>Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
</tr>
<tr>
<td>HAZ (stunting)</td>
<td>0.5 - &lt; 2 yr</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>2 - 5 yrs</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>132</td>
</tr>
<tr>
<td>WAZ (underweight)</td>
<td>0.5 - &lt; 2 yr</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>2 - 5 yrs</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>75</td>
</tr>
<tr>
<td>WHZ (Wasting)</td>
<td>0.5 - &lt; 2 yr</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>2 - 5 yrs</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>21</td>
</tr>
</tbody>
</table>

4.1.2. Age and Sex Distribution Among the Children

Table 3 shows the age by sex ratios and other percentages in the various age group categories. Gender distribution of children was 48.3% male to 51.7% female, whereas 1 to 2 year olds showed the highest malnutrition rate at 35.5%. This may be due to the fact that many children less than two years old may not have been taken for HIV screening as yet and many of those older than 2 years will have died from the disease. The age of children between genders was not significantly different.
Table 3. Distribution of age by sex among children.

<table>
<thead>
<tr>
<th>Age categories</th>
<th>Male</th>
<th></th>
<th></th>
<th>Female</th>
<th></th>
<th></th>
<th>Total</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>0.5 - &gt;1 yr</td>
<td>23</td>
<td>20.4</td>
<td>13</td>
<td>10.7</td>
<td>36</td>
<td>15.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 - &gt;2 yrs</td>
<td>39</td>
<td>34.5</td>
<td>44</td>
<td>36.4</td>
<td>83</td>
<td>35.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 - &gt;3 yrs</td>
<td>9</td>
<td>8.0</td>
<td>10</td>
<td>8.3</td>
<td>19</td>
<td>8.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 - &gt;4 yrs</td>
<td>18</td>
<td>15.9</td>
<td>9</td>
<td>7.4</td>
<td>27</td>
<td>11.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 - 5 yrs</td>
<td>24</td>
<td>21.2</td>
<td>45</td>
<td>37.2</td>
<td>69</td>
<td>29.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>113</td>
<td>100</td>
<td>121</td>
<td>100</td>
<td>234</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.1.3. Morbidity Patterns Among the Children

The rate of community acquired infections was generally high. Majority of children suffered from coughing, fever, diarrhea and running nose (Table 4). Only 2.2% reported no infection. There was no significant association between age and number of infections a child suffered from. However, the graph in Figure 3 demonstrates a known trend that majority of younger children (35.3%) suffered 3 – 4 infections as compared to older ones (33%). This study is similar to one done in Cameroon which showed that poor nutrition was related to infection and disease (Pongou et al 2006).

Table 4. Frequency of infections.

<table>
<thead>
<tr>
<th>Infection</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cough</td>
<td>122</td>
<td>24.7</td>
</tr>
<tr>
<td>Fever</td>
<td>82</td>
<td>16.6</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>67</td>
<td>13.6</td>
</tr>
<tr>
<td>Running nose</td>
<td>61</td>
<td>12.4</td>
</tr>
<tr>
<td>Vomiting</td>
<td>39</td>
<td>7.9</td>
</tr>
<tr>
<td>Eye/ear infections</td>
<td>33</td>
<td>6.7</td>
</tr>
<tr>
<td>Skin infections/Rashes</td>
<td>33</td>
<td>6.7</td>
</tr>
<tr>
<td>Congested chest</td>
<td>26</td>
<td>5.3</td>
</tr>
<tr>
<td>Mouth sores</td>
<td>19</td>
<td>3.9</td>
</tr>
<tr>
<td>No infections</td>
<td>11</td>
<td>2.2</td>
</tr>
<tr>
<td>Total responses</td>
<td>493</td>
<td>100</td>
</tr>
</tbody>
</table>

Figure 3. Distribution of number of infections by age categories.
4.1.4. HIV Sub Type, ARV Drug Administration and Immunization

All the 234 children had HIV I subtype only. The findings are in conformity with previous findings that have indicated that HIV I is the dominant virus in East Africa. (Robat et al 2005). 210 (89.7%) of the children had completed immunization and 24 (10.3%) had not yet completed immunization. 37.6 % were on antiretroviral drug treatment and none of the children had missed immunization completely.

4.1.5. Relationship of Caregivers to the Children

Children taken care of by their own mothers improved their nutritional status after being put on Insta porridge for three months (P=<0.05). The result could be supported by the fact that other relatives in the study already had their own children and therefore taking care of extra child/children was taxing. All grandmothers in the study group were old without formal education, making adoption of improved nutritional practices a challenge, whereas fathers taking care of the children (8.1%) were too few to make a significant impact.

Present findings support a study by Kikafunda and Namusoke (2006) carried out in Uganda to compare the nutritional status of HIV/AIDS orphaned children living with their elderly relatives with those living with their biological parents. They showed that there were high levels of malnutrition at 47% in children living with relatives as compared to children living with their biological parents (28%). The level of underweight children in custody of elderly relatives was particularly significant (p<0.05) in their study.
4.2. Age and Sex Distribution of Caregivers

Majority of caregiver were aged between 25 to 34 years. There was no significant difference in terms of age distribution between genders. However the ratio of male to female was 1:3. Many female caregivers took the burden of caring for children. Age of the caregiver significantly associated with nutritional status of the child. Children whose caregivers were above 30 years showed better improvement than those whose caregivers were below 30 years. (P= 0.023). This can be explained by the fact that caregivers below 30 years were either unemployed or still living with their parents.

4.2.1. Marital Status, Level of Education, and Economic Status of Caregivers

82.9% of caregivers were single parents. (never married, widows and widowers, divorced or separated) while 17.1% were married. Marital status did not affect the nutritional status of the children (P=0 723). More than half of the caregivers (53.8%) had only primary education and same number (53.8%) were unemployed (Fig. 4 and 5). These factors did not affect the nutritional status because all malnourished children were provided with the Insta flour and were trained on the use and preparation regardless of marital status, level of education or economic status.
Figure 4. Level of education.

Figure 5. Distribution of source of income.
4.2.2. Number of children per Family and Actual PPB Practice

Among the Caregivers, 78.2% took care of more than one child (ranging from 2 to 11). On average they took care of 4 children. 20.2% of them had more than two children enrolled at Insta feeding program (ranging from 2 to 4), on average they had 3 children in the program. The number of children was significantly associated with feeding practices, as 40.3% of the children shared the porridge with their siblings. Interestingly among those children who shared, 85% improved as compared to 79.3 that did not share the porridge. This can be explained by the fact that families that had more household members were provided with a food basket to avoid sharing. This is similar to the AMPATH study done in western Kenya that cited sharing among other problems of food interventions (WFP/AMPATH 2006).

4.2.3. Area of Residence and Source of Water

92.2% of those who resided in Kangemi (close to LTP) showed improvement compared to 74.6% of those who resided far from Kangemi (P=0.002). This can be explained by the fact that those who lived further from Kangemi cited problems like not having fare to collect the food promptly or the weight of the food being too heavy to transport to their areas of stay. This then meant that the children got less of the quantity required or did not get the porridge at all. Majority (33.9%) of caregivers in the study collected their water from boreholes, 31.1% from the tap, 19.8% from vendors and 15.2% from rivers. Water treatment was generally ignored. 62.8% of the households did not treat their water. Water treatment and number of infections revealed a marginal significance of P=0.065. Interestingly, 41.9% of those who treated their water had a higher infections (3 to 4 infections) compared to 29.7% who did not treat the water. This may be explained by the fact that those who attempted to treat the water may have done it insufficiently, or used unclean storage facilities.
4.3. FBP Administration

Among 52.6% of those that received training two thirds (2/3) prepared porridge using the right method whereas 1/3 prepared using the wrong method resulting in a significant association between training and Z-scores (P<0.001 (Table 5). There was a direct significant association between training and preparation of porridge (P<0.001).

A survey carried out in South Africa showed similar results in which increased knowledge on nutrition resulted in better purchase and preparation of food (Anderson and Coertze 2001). Similar results were found in low income communities in Free State and Northern Cape Provinces. The study was to determine the impact of nutrition education on dietary practices. Knowledge of what to eat to remain healthy improved significantly by between 42.2% and 52.6% in rural intervention areas (Walsh et al 2003). Lack of knowledge underscores the purpose of the food intervention and especially in prescribed diets which the information is crucial for improvement.

<table>
<thead>
<tr>
<th>Training</th>
<th>As prescribed</th>
<th>Not as prescribed</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Yes</td>
<td>84</td>
<td>66.7</td>
<td>39</td>
</tr>
<tr>
<td>No</td>
<td>42</td>
<td>33.3</td>
<td>69</td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
<td>100</td>
<td>108</td>
</tr>
</tbody>
</table>

4.3.1 Attitudes and Opinions About Insta Program

Caregivers were asked to give their opinion about Insta food program (Table 6). 26.3% felt that the program should remain the same. 73.7% felt that for the program
to be effective other underlying factors should be addressed as well. The relationship between attitudes and irregularities was almost significant \((P = 0.059)\). 34.3% of those with negative attitudes practiced irregular feeding compared to 20.9% that had a positive attitude. Some caregivers expressed concern that the porridge did not taste to their expectation. However, the prescribed blend of Insta porridge was generally accepted since 79.9% of the children liked it and that helped them improve their nutritional status. Only 10.5% of the children refused taking the porridge.

Table 6. Attitudes and opinion about insta food program.

<table>
<thead>
<tr>
<th>Opinion</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remain the same</td>
<td>73</td>
<td>26.3</td>
</tr>
<tr>
<td>Increase the amount</td>
<td>53</td>
<td>19.1</td>
</tr>
<tr>
<td>Have enough for house hold</td>
<td>46</td>
<td>16.5</td>
</tr>
<tr>
<td>Food should be available always</td>
<td>30</td>
<td>10.8</td>
</tr>
<tr>
<td>There should be no exit</td>
<td>15</td>
<td>5.4</td>
</tr>
<tr>
<td>Collection points should be near</td>
<td>23</td>
<td>8.3</td>
</tr>
<tr>
<td>Add sugar, milk, eggs or other ingredient</td>
<td>38</td>
<td>13.7</td>
</tr>
<tr>
<td><strong>Total responses</strong></td>
<td>278</td>
<td>100</td>
</tr>
</tbody>
</table>

4.3.2. Nutritional Assessment After Prescribed Porridge Blend Administration

207 children were assessed instead of the 234 at the beginning of the study because 15 children transferred to other programs, 5 children developed serious infections that needed admission, 7 children relocated from Kangemi, 3 declined to participate in the study while 3 children died. Insta was regarded successful when children attained a \(Z\) score \(\geq 1\) after 3 months. Insta food significantly reduced underweight, from 36.2% to 19.8%, stunting from 63.8% to 46.4%, and wasting from 10.1% to 9.7% respectively (Table 7).
Table 7. Overall changes of malnutrition at baseline and endpoint.

<table>
<thead>
<tr>
<th></th>
<th>End point</th>
<th>&lt; -2 SD</th>
<th>&gt;= -2 SD</th>
<th>Odds ratio</th>
<th>95% CI of Odds ratio</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>WAZ</td>
<td>Baseline</td>
<td>75</td>
<td>36.2</td>
<td>132</td>
<td>63.8</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td>Final</td>
<td>41</td>
<td>19.8</td>
<td>166</td>
<td>80.2</td>
<td>1</td>
</tr>
<tr>
<td>HAZ</td>
<td>Baseline</td>
<td>132</td>
<td>63.8</td>
<td>75</td>
<td>36.2</td>
<td>2.03</td>
</tr>
<tr>
<td></td>
<td>Final</td>
<td>96</td>
<td>46.4</td>
<td>111</td>
<td>53.6</td>
<td>1</td>
</tr>
<tr>
<td>WHZ</td>
<td>Baseline</td>
<td>21</td>
<td>10.1</td>
<td>186</td>
<td>89.9</td>
<td>1.06</td>
</tr>
<tr>
<td></td>
<td>Final</td>
<td>20</td>
<td>9.7</td>
<td>187</td>
<td>90.3</td>
<td>1</td>
</tr>
</tbody>
</table>

At baseline children were 2.3 times more likely to become underweight as compared to final (P<0.001). A child was 2.03 times more likely to be stunted at baseline compared to final. Wasting was not statistically significant (P=0.869). The likelihood of being wasted at baseline and at final was more or less the same.

4.3.3. Cumulative Distribution Curves

Malnutrition indicators were plotted on the cumulative curve to observe graphically the shift in malnutrition status. The curve showed at least a shift of +1 Z-score improvement (Figs. 6, 7 and 8). This is a clear indication that Insta porridge had contributed to the improvement in the nutritional status of the children.

Figure 6. Distribution of weight for age (WAZ) Z-scores from baseline to exit.
Figure 7. Distribution of height for age (HAZ) Z-scores from baseline to exit.

Figure 8. Distribution of weight for height Z-scores from baseline to exit.
4.3.4. Changes in the Mean Z-scores at Baseline and Final

All the three indicators of malnutrition, namely; WAZ, HAZ and WHZ standard deviations between baseline and final measurements, showed significant mean difference of 0.58, 0.75 and 0.27 respectively with p values of <0.001 in both WAZ and HAZ whereas WHZ had had a P=0.006 (Table 8). Insta porridge intake was able to reduce underweight from a mean of -1.76 to -1.18 Z score, stunting from -2.24 to -1.49 Z score and wasting from -0.37 to -0.10 Z score.

Table 8. Summary statistics on Z-scores at baseline and endpoint.

<table>
<thead>
<tr>
<th>Z-scores</th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>207</td>
<td>-1.76</td>
<td>1.61</td>
<td>-1.61</td>
<td>-6.98</td>
<td>3.01</td>
</tr>
<tr>
<td>Final</td>
<td>207</td>
<td>-1.18</td>
<td>1.45</td>
<td>-1.27</td>
<td>-5.98</td>
<td>4.5</td>
</tr>
<tr>
<td>Absolute change</td>
<td></td>
<td>0.58</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HAZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>207</td>
<td>-2.24</td>
<td>2.94</td>
<td>-2.57</td>
<td>-8.91</td>
<td>8.75</td>
</tr>
<tr>
<td>Final</td>
<td>207</td>
<td>-1.49</td>
<td>2.81</td>
<td>-1.89</td>
<td>-8.44</td>
<td>9.03</td>
</tr>
<tr>
<td>Absolute change</td>
<td></td>
<td>0.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WHZ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>207</td>
<td>-0.37</td>
<td>1.95</td>
<td>-0.2</td>
<td>-8.76</td>
<td>7.89</td>
</tr>
<tr>
<td>Final</td>
<td>207</td>
<td>-0.10</td>
<td>1.84</td>
<td>0.17</td>
<td>-8.49</td>
<td>6.88</td>
</tr>
<tr>
<td>Absolute change</td>
<td></td>
<td>0.27</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.3.5. Association Between Socio-demographic Factors with Nutritional Status Indicators

Table 9 shows association between various socio demographic characteristics with the three indicators of nutritional status, underweight, stunting and wasting. Nutritional improvement associated significantly with age of child (P=0.001), Relationship of caregiver to child (P=0.050), preparation of porridge (P=0.054), age of caregiver (P=0.023 and number of infections (P=0.041). 81.2% had a Z-score ≥ -2 in 2 or 3 indicators, and only (18.8%) had 0 or 1 indicator showing a value ≥ -2. The factors
that did not affect nutritional status included ARV administration (p=0.793), gender of children (P= 0.488), gender of caregivers (P= 0.179) and child immunization (P=0.534).

A higher proportion of younger children (0.5 – <2yrs) improved better compared to older children (2 – 5 yrs). This could be explained by the fact that children below 2 years are more compliant to feeding than older children who may refuse to adapt to new tastes of food. Older children may already be adapted to adults’ food even when the food is not nutritionally balanced. This implies that food interventions should be started at an early age for maximum effectiveness. Those with 1 to 2 infections had an improvement rate of 85.6%, whereas those with 2 to 3 infections had a lower improvement rate of 73.3 %, thus the fewer the infections the higher the improvement rate. Caregivers should be trained among other things in ways of managing and preventing infections in order to realize nutritional benefits of a food intervention. In general malnutrition seemed to increase as the child grew older with 7% of the children aged 6 – 24 months being underweight compared to 16% of those aged 25 – 59 months.
Table 9. Association between selected socio demographic characteristics with indicators of nutritional status (HAZ = Height-for-age, WAZ = Weight-for-age, WHZ = Weight-for-height).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
<th>HAZ &lt; -2 (n=96)</th>
<th>WAZ &lt; -2 (n=41)</th>
<th>WHZ &lt; -2 (n=20)</th>
<th>0 or 1 indicator with z score &gt;= -2 (n=39)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pearson chi-square value</td>
<td>P value</td>
<td>Pearson chi-square value</td>
<td>P value</td>
</tr>
<tr>
<td>Age of child in years</td>
<td>0.5 - &lt;2 years</td>
<td>40</td>
<td>3.48</td>
<td>0.071</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 - 5 years</td>
<td>52.9</td>
<td>10.5</td>
<td>8.8</td>
<td></td>
</tr>
<tr>
<td>Gender of child</td>
<td>Male</td>
<td>51.0</td>
<td>22.0</td>
<td>6.5</td>
<td>2.470</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>42.1</td>
<td>17.8</td>
<td>6.3</td>
<td>2.470</td>
</tr>
<tr>
<td>Immunization</td>
<td>Complete</td>
<td>45.3</td>
<td>20.5</td>
<td>10.0</td>
<td>1.980</td>
</tr>
<tr>
<td></td>
<td>Incomplete</td>
<td>58.8</td>
<td>11.8</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>Relationship of caregiver to child</td>
<td>Mother</td>
<td>44.1</td>
<td>16.4</td>
<td>10.5</td>
<td>15.8</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>52.7</td>
<td>29.1</td>
<td>7.3</td>
<td>0.490</td>
</tr>
<tr>
<td>Preparation of porridge</td>
<td>Wrong</td>
<td>50.0</td>
<td>25.0</td>
<td>11.6</td>
<td>25.0</td>
</tr>
<tr>
<td></td>
<td>Correct</td>
<td>42.1</td>
<td>13.7</td>
<td>7.4</td>
<td>7.4</td>
</tr>
<tr>
<td>Stigma</td>
<td>Yes</td>
<td>51.3</td>
<td>21.7</td>
<td>12.2</td>
<td>1.870</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>40.2</td>
<td>17.4</td>
<td>6.5</td>
<td>6.5</td>
</tr>
<tr>
<td>Defaulting</td>
<td>Yes</td>
<td>43.2</td>
<td>21.6</td>
<td>10.8</td>
<td>18.9</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>47.1</td>
<td>19.4</td>
<td>9.4</td>
<td>9.4</td>
</tr>
<tr>
<td>Marital status</td>
<td>Others</td>
<td>51.0</td>
<td>21.2</td>
<td>9.6</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>41.7</td>
<td>18.4</td>
<td>9.7</td>
<td>9.7</td>
</tr>
<tr>
<td>Level of education</td>
<td>&lt;= Secondary</td>
<td>47.8</td>
<td>20.1</td>
<td>9.8</td>
<td>19.0</td>
</tr>
<tr>
<td></td>
<td>&gt; Secondary</td>
<td>34.8</td>
<td>17.4</td>
<td>8.7</td>
<td>8.7</td>
</tr>
<tr>
<td>Age of caregiver in years</td>
<td>&lt; 30 years</td>
<td>52.3</td>
<td>27.3</td>
<td>9.1</td>
<td>25.0</td>
</tr>
<tr>
<td></td>
<td>&gt;= 30 years</td>
<td>42.0</td>
<td>14.3</td>
<td>10.1</td>
<td>10.1</td>
</tr>
<tr>
<td>Monthly income in Kshs</td>
<td>Below 2000 Kshs</td>
<td>48.1</td>
<td>17.5</td>
<td>7.8</td>
<td>2.410</td>
</tr>
<tr>
<td></td>
<td>&gt;= 2000 Kshs</td>
<td>41.5</td>
<td>26.4</td>
<td>15.1</td>
<td>2.410</td>
</tr>
</tbody>
</table>
4.3.6. Multivariate Analysis

The factors that associated with nutritional status as indicated in Table 9 (age of child, age of caregiver, PPB preparation, and relationship of child to caregiver) were fitted into a regression model. Three successive iterations were performed using backward conditional method resulting to only three true predictors of nutrition status. Table 10 shows P values and their respective odds ratio for each of the true predictors. The odds ratio for age of child indicated that when a child was 0.5 – <2 years he/she was 3.3 times more likely to improve on their nutrition status as compared to those that were 2 years and above. Correct food preparation placed a child at 2.2 folds better than wrong preparation. Age of caregiver emerged to be an important factor as well. A child, whose caregiver was ≥ 30 years old, was 1.9 times more likely to improve on his/her nutrition status.

Table 10. Logistic regression predicting nutritional status from age of child, preparation of porridge and age of the caregiver

<table>
<thead>
<tr>
<th>Predictor variables</th>
<th>P</th>
<th>O.R</th>
<th>95% C.I.for O.R</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>Age of child¹ (0.5 – &lt;2)</td>
<td>0.003</td>
<td>3.262</td>
<td>1.503</td>
</tr>
<tr>
<td>Preparation method² (Correct)</td>
<td>0.042</td>
<td>2.178</td>
<td>1.027</td>
</tr>
<tr>
<td>Age of caregiver³ (≥ 30)</td>
<td>0.082</td>
<td>1.906</td>
<td>0.921</td>
</tr>
</tbody>
</table>

¹ - (2-5 years) was used as the reference category
² - (Wrong method) was used as the reference category
³ - (<30) was used as the reference category

In summary, the age of the child, age of caregiver and correct preparation of the porridge were the main factors that controlled the nutritional effectiveness of Insta porridge of HIV infected children.
CHAPTER V

CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

Insta porridge improved the nutrition status of HIV malnourished children. 81.2% had a Z score ≥ -2 in 2 or 3 indicators, and only (18.8%) had 0 or 1 indicator showing a value ≥ -2. The factors that associated with marked improvement were age of child (P=0.001), relationship of caregiver to child (P=0.050), preparation of porridge (P=0.054), age of caregiver (P=0.023) and number of infections a child suffered (P=0.041). The factors that did not affect nutrition status included ARV administration (p=0.793), gender in children, gender in caregivers and immunization of the children (P=0.788).

Addressing malnutrition in HIV infected children should entail an integrated programme that addresses nutrition and socio demographic factors such as age at which intervention is administered, relationship of caregiver to the child and medical care of the infected child.

5.2. Recommendations

Based on the findings in this study the following recommendations for practice and policy are advanced.
5.2.1. Recommendations for Practice

1. Proper instructions on quantities should be put on all packages. The current quantity specifications are misleading. The study found out that measuring quantities per day was a common problem among the caregivers because the spoon specification was not given. Measuring equipment should be included in the packets of flour to ensure correct measurements. The current quality specifications of grammage and liters are not easily understood.

2. Training on preparation of Insta porridge should be mandatory to realize the effectiveness of the same.

3. The whole household should be involved in the care and feeding of the affected child to avoid cases of irregular feeding when the primary caregiver is unavailable.

4. Infection control should be mandatory in food intervention programs in HIV infected children.

5.2.2. Recommendation for Policy

1. Improved nutrition of HIV positive children require a multi-sectoral approach. This should include Ministry of Public Health, Ministry of Medical Services, Nairobi Metropolitan, Water and Sanitation and the Ministry of Agriculture.

5.3. Suggestion for Further Research

As a follow up of this study the following suggestions for further research are made.

1. A cost benefit analysis of FBP verses improved food security, water and sanitation provision and economic empowerment of caregivers.
2. Studies to establish dosing of FBP to various age groups, different levels of malnutrition and settings in order to achieve optimum growth.

3. A comparison of various FBPs in use for HIV patients in terms of composition, stability, ease of use and nutritional improvement.

4. The role of FBPs in treatment of malnutrition not related to HIV infection.

5. Studies to establish relapse after exit from the program.


FANTA-AED. 2007. Nairobi urban health & demographic surveillance system: summary of key findings FANTA-AED, the Kenyan PEPFAR-UASID funded


APPENDICES

APPENDIX 1

LOCATION OF LEA TOTO PROGRAMME IN KANGEMI, NAIROBI
LETTER OF CONSENT

Dear Guardian/Parent/Respondent,

I am a postgraduate student at Kenyatta University, Department of Public Health. I am carrying out a study to assess the efficacy of the Prescribed Insta porridge blend (FF) on the nutritional status of HIV infected children aged between 6 and 59 months as a partial requirement for a Master’s degree in Public Health.

Your child has been selected as a possible participant in this study. The study involves establishing the effectiveness of Insta porridge on the nutritional improvement of your child. The weight and height measurements of your child will be taken every month. Any ailments during the study will be recorded, and the study group will also visit the child at his/her residential place.

I would like to kindly request you to participate by sparing a few minutes to answer the questions attached. Your responses will be treated with utmost confidentiality and will be used for the purpose of making recommendations on improving food prescribed to malnourished HIV infected children. The results of the study can be shared with you on request and you are at liberty to disagree or withdraw from the study at any time and without any repercussions.

Please write your name and sign in the spaces indicated below if you agree to participate in the study.

Thank you for your cooperation

Lily Masinde
P. O. Box 30251
Nairobi

I understand the implications of the study and consent to participate in the research.

________________________
Respondent
SECTION: A

DEMOGRAPHIC INFORMATION FROM CARE GIVER/ PARENT

Tick or fill the blank where applicable

1. Gender and age of Care giver.
   - Male □ Female □ Below 20 □ 20-24 □ 25-29 □ 30-34 □ 35-40 □ More than 40
   - Gender and age of child □ Male □ Female □ Age ...............

2. Marital status of care giver
   - Single □ Married □ Widow / widower □ Divorced □ Separated

3. Please indicate your level of education.
   - Primary □ Secondary □ College □ University □ Never been to school

4. Please indicate your residential area.
   - Kangemi □ Ruthimitu □ Mutuini □ (specify)

5. Do you have any other children under your care? □ Yes □ No

6. If yes to Q5, please indicate the no. of other children under your Care. ............

7. Are any of your other children enrolled in the Insta food by prescription program?
   - Yes □ No

8. If yes to Q7, how many are enrolled? ...........

9. Why did you enroll them in the food by prescription program
   - I was referred by the clinician □ I was advised by a friend □ I was enrolled by the Social Health Worker
   - Personal initiative □ Others (please specify)...........................................

10. Please indicate your source of income.
    - Formal Employment □ Self employment □ unemployed □ Well wishers/Relatives

11. On average, what is your monthly income (please tick as appropriate)
    - Below 2000 □ 200-5000 □ 5001-8000 □ 8001-11000 □ Above 11000

12. What is your relationship to this child? ...................................................

13. Are you enrolled in any other food support other than this one at Lea Toto?
SECTION B

PRESCRIBED FOOD INTAKE 24 HOUR RECALL

14. Please list the food intake for the child from morning when you wake up to evening when you sleep.

<table>
<thead>
<tr>
<th>Time</th>
<th>Insta porridge</th>
<th>As prescribed</th>
<th>Not as prescribed</th>
<th>Reason irregularity</th>
<th>Comments (for researchers use)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid morning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afternoon</td>
<td></td>
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</tr>
<tr>
<td>Evening</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15. Were you trained on how to prepare the Insta porridge?
   □ Yes  □ No

16. What problems do you encounter in administering the prescribed food?
   □ Preparation  □ Collection  □ others (please specify).................

17. Do you face any stigmatization in collecting or administering this food?
   □ Yes  □ No

18. In your opinion, what should be done to improve the effectiveness of Insta food program?

SECTION C

HEALTH INFORMATION (CONFIDENTIAL)

(To be obtained from health records by the researcher through the medical personnel)

19. Admission number and age of the Child

20. Please indicate the methods used to confirm HIV status

21. After how many tests was the HIV status fully confirmed?

22. Please indicate any infections the child has suffered since enrollment on Insta Food

23. Is the child under Antiretroviral drug administration □ Yes □ No

24. Please fill in the following information
MEASUREMENTS TO BE TAKEN BY THE RESEARCHER

Weight, on admission and every subsequent visit till 3 months
Height, on admission and every subsequent visit till 3 months
Calculation of Z scores from admission to exit
Comparison of weight for height (W/H), weight for Age (W/A), Height for Age (H/A)

<table>
<thead>
<tr>
<th>Measurements</th>
<th>On admission</th>
<th>Visit 1</th>
<th>Visit 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight/Age Z score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height/Age Z score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immunizations/ Others</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

FOCUS GROUP DISCUSSIONS FOR CARE

1. What problems do you encounter in the
   a) collecting the food
   b) preparing
   c) administering it to your children

2. Do you face any stigma from the rest of the community for giving your children this porridge?

3. Do the children like the porridge blend as compared to other foods that you give?

4. How often do you give the Insta food prescribed?

5. Do you give the food yourself or someone else gives the food

6. If someone else gives the food, do you instruct them on how to prepare or you leave it prepared.

7. Where do you keep the food when prepared?
a) In a cup covered □  
b) In the refrigerator □  
c) In a cooking pan □  
d) Any other □  

8. Have you noticed a change in the health of the children since you enrolled for the prescribed porridge?  
   Yes □  No □  
   If yes, what changes ___________  
   If No what has been the problem ___________  
   If yes after how long did you notice the change?  

9. In your opinion, what should be done to improve the Insta programme.  

10. Were you given demonstrations on how to prepare and administer Insta porridge?  

11. Do have any other information you want to share with us on effectiveness of Insta porridge or how to improve it?  

Thank you for your cooperation
## APPENDIX 3

### NCHS/WHO NORMALISED REFERENCE CHARTS

NCHS/WHO normalized reference values for weight-for-height and weight-for-length

<table>
<thead>
<tr>
<th>Boys' weight (kg)</th>
<th>Length*(cm)</th>
<th>Girls' weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4 SD</td>
<td>-3 SD</td>
<td>-2 SD</td>
</tr>
<tr>
<td>1.8</td>
<td>2.1</td>
<td>2.5</td>
</tr>
<tr>
<td>1.8</td>
<td>2.2</td>
<td>2.6</td>
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<tr>
<td>1.9</td>
<td>2.3</td>
<td>2.8</td>
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<td>1.9</td>
<td>2.4</td>
<td>2.9</td>
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<tr>
<td>2.0</td>
<td>2.6</td>
<td>3.1</td>
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</tbody>
</table>

SD: standard deviation score (or Z-score). Although the interpretation of a fixed percent-of-median value varies across age and height, and generally the two scales cannot be compared, the approximate percent-of-median values for -1 and -2 SD are 90% and 80% of median, respectively (Görstein J et al. Issues in the assessment of nutritional status using anthropometry. *Bulletin of the World Health Organization, 1994, 72:273-283*).

* Length is measured for children below 85 cm. For children 85 cm or more, height is measured. Recumbent length is on average 0.5 cm greater than standing height; although the difference is of no importance to individual children, a correction may be made by subtracting 0.5 cm from all lengths above 84.9 cm if standing height cannot be measured.
<table>
<thead>
<tr>
<th>Boys' weight (kg)</th>
<th>Height* (cm)</th>
<th>Girls' weight (kg)</th>
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<tr>
<td></td>
<td>Median</td>
<td>-1 SD</td>
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<tr>
<td></td>
<td>Median</td>
<td>-1 SD</td>
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<tr>
<td>-4 SD</td>
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</table>

*Length is measured for children below 85 cm. For children 85 cm or more, height is measured. Recumbent length is on average 0.5 cm greater than standing height; although the difference is of no importance to individual children, a correction may be made by subtracting 0.5 cm from all lengths above 84.9 cm if standing height cannot be measured.

SD: standard deviation score (or Z-score). Although the interpretation of a fixed percent-of-median value varies across age and height, and generally the two scales cannot be compared, the approximate percent-of-median values for -1 and -2SD are 90% and 80% of median, respectively (Gorstein et al. Issues in the assessment of nutritional status using anthropometry. Bulletin of the World Health Organization, 1994, 72:273-283).

Median:

-4 SD: 11.8
-3 SD: 12.0
-2 SD: 12.3
-1 SD: 12.5
0: 12.7
+1 SD: 13.2
+2 SD: 13.6
+3 SD: 13.9
+4 SD: 14.1

Kenyatta University Library
APPENDIX 4

DETAILS AND NUTRITIONAL VALUE OF PPB UNDER THE STUDY

FIRST FOOD®

INSTA HEALTH BUILDER FIRST FOOD® is a precooked, nutritious, complimentary weaning porridge suitable for older infants (over 6 months age) and a deliciously healthy porridge for older growing children and young adults. *Adults of all ages will also enjoy and benefit from eating FIRST FOOD®!* It is a shelf stable, dry-extruded, porridge flour made from whole maize, millet, sorghum, and soybeans. With added energy and a compliment of crucial micronutrient fortification, FIRST FOOD® is formulated as a nutritionally dense (nutrients per gram) complimentary weaning food to ensure infants grow into strong healthy children.

INGREDIENTS

Precooked whole maize, millet (wimbi), sorghum (mtama) and soya with cane sugar, salt, vegetable oil, and fortified with vitamins and minerals.

NUTRITION CONTENTS PER 100g

<table>
<thead>
<tr>
<th>Nutritional Facts</th>
<th>Percentage of Calories from Macronutrients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serving Size: per 100 grams (dry)</td>
<td>CARBOHYDRATE kcal 62%</td>
</tr>
<tr>
<td>Amount Per Serving</td>
<td>Percent of Calories from Macronutrients</td>
</tr>
<tr>
<td>Calories (kcal)</td>
<td>FAT kcal 26%</td>
</tr>
<tr>
<td>Calories from Fat</td>
<td>PROTEIN kcal 12%</td>
</tr>
<tr>
<td>Total Fat</td>
<td></td>
</tr>
<tr>
<td>Saturated Fat g</td>
<td></td>
</tr>
<tr>
<td>Trans Fat g</td>
<td></td>
</tr>
<tr>
<td>Polyunsaturated Fat g</td>
<td></td>
</tr>
<tr>
<td>Cholesterol mg</td>
<td></td>
</tr>
<tr>
<td>Sodium mg</td>
<td></td>
</tr>
<tr>
<td>Potassium mg</td>
<td></td>
</tr>
<tr>
<td>Total Carbohydrate g</td>
<td></td>
</tr>
<tr>
<td>Dietary Fibre g</td>
<td></td>
</tr>
<tr>
<td>Soluble Fibre &lt; g</td>
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</tr>
<tr>
<td>Insoluble Fibre g</td>
<td></td>
</tr>
<tr>
<td>Sugars g</td>
<td></td>
</tr>
<tr>
<td>Other Carbohydrate g</td>
<td></td>
</tr>
<tr>
<td>Protein g</td>
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<table>
<thead>
<tr>
<th>Percent of Calories from Macronutrients</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAT kcal 26%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NUTRITION CONTENTS PER 100g</th>
<th>Micronutrient Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount Per Serving</td>
<td>Nutrient</td>
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<tr>
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<td>Per 100g</td>
</tr>
<tr>
<td>Total Fat</td>
<td>Nutrient</td>
</tr>
<tr>
<td>Saturated Fat g</td>
<td>Vitamin A RE</td>
</tr>
<tr>
<td>Trans Fat g</td>
<td>Vitamin B1</td>
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<tr>
<td>Polyunsaturated Fat g</td>
<td>Vitamin B2</td>
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<tr>
<td>Cholesterol mg</td>
<td>Niacin (B3)</td>
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<td>Vitamin B5</td>
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<td>Potassium mg</td>
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<td>Total Carbohydrate g</td>
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<td>Dietary Fibre g</td>
<td>Folate</td>
</tr>
<tr>
<td>Soluble Fibre &lt; g</td>
<td>Vitamin C</td>
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<tr>
<td>Insoluble Fibre g</td>
<td>Vitamin D³</td>
</tr>
<tr>
<td>Sugars g</td>
<td>Vitamin E</td>
</tr>
<tr>
<td>Other Carbohydrate g</td>
<td>Vitamin K</td>
</tr>
</tbody>
</table>
PACKAGING
5kg high density polyethylene hermetically sealed bags. 250g polyester / polyethylene composite bags, custom orders. Also available as 20 X 250g bags packed in a 5kg polythene over bag for convenient shipping, carrying and distribution.

SHELF LIFE
9 months from date of manufacture when stored in dry moderate temperatures away from direct sunlight.

PRODUCT QUALITY
Products made by Insta Products are manufactured under HACCP conditions. All raw ingredients are rigidly tested for aflatoxin to confirm they are below 3ppb (parts per billion). Microbiological analyses are conducted on every batch of finished goods.

PRODUCT ATTRIBUTES
- Particle size: 100% through 0.6 mm mesh screen
- Colour: brown to tan
- Taste: Clean, nutty, slightly sweet, not "beany" or raw
- Moisture Level: Max = 12% Min = 6.5%
- Fat Sources: 100% vegetable oil including whole maize and whole soybean oils

ACIDITY - pH of prepared porridge = 6.5 (when water pH = 7)

GLYCEMIC INDEX: 65.15
(Calculated from published GI tables. White Bread GI = 100)

WATER CONTENT of Cooked Porridge: 75%
(of prepared food at recommended dilution rate of 1:3)

POTENTIAL FOOD ALLERGENS
Contains Soy
NO dairy, eggs, fish, crustaceans, tree nuts, groundnuts, or wheat (gluten)

PREPARATION INSTRUCTIONS
Mix FIRST FOOD® one part flour with three parts clean cold water in a pan according to the table and boil for 10 minutes, stirring continuously. Add more water for a thinner consistence if desired. Cool and serve.

SERVING SUGGESTION (1:3): (recommended for children over 6 months age)

<table>
<thead>
<tr>
<th>Age</th>
<th>FIRST FOOD® per Day</th>
<th>Water (300 ml cup)</th>
<th>Yield Porridge (300 ml cup)</th>
<th>Nutrition / Serving</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 - 24 months</td>
<td>6 spoons (100g)</td>
<td>1</td>
<td>1.3</td>
<td>Energy: 435kcal, Protein: 13g</td>
</tr>
<tr>
<td>2 - 10 years</td>
<td>12 spoons (200g)</td>
<td>2</td>
<td>2.6</td>
<td>Energy: 870kcal, Protein: 26g</td>
</tr>
</tbody>
</table>
CLINIC NOTES

CHILD HEALTH CARD

MINISTRY OF HEALTH
KENYA EXPANDED PROGRAMME ON IMMUNIZ (KEPI)

HEALTH FACILITY NAME:
SERVICE DELIVERY POINT (SDP) No:
CHILD'S NAME:
SEX: MALE FEMALE
CHILD'S CLINIC No:
DATE FIRST SEEN:
DATE OF BIRTH:
PLACE OF BIRTH: HOME HEALTH FACILITY
FATHER'S NAME:
MOTHER'S NAME:
PROVINCE:
DISTRICT:
DIVISION:
LOCATION:
ESTATE/VILLAGE:
P.O.Box:
Telephone:

ANY ADVERSE EVENTS FOLLOWING IMMUNIZATION (AEFI)
DATE OF AEFI:
DESCRIPTION:
ANTIGEN/ VACCINE:
BATCH NUMBER:
MANUFACTURE DATE:
EXPIRY DATE:
MANUFACTURER'S NAME:

IF YOUR CHILD DEVELOPS ANY ADVERSE EVENTS FOLLOWING IMMUNIZATION (AEFI) PLEASE REPORT IMMEDIATELY TO THE NEAREST HEALTH FACILITY

ONYESHA KADHI HIKI MARA WAO, LIOILOTO NYIKA KUJA

SHOW THIS CARD ON EVERY VISIT

IMMUNIZATIONS

PROTECT YOUR CHILD

<table>
<thead>
<tr>
<th>VACCINE</th>
<th>AGE IN MONTHS</th>
<th>DATE</th>
<th>SIGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCG VACCINE</td>
<td>at birth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DPT (intra-dermal left fore-arm)</td>
<td>Date Given</td>
<td>Date of next visit</td>
<td></td>
</tr>
<tr>
<td>Doce: 0.5mls for child below 1 year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doce: 1ml for child above 1 year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCG: Scar Checked</td>
<td>DATE CHECKED PRESENT ABSENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DATE REDONE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIPHTHERIA/PERTUSSIS/ TETANUS/ HEPATITIS B/ HAEMOPHILUS INFLUENZAE Type b</td>
<td>Date Given</td>
<td>Date of next visit</td>
<td></td>
</tr>
<tr>
<td>Doce: 0.5mls Intramuscular outer thigh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st dose at 6 weeks (DPT/ HepB + Hb)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd dose at 10 weeks (DPT/ HepB + Hb)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd dose at 14 weeks (DPT/ HepB + Hb)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ORAL POLIO VACCINE (OPV)</td>
<td>Date Given</td>
<td>Date of next visit</td>
<td></td>
</tr>
<tr>
<td>Dose: 2 drops orally</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth Dose: at birth or within 2 wks (OPV 0)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Dose at 6 weeks (OPV 1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd Dose at 10 weeks (OPV 2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd Dose at 14 weeks (OPV 3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEASLES VACCINE at 9 Months</td>
<td>Date Given</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doce: 0.5 ml Subcutaneously right upper arm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>YELLOV FEVER VACCINE at 9 Months</td>
<td>Date Given</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doce: 2 drops orally</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VITAMIN A CAPSULE: Given orally</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At first contact after 6 months of age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doce Age</td>
<td>T/Ck age</td>
<td>Date of Next Visit</td>
<td></td>
</tr>
<tr>
<td>100,000 IU</td>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200,000 IU</td>
<td>at 6 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200,000 IU</td>
<td>at 12 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200,000 IU</td>
<td>at 18 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200,000 IU</td>
<td>at 24 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300,000 IU</td>
<td>at 36 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300,000 IU</td>
<td>at 42 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300,000 IU</td>
<td>at 48 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300,000 IU</td>
<td>at 54 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200,000 IU</td>
<td>at 60 months</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BRING TH CHILD TO THE CLINIC EVERY MONTH
EVERY CHILD MUST HAVE A BIRTH CERTIFICATE

SHOW THIS CARD ON EVERY VISIT
APPENDIX 6

PERMISSION LETTER FROM NYUMBANI, LEA TOTO PROGRAM ADMINISTRATION

NYUMBANI
THE CHILDREN OF GOD RELIEF INSTITUTE
A Registered Charity in Kenya, USA, UK, Italy, Ireland & Spain

P.O. Box 24970-00502, Nairobi, Kenya - Office Tel: 254-20-883249, Fax: 883240, e-mail: mary@nyumbani.org
Hospice: Tel: 2015573/883731, Fax: 882371, Mobile: 0722-201163, 0733-661418, e-mail: admin@nyumbani.org
Homepage: http://www.nyumbani.org - Dagoretti, Karen

Lily Masinde
Kenyatta University
Department of Public Health
P.O. Box 43844-00100
Nairobi.

July 15, 2008

Dear Ms. Masinde,

Re: Request for permission to assess the effectiveness of food by prescription program on the nutritional status of malnourished HIV+ children at Lea Toto.

Thank you for your application to conduct research on the effectiveness of food by prescription program on the nutritional status of malnourished HIV+ children at Lea Toto. Since you have approval from The Ministry of Science and Technology, we are happy to accept your request.

Please note that since the children in Lea Toto are not under COGRI guardianship, you need to obtain permission from their caregivers to access information regarding their condition and progress.

We wish you every success in your work and look forward to receiving a copy of your thesis.

Yours sincerely,

Sr. Mary Owens IBVM
Executive Director.

Cc: Mr. Nicholas Makau
    Mr. Paul Mulongo.
RESEARCH PERMIT FROM MINISTRY OF HIGHER EDUCATION, SCIENCE AND TECHNOLOGY

MINISTRY OF HIGHER EDUCATION SCIENCE & TECHNOLOGY

Telegram: "SCIENCE T'EC", Nairobi
Telephone: 02-318581
E-Mail: ps@scienceandtechnology.go.ke

When Replying please quote
Ref. MOHEST 13/001/38C386/ 2nd July 2008

Lily J. A. Masinde
Kenyatta University
P.O. Box 43844
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on, 'Effectiveness of Insta Prescribed Porridge Blend on Nutritional Status of Malnourished HIV/AIDS Children at LEATOTO Programme, Kangemi, Nairobi.

I am pleased to inform you that you have been authorized to carry out research in Nairobi for a period ending 30th October, 2008.

You are advised to report to the District Officer, Kangemi Area before embarking on your research.

On completion of your research, you are expected to submit two copies of your research report to this office.

M. O. ONDIEKI
FOR: PERMANENT SECRETARY

Copy to:
The District Officer
Kangemi
NAIROBI