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THE EFFECT OF INTEGRATED NUTRITION CARE INTERVENTION ON THE NUTRITIONAL STATUS OF HIV/ AIDS CHILDREN IN KILIFI DISTRICT, KENYA

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ABSTRACT

The right to adequate nutrition in children is essential for the attainment of high standards of health. The health and nutritional status of orphans and vulnerable children is important as it affects their growth, health and mental development. However, these children suffer from malnutrition as they have limited access to adequate food and proper health care. The objective of this study was to assess the effect of an integrated nutrition care intervention in improving the nutritional status of children aged 6 - 14 years orphaned and made vulnerable by HIV and AIDS in Kilifi District, Kenya. A longitudinal quasi-experimental study was carried out in selected households of two divisions of Kilifi District. Two-stage sampling was used to identify the target households. Random sampling was used to identify the study subjects. A sample of 276 children was included in the study for experimental (138) and control (138) groups drawn from 153 households. The data collected included anthropometry measurements, dietary intake and socio-demographic characteristics of the study children. The intervention measures of the study were food rations, health and nutrition education, Vitamin A supplementation and de-worming. The experimental group was put on all the intervention measures, whereas the control group was given Vitamin A supplements and de-worming tablets, given in all the three phases. Epi-Info Anthro' software package was used to analyze anthropometry data. Nutri- survey package was used to compute the nutrient content of the children's meals. In both study areas, 26.1% of the children were underweight and 17.8% were wasted at baseline. In the control group at baseline, underweight was 29.7% and 18.8% were wasted, whereas in the experimental group, underweight was 22.5% and wasting was 16.7%. At endline evaluation, the proportion of underweight children in the control group reduced insignificantly ($p=0.203$) from 29.7% to 22.6% and wasting reduced insignificantly ($p=0.295$) from 18.8% to 13.9%. Among the experimental group, there was significant reduction ($p=0.007$) of underweight children from 22.5% to 9.4%, and wasting reduced significantly ($p=0.031$) from 16.7% to 7.7%. There was significant reduction ($p<0.05$) in malnutrition among the children in the experimental group but no significant reduction ($p>0.05$) in the control group. There is need for food rations and nutrition education among orphans and vulnerable children to improve their nutritional status. These results can be used by policy makers to modify programmes targeting orphans and vulnerable children to assure their nutrition security and improve their quality of life.

Key words: Nutritional status, orphans, vulnerable, under-nutrition

INTRODUCTION

The HIV and AIDS pandemic is of global concern as it has affected all nations and communities of the world. A significant number of families have been affected by the effects of HIV and AIDS. Globally, by November 2009, 33.3 million people were living with HIV, with 30.8 million adults and 2.5 million children under 15 years old [1]. In Kenya, it is estimated that there are 2.4 million orphans, with 1,149,000 million orphaned due to the AIDS epidemic [2].

According to the United Nations Convention on the Rights of the Child (UNCRC), orphans and vulnerable children are those children from 0 - 18 years, and orphans can be maternal, paternal or double [3]. Vulnerable children are those who have been affected by the effects of the HIV and AIDS pandemic. Vulnerability usually begins with the onset of parental HIV related illness and all available household resources being used to care for them [4].

The increasing number of orphans and vulnerable children has posed a great challenge to most nations, communities and families. These children need care and support to live quality lives like their peers who are neither orphaned nor vulnerable [5]. In addition, the ability of households and communities to assure their own food and nutrition security is increasingly being threatened due to the high numbers of orphans and vulnerable children [6]. Therefore, orphans and vulnerable children are likely to be undernourished because they may lack access to adequate nutritious food, health and parental care, which are the underlying causes of malnutrition [7]. The combination of malnutrition and infections affects the health and nutritional status of children, thus reducing a child's learning potential, growth and development [8]. Therefore, all children have the right to adequate nutrition, irrespective of their status in society, which is essential for attainment of high standard of health [9].

In sub-Saharan Africa (SSA), the problem of malnutrition continues to be significant with the prevalence of stunting in the region reported at about 34%, underweight at 24% and wasting at 9% [10]. A study done in Nyanza province, Kenya, among children aged 6 -14 years, found 42% of fostered children were stunted, and 32% of fostered children and 23% of children of HIV positive parents were underweight [11]. Many of these children were fostered because they were orphaned by HIV and AIDS. Therefore, orphaned children are especially vulnerable and potentially at increased risk of compromised nutrition [10]. Furthermore, good nutrition has been reported to be the corner stone for survival, health and development in the current and succeeding generations, and a key requirement in realizing the Millennium Development Goals (MDGs) [9]. Therefore, urgent measures need to be taken since the HIV and AIDS pandemic impacts negatively on the nutritional status of orphans and vulnerable children.

Kilifi District was targeted by WFP because it has a high prevalence of HIV infection. The prevalence of HIV and AIDS in the district in 2002 was estimated at 10%, with a total of 19, 439 orphans [12]. This is higher than the national prevalence of HIV and AIDS in 2009 which was 6.3% [2]. In addition, the district is also one of the poorest

districts in the country [12]. Therefore, Kilifi District was chosen for this study because WFP had a Nutrition and HIV and AIDS food support project in the district. Therefore, it was important to establish the impact of this specific intervention providing food rations and nutrition education among orphans and vulnerable children.

STUDY PURPOSE

Little research has been done on the health and nutritional status of orphans and vulnerable children and more so, the effect of any intervention measures. The National AIDS Control Council research strategy priorities include preventive programmes for OVCs [13]. The results of this research will add knowledge to existing information on the effect of food rations and nutrition education among OVCs. It will inform policy and assist in planning for more effective interventions for OVCs.

STUDY OBJECTIVES

General objective

To evaluate the effect of an integrated nutrition care intervention on the nutritional status of HIV and AIDS children aged 6-14 years in Kilifi District.

Specific objectives

1. To determine the nutritional status of all the study children at baseline;
2. To investigate the existing dietary intake patterns of the study children and compare the nutritional knowledge of the households in both study areas;
3. To determine the socio-demographic characteristics of the households and all the study children;
4. To compare the changes in the nutritional status of study children in the experimental and control groups after implementation of the intervention and at endline.

METHODOLOGY

A longitudinal quasi-experimental study was carried out to evaluate the effect of an integrated nutrition care intervention in improving the nutritional status of orphans and vulnerable children aged 6 -14 years in the study area. The study was done in two urban divisions of Kilifi District (Bahari and Kikambala). Bahari (experimental) had been selected by World Food Programme (WFP) for their food support project while Kikambala (control) was adjacent. This was for the purpose of having a study site which had similar characteristics with the experimental division. The study was done in three phases from March 2009 to January 2010 with three months between the phases. The implementation of the study (Phase one) was in June 2009, phase two was in September and phase three was in December, 2009.

The sample size was 125 for each study site, but due to attrition, an increase of 10% (13) was added making a total of 138 children for each study site. A comprehensive

household list from the beneficiary list of 134 households used by WFP for their food support project was used to identify the eligible households for the experimental group. The list was given by Kilifi District Hospital and the clients had been identified through the Comprehensive Care Clinic (CCC). For the control group, a list of households affected by HIV and AIDS in the division was provided by the Divisional Children's Officer (DCO). Two-stage sampling was used to identify the target households and the children to be included in both study areas.

The intervention measures of the study were: food rations, courtesy of WFP (provided throughout the study period), health and nutrition education, Vitamin A supplementation (given during phase one and at the end of the study) and de-worming (given during phase one, two and three). The children in the experimental group were put on all the intervention measures, whereas the children in the control group were given Vitamin A supplements, and de-worming tablets.

The dependent variable of the study was the children's nutritional status. The independent variables were: the children's food intake and the nutritional knowledge of the household heads. Nutritional knowledge was only done at baseline and endline evaluation, while the other variables were measured during baseline, midline and at endline.

The research study tools were: structured interview schedule which was administered to the household head or caregiver; and a 24-hour dietary recall, used to assess the quantity and quality of the food taken by the index children in the 24 hours preceding the interview. The nutrients in the foods and beverages were analyzed using the Nutri-survey package. The calorie (energy) and protein intake were computed at baseline before the implementation of the intervention. This was compared with the Recommended Daily Allowance (RDA) for this age group, according to Latham [7] to gauge the amount of each nutrient the children received from the home diets. This was repeated at midline and endline to assess any differences in the food and nutrient intakes at the beginning and at the end of the study.

The nutritional status of the children was determined by anthropometric measurements of height, weight and age. The nutritional data collected were compared with the National Centre for Health Statistics (NCHS) [14] to categorize well-nourished and undernourished children using Z-scores with cut-off points of -2SD [14]. The body measurements of weight and height were converted into nutritional indices to generate the nutritional indicators to be used in assessing the nutritional status of the children. The nutritional indicators used were: Weight-for-Age (Low weight-for-age - Underweight) and Weight-for-Height (Low weight-for-height – Wasting).

To ensure that the measurements taken were valid and reliable, the weights and heights of the children were taken twice, and an average was calculated and recorded. The weighing machines (UNICEF Electronic Machine-SECA) were calibrated daily to ensure uniform measurements were taken. The accuracy was put at +/- 100 g. The

children's heights were taken using Leicester Height board and recorded in centimetres with a tolerance of +/- 0.5 cm.

All questionnaires were checked at the end of each day to ensure that all questions had been answered and entered correctly. All corrected and completed questionnaires were filed and kept in safe custody. Pre-testing of all the research tools was done in 25 households outside the chosen clusters. This enabled the detection of any errors or mistakes or unclear questions, which were then corrected and clarified before the main research study was implemented.

Data were analyzed using descriptive statistics. This helped to summarize categorical variables. The Pearson's Chi-square test was used to establish the association between two categorical variables. The significance level was set at alpha = 0.05, with a 95% Confidence Interval. Epi-Info Anthro' software package was used to analyze child anthropometric data. Nutri- survey package was used to compute the nutrient content in the index children's meals.

RESULTS

i) Baseline characteristics of the household heads and the study children

This information was sought at baseline and endline. The households that participated in the study at baseline were 153 (75 for control and 78 for experimental). The households that participated at endline were 126 (62 – control and 64 - experimental). The households which dropped out of the study due to relocation of their residence were 11; death of parent/s were 3 and 13 households did not disclose the reason.

At baseline, 138 children participated in the study from each study site obtained from 153 households. Two children of different age groups were included in the study as sample size and number of households did not tally. As the research progressed into the second and third phase, there was attrition of subjects due to the above cited reasons. At endline, the control group had 115 children and the experimental group 117.

ii) The socio-demographic characteristics of the study children

The age of the children ranged from 6 to 14 years with the majority aged between 6 and 8.99 years (42.8%; 118) in both study groups, with a mean age of 9.41 for the control group and 10.51 for the experimental group. There was significant difference ($p<0.001$) in age distribution among the children between the treatment groups. There were only 13 (9.4%) children in the control group aged between 12 and 14 years compared to 43 (31.2%) of their counterparts in the experimental group. There was no significant difference ($p>0.05$) in the children's sex as the females were 148 (53.6%) and males were 128 (46.4%). The children who had both parents alive were 17 (22.7%). There was significant difference ($p<0.001$) in the parentage of the children, with 17 (22.7%) among the controls having both parents alive compared to 54 (74.4%) in the experimental group. However, a total of 148 (66.7%) lived with at least one parent among the control group, with those whose parents had separated or

divorced were 9 (12%) and; 41 (54.7%) had either a father or a mother still living (Table 1).

iii) Nutrition knowledge of the household heads

(a) Knowledge on frequency of meals and snacks per day

The household heads' nutrition knowledge on how many meals and snacks per day children aged 6 -14 years need to consume was assessed using a questionnaire. During baseline assessment, 72 (96%) of the household heads in the control group and 66 (84.6%) in the experimental group reported that children require three meals per day (breakfast, lunch and dinner). During endline assessment, 62 (96.9%) of the household heads in the experimental group reported that children require three meals a day compared to 51 (82.3%) in the control group ($p=0.007$). During baseline assessment, 25 (33.3%) of the household heads in the control group and 34 (43.6%) in the experimental group reported that children should receive two snacks per day. At endline assessment, a higher proportion (65.6%; 42) of the household heads in the experimental group indicated that these children require at least two snacks per day compared to 17 (27.4%) in the control group ($p<0.001$) (Table 2).

(b) Knowledge on composition of a balanced diet

On the composition of a balanced diet *(meals providing adequate energy and all the essential nutrients in the required proportion in the foods)*, the household heads were asked what constitutes a balanced nutritious diet for children aged 6-14 years old. The composition of the diets was determined by categorising the different foods which the participants gave as forming a balanced diet. A total 23 (30.7%) of the household heads in the control group and 26 (33.3%) in the experimental group knew the composition of a balanced diet during baseline. During endline evaluation, those who knew the composition of a balanced diet among the experimental group increased significantly ($p=0.001$) from 33.3% to 59.4%, compared to 25.8% in the control group (Table 2).

(c) Knowledge on special foods for children

During baseline evaluation, over 50.0% of all the households knew that special foods (*special foods included milk and enriched porridge)* should be given to children, but the proportion dropped to 58 (46.0%) at endline. When probed on the type of special foods, 54 (63.5%) reported milk or enriched porridge. The proportion of those who would give milk or enriched porridge increased to 42 (72.4%) for both groups at endline. During baseline, 61 (71.8%) and 53 (91.4%) at endline cited the main reason for giving these special foods to their children as improvement in their health. At endline, there was significant difference ($p<0.001$) in the nutrition knowledge between the control and the experimental groups (Table 2).

iv) Food intake by the study children

(a) 24-hour dietary recall

The food intake of the children was assessed using the 24-hour dietary recall. Baseline evaluation revealed that 90 (65.2%) of the children in the control group and 113

(81.9%) in the experimental group had consumed three meals within the previous 24 hours (p=0.002). At endline, the proportions were almost similar to baseline evaluation; the control group were 72 (62.6%) and 96 (82.1%) for the experimental group (p=0.001). During baseline evaluation, analysis on whether the consumed meals were balanced or not showed that only 13 (9.5%) of the children in the control group had consumed balanced meals compared to 15 (10.9%) children in the experimental group (p=0.544). At endline evaluation, the distribution of children who consumed balanced meals in the control group were 12 (10.4%) and 49 (41.9%) in the experimental group (p<0.001) (Table 3).

(b) Nutrient content in the children's diet

The analysis of the nutrient content in the children's 24-hour dietary recall was done using the Nutri-survey package. There was no significant difference (p=0.171) between control (22.5%; 31) and experimental groups (29.7%; 41) with regard to energy adequacy at baseline. Among the children in the control group, 91 (65.9%) compared to 121 (87.7%) in the experimental group received adequate protein during baseline. At endline evaluation, 100 (87%) of the study children in the control group and 81 (69.2%) in the experimental group did not receive adequate energy, while 66 (57.4%) in the control group and 111 (94.9%) in the experimental group had adequate proteins as per the recommended daily allowance (Table 4). From the findings of this study, the children in the control group consumed an average of 1529 kcalories and 48.3 g of protein, compared to an average of 1810 kcalories and 82 g of protein for the children in the experimental group in all the three phases. However, the energy intake was not adequate as per the RDA (approximately 2000 kcal per day) for this age group.

v) Nutritional status of the children

(a) Nutritional indicators

The NCHS reference standards, categorize well-nourished and undernourished children using Z-scores with cut-off points of -2 Z-scores [14]. The children who had their Z-scores above -2 Z-scores were categorized as well-nourished, while those with their Z-scores less than -2 Z-scores were categorized as underweight or wasted. Weight-for-Age (WAZ) and Weight-for-Height (WHZ) were used in establishing the nutritional status of the children.

(b) The nutritional status (weight-for-age) of the index children

The proportion of underweight in the control group was (14) 29.7% compared to 31 (22.5%) in the experimental group (p=0.170) during baseline evaluation. At endline evaluation, the proportion of underweight children reduced insignificantly (p=0.203) in the control group from 41 (29.7%) to 26 (22.6%), while the proportion of underweight children decreased significantly (p=0.007) from 31 (22.5%) to 11 (9.4%) among the experimental group (Figure 1).

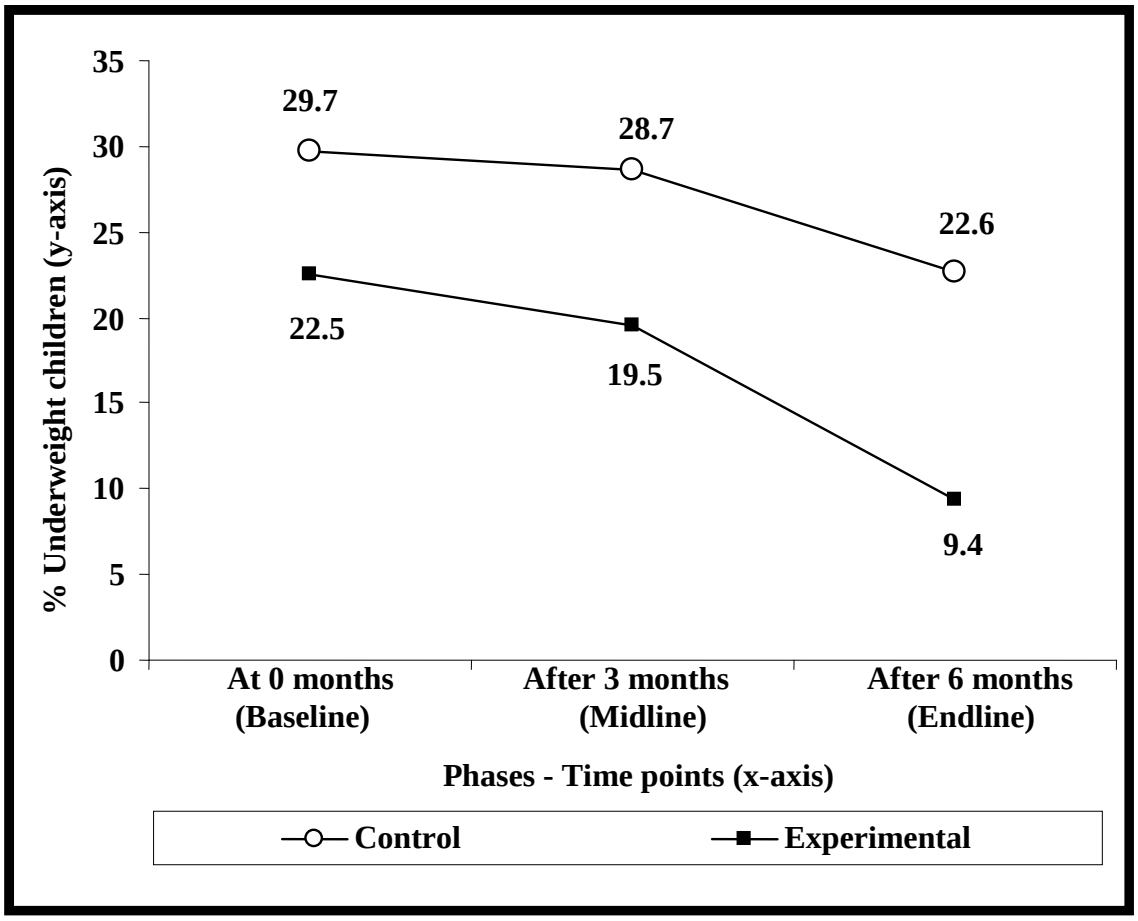

Figure 1: Distribution of underweight children by study groups during the different phases

(c) The nutritional status (weight-for-height) of the index children

The proportion of wasting at baseline for the control group was (26) 18.8% compared to (23) 16.7% for the experimental group (p=0.637). The proportion of wasted children decreased significantly (p=0.031) from 23 (16.7%) to 9 (7.7%) at endline in the experimental group. However, the proportion of wasted children in the control group reduced insignificantly (p=0.295) from 26 (18.8%) to 16 (13.9%) at endline (Figure 2).

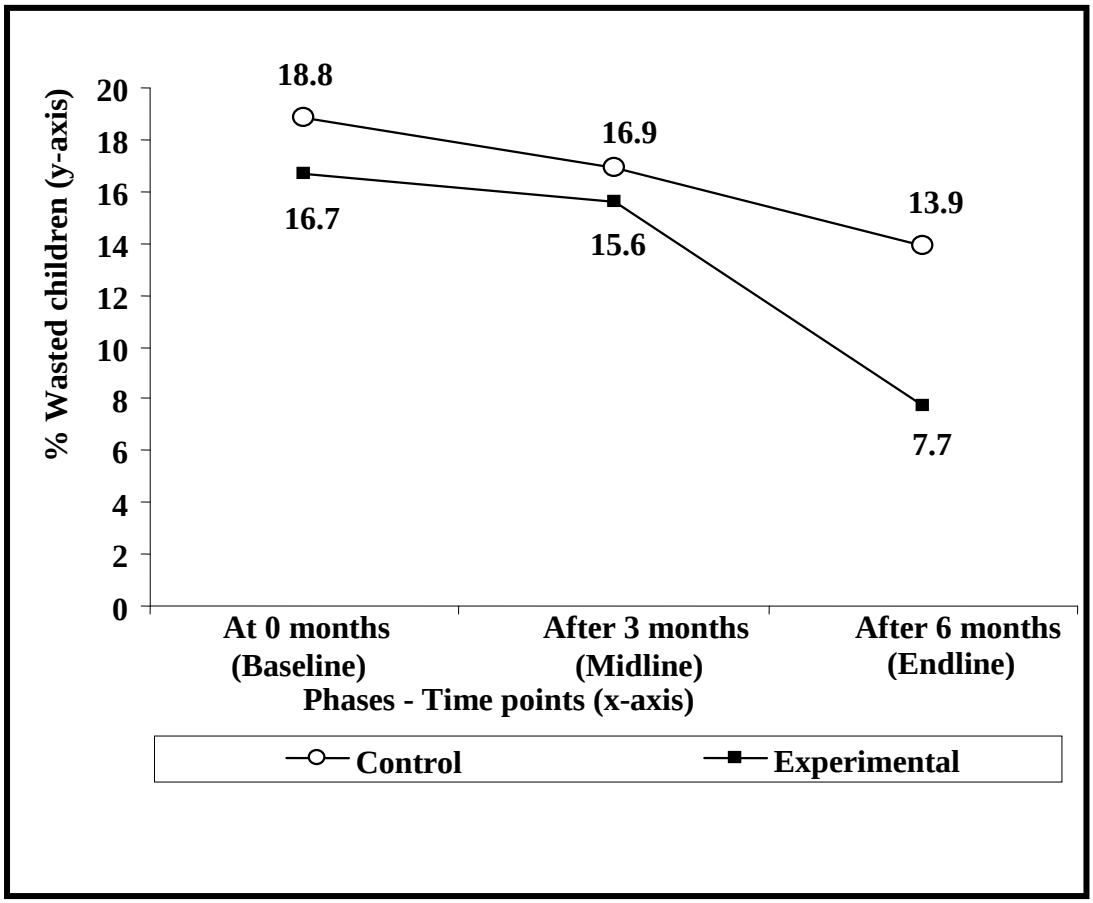

Figure 2: Distribution of wasted children by study groups during the different phases

DISCUSSION

The study population comprised orphans and vulnerable children aged 6 – 14 years with the majority falling in the 6 – 9 year age bracket. The sex of the children was a ratio of almost 1:1; the females were 53.6% and males were 46.4%.

Most household heads knew that children ought to have three meals in a day. At baseline, a smaller proportion of both study groups knew that these children should have snacks two times a day and did not understand the concept of a balanced diet, but the proportion increased at endline, mainly among the experimental group. This increase was attributed to nutrition education which was provided to the experimental group. Therefore, nutrition education programmes should be encouraged for the consumption of a nutritionally adequate diet to promote healthy lifestyles [7].

Special foods for school-age children are necessary in that most of these children are still growing and some are entering the adolescent stage, where the need for good nutrition is paramount. These special foods supplement the nutrients these children receive in their regular meals. Moreover, for optimal growth and development, children require adequate nutritious food to meet their daily nutritional requirements and throughout the year. This will not only ensure food security, but there will be

reduction of short-term hunger and the improvement of their nutritional status, thereby reducing levels of malnutrition and the exacerbation of minor infections [15]. The 24-hour dietary recall method was used to establish if the children had three meals in a day, and if the meals were balanced and adequate to meet their RDA for energy and protein. The results indicated that during baseline assessment, the majority of the children in both groups had three meals with only 28% having a balanced diet. The proportions for both variables improved significantly at endline in the experimental group compared to the control group. This increase was attributed to the nutrition education among the experimental group which increased the proportion of children who consumed three balanced meals in the previous 24 hours. Nutrition education is a strategy that has been widely used for many years to promote healthy diets and thereby ensure proper growth of children [7].

Analysis of the nutrient content of the children's meals showed that only a small proportion had adequate energy and more than 75% received adequate protein during baseline. At endline, there was minimal increase among the experimental children who consumed adequate energy, while those who had adequate energy in the control group dropped. This was expected because of the food rations given to the children in the experimental group. A study in western Kenya, amongst school children on a school lunch programme found that they received an additional 841 kilocalories, over and above the home diet, thus improving their nutritional status [16]. Furthermore, for children to grow optimally there is need to ensure that they access adequate nutritious foods to meet their daily nutritional requirements [8]. Provision of adequate nutritious foods will provide additional calories to meet the recommended daily allowance for this age group.

The overall nutritional status of the target children in both areas of the study revealed that 26.1% were underweight and 17.8% were wasted at baseline. Almost similar results were found in a study among orphans and vulnerable children aged 6 -14 years in Nyanza Province, Kenya, where 23% of children were underweight among HIV positive parents [10]. The results of this study, therefore, showed that malnutrition among the study children was more than the threshold for Global Acute Malnutrition (GAM) in which a rating equal to or above 15% is categorized as critical, requiring urgent intervention [17].

After the intervention, the children who were underweight and wasted among the control group reduced insignificantly, compared to significant reduction in the experimental group. Therefore, there was significant reduction in under-nutrition among the study children in the experimental group at the end of the study. This was attributed to the intervention measures of the study, and more specifically the food rations, which had positive effect on the nutritional status of the experimental children compared to those in the control group.

In addition, the majority of the household heads knew that children required three meals per day, but only a small proportion had knowledge on balanced diet and two snacks per day. However, the nutrition knowledge of the household heads in the experimental group improved after nutrition education as provided. A study by

Khattak [18] found positive correlation between the level of nutrition knowledge of the household heads and particularly the mother with the nutritional status of their children.

CONCLUSION AND RECOMMENDATIONS

The nutritional status of the children in the two study areas at baseline showed that the children were undernourished (underweight and wasted). The malnutrition levels were high (above 15%) and thus more than the threshold for GAM in both study groups.

Using the 24-hour dietary recall, and after analyzing the nutrient content of the children's meals, most of them had inadequate energy intake and the meals taken were not balanced at baseline. The overall nutrition knowledge of the household heads was poor, as most of them did not know what constituted a balanced nutritious diet.

This study showed that the nutritional status of the study children who were put on an integrated nutrition care intervention improved significantly. There was significant reduction in underweight and wasting among the children in the experimental group.

The reduction in malnutrition is an indication that the food rations and the nutrition education were effective in improving the nutritional status of the children in the experimental group. Therefore, in addition to other programmes in place, there is need to place emphasis on improved food rations and nutrition education when addressing the health and nutritional issues of orphans and vulnerable children. This can be part of the Government's national cash transfer programme of giving cash targeting families affected and infected by HIV and AIDS [13].

In conclusion, this study showed that orphans and vulnerable children are prone to undernutrition and this needs to be addressed. Comprehensive nutrition education for parents, caregivers and the target children needs to be provided for them to understand the importance of good nutrition. In addition, there is need for concerted effort by all key partners and stakeholders in various organizations when addressing the health and nutritional needs of these children.

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Table 1: The socio-demographic characteristics of the study children

Variables	Total (N=276)		Control (n=138)		Experimental (n=138)		P-value
	n	%	n	%	n	%	
Age in years							
6 – 8.99 years	118	42.8	70	50.7	48	34.8	<0.001*
9 – 11.99 years	102	37.0	55	39.9	47	34.1	
12 or more years	56	20.3	13	9.4	43	31.2	
Sex							
Male	128	46.4	61	44.2	67	48.6	0.469
Female	148	53.6	77	55.8	71	51.4	
Relationship							
Son/daughter	212	76.8	105	76.1	107	77.6	0.904
Grandchild	42	15.2	21	15.2	21	15.2	
Niece/Nephew/other	22	8.0	12	8.6	10	7.2	
Parenthood of the children							
Both parents are alive	75	49.0	17	22.7	58	74.4	<0.0001*
Both parents alive but separated/divorced	19	12.4	9	12.0	10	12.8	
Mother is alive and father is dead	36	23.5	30	40.0	6	7.7	
Father is alive and Mother is dead	15	9.8	11	14.7	4	5.1	

**** Significant difference (p ≤ 0.05)***

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Table 2: Nutritional knowledge of household heads at baseline and endline

Variables	Baseline							Endline						
Knowledge about	Total (N=153)		Control (n=75)		Experimental (n=78)		P- value	Total (N=126)		Control (n=62)		Experimental (n=64)		P – value
	n	%	N	%	n	%		n	%	n	%	n	%	
Frequency of meals per day														
Twice	1	0.6	0	0.0	1	1.3	0.056	9	7.1	9	14.5	0	0.0	0.007*
Thrice	138	90.2	72	96.0	66	84.6		113	89.7	51	82.3	62	96.9	
Don't know	14	9.2	3	4.0	11	14.1		4	3.2	2	3.2	2	3.1	
Frequency of snacks per day														
Once	18	11.8	10	13.3	8	10.3	0.555	4	3.2	2	3.2	2	3.1	<0.001*
Twice	59	38.6	25	33.3	34	43.6		59	46.8	17	27.4	42	65.6	
Thrice	49	32.0	27	36.0	22	28.2		53	42.1	35	56.5	18	28.1	
Don't know	27	17.6	13	17.3	14	17.9		10	7.9	8	12.9	2	3.1	
Composition of a balanced diet														
Balanced	49	32.0	23	30.7	26	33.3	0.558	54	42.8	16	25.8	38	59.4	0.001*
Not balanced	100	65.4	51	68.0	49	62.8		68	54.0	43	69.4	25	39.1	
Don't know	4	2.6	1	1.3	3	3.8		4	3.2	3	4.8	1	1.6	
Special food for index children														
Yes	85	55.6	40	53.3	45	57.7	0.589	58	46.0	23	37.1	35	54.7	0.049*
No	68	44.4	35	46.7	33	42.3		68	54.0	39	62.9	29	45.3	
Type of special foods														
Milk/porridge	54	63.5	24	60.0	30	66.7	0.526	42	72.4	12	52.2	30	85.7	0.006*
Other foods	31	36.5	16	40.0	15	33.4		16	27.6	11	47.8	5	14.3	
Reason for giving special foods														
Good health	61	71.8	30	75.0	31	68.9	0.535	53	91.4	20	87.0	33	94.3	0.375
Other reasons	24	28.2	10	25.0	14	31.1		5	8.6	3	13.0	2	5.8	

** **Significant difference (p ≤ 0.05)***

Table 3: 24-hour recall of all the children

Variables	Baseline						
	Total (N=276)		Control (n=138)		Experimental (n=138)		P- value
	n	%	n	%	n	%	
Three meals in the previous 24 hours							
Yes	203	73.6	90	65.2	113	81.9	0.002*
No	73	26.4	48	34.8	25	18.1	
If meals taken in the previous 24 hours were balanced							
Yes	28	10.1	13	9.5	15	10.9	0.544
No	248	89.9	125	90.5	123	89.1	
Variables	**Endline**						
	Total (N=232)		Control (n=115)		Experimental (n=117)		P- value
	n	%	n	%	n	%	
Three meals in the previous 24 hours							
Yes	168	72.4	72	62.6	96	82.1	0.001*
No	64	27.6	43	37.4	21	17.9	
If meals taken in the previous 24 hours were balanced							
Yes	61	26.3	12	10.4	49	41.9	<0.001*
No	171	73.7	103	89.6	68	58.1	

** Significant difference ($p \leq 0.05$)*

Table 4: Nutrient content in the children's diet during baseline and endline

Variables	Baseline						
	Total (N=276)		Control (n=138)		Experimental (n=138)		P- value
	n	%	n	%	n	%	
Energy (Kcal)							
Adequate (≥ 2000)	72	26.1	31	22.5	41	29.7	0.171
Inadequate (< 2000)	204	73.9	107	77.5	97	70.3	
Protein (g)							
Adequate (≥ 40)	212	76.8	91	65.9	121	87.7	<0.001*
Inadequate (< 40)	64	23.2	47	34.1	17	12.3	
Variables	**Endline**						
	Total (N=232)		Control (n=115)		Experimental (n=117)		P- value
	n	%	n	%	n	%	
Energy (Kcal)							
Adequate (≥ 2000)	51	22.0	15	13.0	36	30.8	0.001*
Inadequate(< 2000)	181	78.0	100	87.0	81	69.2	
Protein (g)							
Adequate (≥ 40)	177	76.3	66	57.4	111	94.9	<0.001*
Inadequate (< 40)	55	23.7	49	42.6	6	5.1	

* ***Significant difference (p ≤ 0.05)***

Table 5: The under-nutrition status of the study children

Variables	Baseline						
	Total (N=276)		Control (n=138)		Experimental (n=138)		P- value
	n	%	n	%	n	%	
WAZ							
Underweight (< -2 SD)	72	26.1	41	29.7	31	22.5	0.170
WHZ							
Wasting (< -2 SD)	49	17.8	26	18.8	23	16.7	0.637
Variables	**Midline**						
	Total (N=257)		**Control (n=129)**		**Experimental (n=128)**		**P – value**
	n	**%**	**n**	**%**	**n**	**%**	
WAZ							
Underweight (< -2 SD)	62	24.1	37	28.7	25	19.5	0.086
WHZ							
Wasting (< -2 SD)	41	16.3	21	16.9	20	15.6	0.778
	Endline						
Variables	**Total (N=232)**		**Control (n=115)**		**Experimental (n=117)**		**P – value**
	n	**%**	**n**	**%**	**n**	**%**	
WAZ							
Underweight (< -2 SD)	37	15.9	26	22.6	11	9.4	0.006*
WHZ							
Wasting (< -2 SD)	25	10.8	16	13.9	9	7.7	0.127

- ***Significant difference (p ≤ 0.05)***
- ***SD – Standard Deviation***
- ***WAZ - Weight-for-Age***
- ***WHZ - Weight-for-Height***

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Ethical Clearance Letter

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KEMRI/RES/7/3/1 **June 4, 2009**

TO: **MS. EMMY CHESIRE (JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY) (PRINCIPLE INVESTIGATOR)**

THROUGH: **DR. YERI KOMBE, THE DIRECTOR, CPHR, NAIROBI**

forwarded 4/06/09

RE: **SSC NO. 1593 (*ETHICS REVIEW*): THE EFFECT OF AN INTEGRATED NUTRITION CARE INTERVENTION ON THE NUTRITIONAL STATUS OF CHILDREN ORPHANED AND MADE VULNERABLE BY HIV/AIDS IN KILIFI DISTRICT, KENYA.**

Dear Ms. Chesire,

Make reference to your letter dated June 3, 2009

We acknowledge receipt of the assent form and the revised protocol indicating the consenting adult in the event the Head of the Household has died.

Due consideration has been given to ethical issues and the study is hereby granted approval for implementation effective this **4th day of June 2009,** for a period of twelve (12) months.

Please note that authorization to conduct this study will automatically expire on **Thursday, 3rd June 2010.** If you plan to continue with data collection or analysis beyond this date, please submit an application for continuing approval to the ERC Secretariat by **Thursday, 22nd April 2010.**

You are required to submit any amendments to this protocol and other information pertinent human participation in this study to the SSC and ERC prior to initiation. You may embark on the study.

Yours sincerely,

R.C.Kithinji

R. C. KITHINJI,
FOR: SECRETARY,
KEMRI/NATIONAL ETHICS REVIEW COMMITTEE

In Search of Better Health

Participant consent form

Participant Statement

I, Mr, Mrs, Miss, …… hereby give consent to Emmy Chesire to include me and my child in the proposed study entitled "An integrated nutrition care intervention for children orphaned and made vulnerable by HIV/AIDS". I have read the information concerning this study, and I fully understand the aim of the study and what will be required of me if I accept to take part in the study. The risks and benefits have been explained to me. Any questions I have concerning the study have been adequately answered and I am satisfied. I understand that I can withdraw from this study anytime if I wish so without giving any reason and this will not affect my access to normal health care and management. I understand that I will be interviewed three times from the implementation of this study to the end. I therefore consent voluntarily to participate in this study.

Appendix 5: Child Assent form - Child Statement

I…….hereby give consent to Emmy Chesire to include me in the proposed study entitled "The effect of an integrated nutrition care intervention for children orphaned and made vulnerable by HIV/AIDS". I have read/been explained the information concerning this study, and I fully understand the aim of the study and what will be required of me if I accept to take part. The risks and benefits have been explained to me. I understand that I can withdraw from this study anytime if I wish so without giving any reason and this will not affect my access to normal health care. I understand that I will be interviewed three times from the implementation of this study to the end. I therefore assent voluntarily to participate in this study. The investigator can only proceed when my parent/caretaker will consent to my participating in this study.