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Nutritional status and morbidity among HIV/AIDS-affected children aged 6-9 years in Suba district, Kenya

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Abstract

The HIV/AIDS pandemic continues to claim lives and render many children orphans. More than 3 million people died from AIDS including half a million children. In Sub-Saharan Africa, it is estimated that 12 million children have been orphaned by HIV and this number is set to increase. HIV/AIDS orphaned children suffer malnutrition which adversely affects their health. Objective of this study was to establish the magnitude of underweight, stunting and wasting as indicators of malnutrition among HIV/AIDS-affected school children aged 6-9 years in Suba district. A cross-sectional research design was used and setting included Lambwe, Sindo and Ong'ayo primary schools in Suba district. A total of 150 children were sampled from HIV/AIDS-affected households. Anthropometric measurements and guided questionnaires were the main tools of data collection. Data was analyzed using SPSS and the Nutri-survey computer software programs. Of the children 8.8% were underweight, 13.3% stunted and 7.6% wasted. Cereals formed the main part of the childrens' diet, fish was the most consumed protein and vegetable and fruit consumption was low. Total kilocalories taken were 41% of the Recommended Dietary Allowance. The most reported illnesses which were also confirmed by the doctor's clinical assessment were malaria (16%), upper respiratory infections (6.1%) and skin infections (8.0%). Primary education was completed by 67.4% of mothers, while only 1.2% had post secondary education. The average monthly maternal income was Ksh 1,550 ($ 24.2). Food security was reported to be low as 64.6% of the households purchased food three months after harvest. HIV/AIDS-affected children suffered underweight, stunting and wasting with morbidity, poverty, low educational and occupational status of the parents/guardians cited as probable determinants. Interventions should therefore focus on improved agricultural production, innovative poverty alleviation methods and education.

Key words: Orphans, household, underweight, stunting and wasting.

Introduction

The HIV/AIDS epidemic has continued to be a serious health and development problem in (SSA). Estimates indicate that over 40 million people are currently living with the virus, world wide more than 70% of whom are in SSA [1]. In 2004, more than 3 million people died from AIDS including half a million children [1]. Kenya's prevalence is 6.7% with 140,000 deaths reported in 2005. The HIV/AIDS scourge has brought about many negative impacts which include orphanhood in communities. In SSA 12 million children have been orphaned by losing either one parent or both to AIDS [1, 2] with 1.1 million in Kenya alone [3]. A study by Njeru and Kioko [4] showed that the number of AIDS orphans increased from 43,359 in 1990 to 965,975 in 2000 in primary schools in Kenya. This number is projected to increase to 2,189,593 by the year 2010.

Suba district is one of the twelve districts in Nyanza province, it has a population of 181,138 people with a population density of 147/km^2 [5]. The Welfare Monitoring Survey Report [6] estimates that 50% of the population in Suba is poor, and the district's poverty index is 64% [5]. The HIV/AIDS prevalence in Suba district is 41% which is the highest in Kenya [7]. Many households in Suba district are affected by HIV/AIDS and the number of orphans and other vulnerable children is estimated to be 5,072 [7].

One of the negative impacts of orphanhood is increased food insecurity. Several studies show that the health and nutritional status of many children is threatened by HIV/AIDS on families. A majority of households affected by HIV/AIDS are chronically food insecure rendering the children to malnutrition. Studies have shown that malnutrition is particularly high among HIV/AIDS-affected children. Further, studies in Tanzania and Zambia have shown that orphans were more likely to be stunted and wasted compared to other children with parents [8].

This paper presents findings of a baseline survey carried out between November, 2006 and January, 2007 among HIV/AIDS-affected children aged 6-9 years in Suba district. The paper discusses protein-energy malnutrition outlining the determinants of three commonly used indicators that are sensitive to child health and food intake, namely weight-for-age (underweight), weight-

for-height (wasting) and height-for-age (stunting). Finally, the paper discusses food consumption patterns and morbidity among the children under study.

Materials and Methods

A cross-sectional study design was employed in this study. Mbita and Lambwe divisions of Suba district were purposively selected. The three primary schools used for the study were Sindo and Onga'yo situated in Central location and Lambwe primary school in Lambwe location. A sampling frame of 565 children was constituted as follows: 125, 200 and 245 children from Ong'ayo, Lambwe and Sindo primary schools respectively. From these, the simple random sampling strategy was used to identify 50 children from each school. A total of 150 respondents formed the study sample. These children aged 6-9 years were orphaned by HIV/AIDS.

Structured questionnaires were prepared and pretested using 5% of the children not involved in the study. The researcher administered the questionnaires to mothers or guardians of the children. Data on socio-economic, demographic, food production, food consumption patterns and morbidity was gathered here. A medical doctor from Suba district hospital carried out a clinical assessment which confirmed the cases of morbidity among the study children.

Anthropometric measurements, specifically height and weight, were carried out by the researcher on the study children as described in the anthropometric indicators guide [9]. Body weight was taken with minimum clothing using an electronic scale (Camry, Model BR9012, Germany) to the nearest 0.1 kg. Height was taken while the child was standing straight using a portable stadiometer (Model 26SM 200cm, Germany) to the nearest 0.1 cm. Each measurement was taken three times and the average taken to be adequate. Dietary assessments involved use of both 24 hr recall and the food frequency questionnaire.

Ethical approval: Research approval was sought from the Institute of Research Ethics Committee (IREC), Moi University. Besides, verbal consent was sought from the parents/guardians of the children and the respondents' confidentiality assured.

Data analysis: Data obtained was analyzed using the Statistical Package for Social Sciences (SPSS) version 11.5 [10]. Descriptive statistics were used to analyze demographic, socio-economic and dietary data. The Nutri-survey computer software program [11] was used to analyze anthropometric measurements, and computation of weight-for-age, weight-for-height and height-for-age z-scores was done according to NCHS-WHO [12] growth reference curves as indicators of the nutritional status of children. The forms of malnutrition presented in this paper include underweight, stunting and wasting. Stunting (height-for-age) is an indicator which reflects slowed skeletal growth and stature mainly due to extended period of inadequate food intake and is generally found in areas that are economically poor. Wasting (weight-for-height) is an indicator of acute malnutrition as it measures body weight compared to length thus describing current nutritional status. Underweight (weight-for-age) is a combination of both stunting and wasting.

A child was considered malnourished if he/she fell below – 2 SD of the reference NCHS. If a child was below – 3 SD, he/she was considered severely malnourished [9]. A p-value of <0.05 level was considered significant.

Results

Demographic and socio-economic characteristics of the household members: Data was obtained from 150 HIV/AIDS-affected households. The average household size was 4.7 which is within the national range [5]. The mean size of a Kenyan household is 4.4 persons [5]. The maximum and minimum number of people in a household was 12 and 3 respectively. Majority (60.1%) of the respondents was 16-25 years old, minority (0.6%) was 36-45 years old. Male respondents were 25.9% and female 72.8%. There were no significant differences ($p>0.05$) between males and females in the different age categories. There were three times more (75%) male-headed than female-headed households (24.5%). These findings show wider margins in gender disparities in Suba district than in the National and Nyanza province figures of 68 and 63.4% male-headed households [5]. The male-headed households were significantly larger because of cultural practices such as polygamy and wife inheritance [5]. Majority of the household members living in the households were related to the household head. Only 16.4% of them reported that household heads were their spouses. Majority of household members was Protestants 38%, and close to them were the Seventh Adventists 31%, Catholics formed 19.6% while Muslims and Traditionalists formed 1.9%.

Education, occupation and income levels of household members: More than half of the household members (64.1%) did not have post primary education. Only 14.1 and 1.9% proceeded to secondary school and college/university respectively. Of the total household members 3.9% had not gone to school at all. Results also indicate that more than half of the mothers (67.4%) had attained primary education with 18.9% and 1.2% having secondary and college education respectively. Slightly more than half (55.7%) of the household members reported that they had no formal employment but worked on their own farms. About 11.4 and 29.1% were casual laborers and involved in small businesses respectively. Moreover, farming was practiced in Lambwe division. The monthly household incomes ranged from a minimum of Ksh 1,550 ($ 24.2) to a maximum of Ksh 5,500 ($ 85.9) and a mean Ksh 2,000 ($ 31.25). Low income could probably be due to low education and occupation status with meager returns.

Food production: For most households the mean land acreage of 1.8 acres was under cultivation and a mean acreage of 1.2 acres under food crop cultivation. Food crops were produced in nearly all the households, 91.7% grew maize with an annual mean production of five bags of 90 kg (450 kg) harvested during the first season (April-August). Slightly over half of the respondents (64.6%) reported that the food lasted only 3 months after harvest, 23.4% reported to have food in storage 5 months after harvest while 12% had food stored 6 months after harvest. About 31.1% of the respondents reported not to be cultivating land at the time of data collection (Nov. 2006 - Jan 2007). Out of those who cultivated 48.4% of them reported to grow maize, millet and beans, while 10.2, 3.2 and 7.1% reported to grow maize, sorghum, tubers (cassava and sweet potatoes), vegetables (kales and tomatoes) and fruits respectively. Of respondents 46% used hand hoes/ *pangas* and 26.8 and 0.8% used oxen and tractors, respectively,

as farming equipment. This can possibly be explained by the low ownership of land and the fact that the community depends heavily on fishing.

About three quarters of the respondents (75.2%) reported to own livestock, 36.2, 10.2, 42.9, 65.4 and 0.8% reported to have cows, sheep, goats, poultry and donkeys respectively. However, households owned just a few animals with an average of 2 cows, 1 sheep, 3 goats and 7 chickens per household. Consequently, those who owned livestock used animal and animal products at home or for sale to generate income. All those owning cows sold some milk while 35.8% reported to sell chicken and eggs they produced.

Profiles of the children: One hundred and fifty school children aged 6-9 years were included in the study sample. Three quarters (77.7%) had their mothers alive and living with them while over half of the pupils (60%) had their fathers alive and living with them. About 12.6% of them had lost their mothers. Over half of the pupils (60%) had their fathers alive and living with them in the households. Further, 25% had lost their fathers while 2 pupils (1.3%) did not know their fathers' whereabouts.

Children's nutritional status: Table 1 shows the magnitude of the nutrition indicators under study; the results show that underweight children were 8.8%, stunted 13.3% and 7.6% wasted. It is evident from these findings that 29.7% of the study children suffered varied forms of malnutrition with stunting being most common.

Table 1. Percentage of underweight, stunting and wasting in the study children (N=150).

Nutrition index under study	Percentage
Underweight	8.8
Stunting	13.3
Wasting	7.6
Total	29.7

Food consumption patterns: Food consumption patterns usually depict the nutrition and health status of a population, especially children. This study presents results of food consumed by the study children who all ate from the family pot. The results indicate that maize, millet and fermented porridge recorded the highest daily cereal consumption with 76, 46.1 and 36.2% respectively. Groundnuts were consumed by half of the respondents (50%) while green grams were consumed by 27.8%. Consumption of tubers was average with sweet potatoes, Irish potatoes, cassava and arrowroots recording 67.3, 46.1, 38.6 and 17.7% respectively. Consumption of chicken, meats such as beef and pork and sausages was generally very low. Fresh milk was rarely consumed unless in tea.

Slightly more than half of the households (52.4%) reported to consume kales on a daily basis. Consumption of traditional vegetables was relatively high (26%). Mushrooms, pumpkins, carrots and spinach were hardly consumed by the households probably because they were not available. Fish was the most commonly consumed protein (49.2%) on a daily basis because most of the households were involved in fishing activities. The most commonly eaten fruits were mangoes (93%) and pawpaw (65%), otherwise generally fruit consumption was low.

Most of the respondents reported that they bought most of the food consumed except for maize, millet and African leafy vegetables that recorded 36.7, 38.7 and 31.7% own production and that what they consumed was not adequate except for cereals, legumes and fish. In the event of a food shortage from own production, 84.6% of the respondents reported to purchase food, 5.5% obtained food through assistance from friends and relatives, 3.2% sold household assets to buy food and 6.7% reported to work for food.

The 24-hr recall revealed that children consumed the three traditional meals (breakfast, lunch and supper) from the family pot. The study showed that nearly all children except 5.6% took some breakfast with 47.7% consuming porridge made from mixed flours. There was low consumption of mid-morning snack with nearly all (98.1%) not consuming a morning snack. This could probably be due to the fact that the children were in school and no snack is served in school. Similarly, no evening snack was consumed because the children were away in school or it was not available. On average each child consumed 740 kilocalories daily which is 41% of RDA and 16 g of protein, which is 48% of RDA.

Morbidity patterns: Common illnesses suffered by the children and which were confirmed by the doctor's clinical assessments were malaria, skin infections, upper respiratory infections and measles with 16, 8.0, 6.1 and 2.8% respectively. Other diseases reported were stomach ache and diarrhea 1.9%, chicken pox 0.5% and eye infections 0.9%. Those who reported to have been ill for more than one week were 2.8, 6.1, 0.5, 1.4 and 0.9% who suffered malaria, skin infections, upper respiratory infections, measles, stomach ache and diarrhea.Vital statistics at the Suba district hospital confirmed that 30 children had been admitted with malaria in the past two months, and dehydration due to diarrhea, upper respiratory infections and skin infections were common problems among the outpatient cases.

Nearly all the children (90.6%) had received BCG vaccine given at birth, except 8.5% whose status was not known. About 1.9% had not received any of the DPT and OPV (polio) vaccines while the DPT and OPV vaccination status of 9.4% was unknown and could not be established. Further, 3.8 and 8.9% of school children had not received measles vaccine or their measles vaccination status was unknown.

Discussion

This study sought to establish the nutritional status of HIV/AIDS-affected children. Results showed a higher proportion of stunted children and slightly fewer underweight and wasting (13.3, 8.8 and 7.6%, respectively). These results are comparable to the Nyanza province prevalence rates which show stunting at 31.1%, wasting at 2.3% and 15.8% underweight [7]. The results are similar to findings in Tanzania where the death of a mother was associated with an average decline of 1 standard deviation in child height hence HIV-affected children were more likely to be stunted [8]. Ainsworth and Semali found that the 650,000 children orphaned by HIV in Zambia were more likely to be stunted than non-orphans [13]. A similar trend was reported in Zimbabwe, where stunting (22% versus 17%) and underweight (34% versus 26%) were more common among orphans than non-orphans [14]. In Indonesia, maternal orphans had a 15% probability of being wasted [14]. Kikafunda and Namusoke found high prevalence of

underweight among HIV/AIDS orphans in Rakai, Uganda [15]. These results show that stunting, underweight and wasting are a common problem among children orphaned by HIV/AIDS.

From the study findings there were variation in the proportions of the indices studied between the three schools. These differences were attributed to unique aspects about the school. Fig. 1 shows the percentage distribution of underweight, stunting and wasting in the three schools studied.

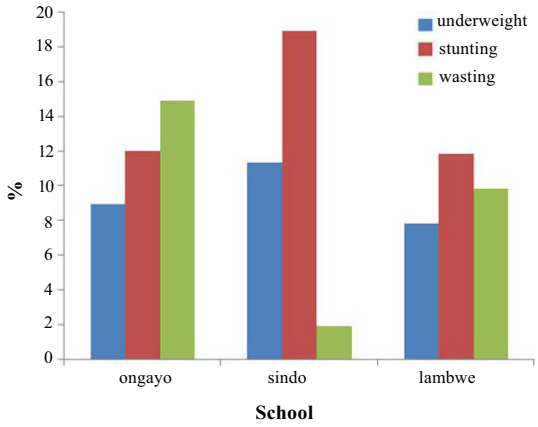

Figure 1. Percentage distribution of underweight, stunting and wasting in each school.

Onga'yo primary school (N = 50) had 8.9% children underweight, 12% stunted and 14.9% wasted. This school reported the highest proportion of children wasted. About three quarters (73.2%) of the parents were unemployed while 17.9% did business and 8.9% were temporarily employed. This community is involved in both farming (50%) and fishing activities (1.8%).The unemployed parents were reported to be working on their farms. The mean monthly income was Ksh 2,500 ($39), about Ksh 80 ($1.25) per day. This amount of money is insufficient in terms of household needs and family meals. Despite the fact that farming is practiced in this community there is no evidence of well nourished children as shown by the percentage of wasting.

Sindo primary school (N = 50) had 11.3% children underweight, 18.9% stunted and 1.9% wasted. This school had the highest number of children stunted in comparison to the other two schools. It is located within Sindo trading center where the community is predominantly business oriented with a large proportion engaged in fishing activities. Parents/guardians of children in this school reported that 62.3% were involved in business, 9.4% engaged in farming, 3.8% were casual laborers and 1.9% worked in the *jua kali* sector. About a quarter of the respondents (26.4%) was employed while 56% were engaged in business. The mean monthly income was Ksh 2,000 ($ 31.25) which reflects an income of about Ksh 66 ($ 1.03) per day which may not be able to cater for family meals. It is evident that this community mainly depends on buying food instead of growing, hence threatening food security. Furthermore, most of the food sold in the local market is imported from neighboring districts and tends to be expensive.

Lambwe primary school (N = 50) had 7.8% children underweight, 11.8% stunted and 9.8% wasted. The children showed only moderate forms of malnutrition (< 2 standard deviation) and no child had severe form (< 3 standard deviation) of the indices under study. Approximately 62.5% of the respondents reported to be involved in farming, 14.6% in business, 8.3% were teachers and 4.2% casual laborers, and 2.1% were in the *jua kali* sector. Slightly over half (68.8%) of the respondents were unemployed, 10.4% in temporary employment and 8.3% permanently employed. Mean monthly income was Ksh 3,000 ($46.9), therefore about Ksh 100 ($1.6) daily. Despite the fact that this school is located in a farming area hence availability of a variety of foods to the households, there were still cases of malnutrition among the children as seen from the results.

One of the determinants of malnutrition, which is evident in this study, is food insecurity. HIV/AIDS reduces the physical ability of people to produce food leading to diminished food stores, therefore undermining food security. In instances where infections are frequent, any available income is spent on settling hospital bills and purchasing medication [2]. As a coping strategy, HIV/AIDS-affected households are often forced to resort to some of the following unfortunate measures: reduce food intake at each meal or skip meals, this is for all family members including children. Therefore, HIV/AIDS has reduced the ability of many households to produce and buy food [16].

Several studies show that household food security is reduced by HIV/AIDS, rendering the children more vulnerable to malnutrition. A study in Kenya showed that the death of a household head reduced the value of the household crop production by 68% [17]. A similar study in Rwanda showed that 53% of households had a less nutritious diet when the father died and 23% when the mother died, and about 42% of households had a less nutritious diet when the father was ill while 34% had a less nutritious diet when the mother was ill [17].

Land ownership in the district was low with mean land acreage under food crops being 1.2. Some of the reasons cited for low acreage were lack of enough resources to cultivate larger acreage, unpredictable rainfall and general laxity. Despite the reasonable harvest realized in 2006, farmers continued to use uncertified seed, no fertilizer and poor postharvest procedures [18]. From the literature it is clear that majority of households affected by HIV/AIDS are chronically food insecure; the amount of grain harvested does not last long. Majority (91.7%) of households reported to have cultivated land yet the amount of food harvested hardly lasted till the next planting season (October-December). Further, reports from the respondents were that the harvest was not only used as food stock but as a source of income. Through direct selling of food, the households would purchase other household necessities. This practice reduces the amount of household food stock rendering children vulnerable to malnutrition. Such practice of selling household food stock to meet household expenses is harmful to household food security [19]. Food security is therefore a major problem among HIV/AIDS-affected children.

From the study findings, food consumption patterns show that cereals formed the main part of the childrens' diets. Whereas these cereals provide a good source of energy they are lacking in micro-nutrients, specifically iron. Additionally, the absence of meat from their diets has an implication on levels of micro-nutrients such as zinc, vitamin B_6 (pyridoxine), B_{12} (cyanocobalamin) and iron predisposing the children to anemia. It is, however, important to mention that most mothers prepared porridge and *ugali* from whole grains. This is a good nutritional practice because sifting removes

important nutrients available in the husks.Frequency of consumption of groundnuts (50%), fish (49.2%) and kales (about 52.4%) is also worth mentioning because of their nutritive value. However, boiling vegetables for too long, common in rural communities of SSA destroys vitamins.Results from the 24 hr recall showed that nearly all the children took some breakfast. This is encouraging since studies have shown that children who consume breakfast were attentive and performed better on intelligence tests [20].

Results indicated high morbidity patterns among school children. The common illnesses were malaria (16%), skin infections (8.0%), upper respiratory infections (6.1%), stomach ache and diarrhea (1.9%). Malaria coupled with high fever and anorexia causes a reduction in absorption and utilization of nutrients hence leading to increased body requirements for nutrients, therefore leading to malnutrition. The skin infection that was common was *tinia capitis,* a fungal infection of the scalp, and according to the doctor's clinical assessment, this problem was attributed to poor personal hygiene standards. The frequency of upper respiratory infections was probably due to crowded households; majority of the households had an average of 4.7 persons [20, 21]. Stomach ache and diarrhea cause reduction in food intake and nutrient losses. This is highly linked to use of untreated water and poor standards of hygiene. Worm infestation and its impact on utilization of nutrients, particularly iron, were cited by the doctor as a likely cause of anemia. These results are in agreement with findings of UNICEF [17] which show evidence of the negative impact of infections on wasting.

Maternal education, occupation and income levels are important determinants of children's nutritional status because these variables reflect the quality of child care practices. Furthermore, mothers are known to partially influence household food security. Results from this study show that more than half of the mothers (67.4%) attained primary education with only 18.9 and 1.2% having secondary and college education respectively. These results show gender disparities in education attainment in higher levels of education with fewer women attaining higher levels of education. This trend is similar to the national figures which show 22% males and 17% females having attained secondary education.

Furthermore, the national literacy levels among women are low; 23% of females and 16% of males have no education [7]. Nyanza province figures show a similar trend with more females (18.3%) than males (10.3%) not having attended school [7]. Maternal monthly incomes varied with mean income of Kshs1,550 ($24.2) reflecting an income of Ksh 20-30 ($ 0.39) per day. This is a clear indication of the poverty levels since this cannot be enough to meet the daily food budget and other household expenditures such as medical needs. These results are similar to those of the Geographic Dimensions of Well being in Kenya [22] which show that 64-74% of the population live below the poverty line. Low income levels are probably due to low educational status. This therefore means that the mothers lack skills that may enable them to obtain better paying jobs and probably need to be facilitated. Low maternal education and income therefore have a negative impact on the nutritional status of HIV/AIDS-affected children.

Conclusions

Findings from this study indicate that malnutrition with varying degrees of underweight, stunting and wasting affect HIV/AIDS-orphaned children in Suba district. This may be attributed to deepening food insecurity in the area, poverty among the communities and poor hygiene and sanitation standards leading to frequent infections. All these have a negative impact on the nutrition and health status of the children.

Recommendations

Results from this study reveal an array of aspects which affect the nutrition and health status of HIV/AIDS-affected children either directly or indirectly. In view of this, there is need to incorporate a multi-sectoral approach in tackling these problems. 1) The agricultural sector needs to provide an enabling environment for farmers to be able to access loans for the purchase of certified seed and fertilizer probably through Agricultural Finance Corporation and other local cooperatives. This could probably increase annual yields. Farmers need to be trained on proper postharvest methods so as to avoid wastage. 2) Innovative poverty alleviation programs could be developed at the local levels to provide support for the community members, particularly those who care for AIDS orphans in terms of providing micro-finance to facilitate small-scale businesses. This can help generate income and alleviate poverty. 3) Nutrition education is of paramount importance in this area. Communities should be sensitized about sound nutrition practices, high standards of hygiene and sanitation in order to reduce the rate of infections. 4) Economic empowerment of women by way of opening more opportunities for women and enforcing affirmative action in education, training and employment. 5) The Ministry of Health should step up interventions to alleviate hunger and malnutrition.

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