

Full Length Research Paper

Nutritional assessment of children orphaned from human immunodeficiency virus infection and acquired immune deficiency syndrome (HIV/AIDS), and implementing a food based intervention to improve their nutritional status in Bauchi metropolis, Nigeria

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The adverse effects of the human immunodeficiency virus infection and acquired immune deficiency syndrome (HIV/AIDS) pandemic are felt most severely in some of the world's poorest countries in sub-Saharan Africa which has led to an upsurge in the number of orphaned children. This study assessed the nutritional status of 196 children, 0 to 17 years orphaned from HIV/AIDS living in Bauchi metropolis, using anthropometry and food frequency questionnaire. Descriptive statistical tools such as frequencies, percentages, mean, standard deviation and paired samples T-test were computed using Statistical Package for the Social Sciences (SPSS) version 16.0. Their body mass index (BMI)-for-age and height-for-age were computed using WHO AnthroPlus software. Majority 159 (81.4%) of the respondents were above 5 years while 36 (18.6%) were under 5 years. The most frequently consumed cereals were rice 179 (92.3%) and maize 172 (88.7%), while the most frequently consumed tuber, animal protein, fruits and vegetables were yam 171 (88.1%), meat 130 (67%), and fish 129 (66.5%), Orange 147 (75.8%) and garden egg 134 (69.1%) respectively. Twenty-eight (14.4%) and 18 (9.3%) of the children were moderately and severely underweight respectively, while 34 (17.6%) and 5 (2.6%) were moderately and severely stunted respectively. Twenty children were used for the intervention (administering kwash-pap powder for a period of 1 month) and the mean weight gain (0.99 ± 0.43 kg) was significantly different before and after the study ($p < 0.001$). Food based intervention can improve the nutritional status of children orphaned by HIV/AIDs.

Keywords: HIV/AIDs, Bauchi, malnutrition, kwash-pap, orphans.

INTRODUCTION

The adverse effects of the human immunodeficiency virus infection and acquired immune deficiency syndrome (HIV/AIDS) epidemic are felt most severely in some of

the world's poorest countries in sub-Saharan Africa. One of the consequences has been an upsurge in the number of orphaned children (UNAIDS and UNICEF, 2003).

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HIV/AIDS and associated infections are reversing some of the hard-won development gains in many countries and leaving populations more vulnerable to poverty, malnutrition and ill health (UNICEF, 2005). Children orphaned by AIDS are defined as people aged under 18 who are alive and have lost one or both parents to HIV and AIDS. With poverty and harsh economic policies in Nigeria, there is need for nutritional inputs in intervention programs for orphans (Beverly and Tessa, 1990). The extended family system, which cares and supports orphans in times of difficulties, has been eroded due to unfavourable economic policies. The need to encourage community response in care and support of orphans is advocated (RACOBAP, 2002).

It has been estimated by the US bureau that by the end of 2000, 15.6 million children around the world had lost a mother, father or both to HIV/AIDS and by 2010, at least 44 million children will have lost a mother, father or both parents to AIDS but by 2009 children orphaned from HIV/AIDS worldwide ranged from 14.4 to 18.8 million (UNAIDS, 1998). According to the UN, the country Nigeria has the largest number of orphans from HIV at 2,500,000 orphans followed by South Africa at 1,900,000 orphans (Ellen and Aaron, 2000). As the number of orphans varies between countries, so does it vary between different regions within those countries. Particular areas may have higher or lower percentages of orphans, largely depending on the local HIV prevalence rates. There are also substantial differences between states, rural and urban areas with Abia at 7%, Kano 6.3%, Bauchi 4.8% and Abuja 8%. The age of orphans, however, is fairly consistent across countries. Surveys suggest that overall, about 15% of orphans are 0 to 4 years old, 35% are 5 to 9 years old, and 50% are 10 to 14 years old (UNICEF, 2005).

Parental HIV-related illness and death often lead to decreased household resources due to treatment costs and job loss, which may affect health care and the nutritional status of children. Death of even one parent could result in changes in living arrangements, displacement, and lack of availability of resources for schooling, health care, and food for children (Meyer, 2000). In sub-Saharan Africa, a mother's death is more likely to result in changes in living arrangements for children, whereas a father's death is more likely to reduce resource availability. Care providers for orphans tend to be elderly persons, who are generally less likely and less capable of providing proper health care and schooling. Parental HIV seropositive status also affects the psychosocial adjustment of children (Watts et al., 2007).

Stigma associated with HIV/AIDS contributes further to the vulnerability of these children. Orphaned and fostered children are more likely to be discriminated against in schooling and health care, and are more prone to neglect and abuse (UNICEF, 2013). The objectives of this study was to carry out nutritional status assessment of the respondents using anthropometry, evaluate their current feeding practices using food frequency questionnaire and

design and implement a food based intervention to improve the nutritional status of the children, incorporating elements of nutrition education.

METHODOLOGY

The study was carried out in Bauchi metropolis, a city in north-eastern Nigeria being the capital of Bauchi state. The state has 32 HIV/AIDS support groups with 9 support groups in Bauchi metropolis instituted by the Bauchi State Agency for the Control of HIV/AIDS, Tuberculosis/Leprosy and Malaria (BACATMA). Four of these support groups are for children orphaned by HIV/AIDS who may be infected or affected. They meet monthly in the Abubakar Tafawa Balewa University Teaching hospital and respondents for the study were drawn from this support group. Targeting the children in 4 (four) support groups, all the children in the support groups were enrolled for the study but 20 children were randomly selected (5 from each support group) for the intervention programme.

Study design

The study was done in 2 stages, viz; the first was a descriptive, cross sectional study where purposive sampling was used to select respondents (children and their guardians), while the second stage was an experimental study which involved random selection of severely malnourished children ($\leq 3SD$ underweight) and carrying out nutrition education and a food based intervention over a period of 1month and then computing changes in nutritional status. The sample size was calculated using the formula:

$$N = \frac{Z^2 \times P (1 - P)}{D^2}$$

Where N = required sample size

Z = value of confidence at 95% (1.96)

P = prevalence of children orphaned from HIV/AIDS -15% (UNICEF, 2005)

The sample size, after calculation was given as 196 but the total number of children in the 4 support groups was 194, so 194 correctly filled questionnaires were retrieved and analysed.

Instruments of data collection

A semi-structured interviewer-administered questionnaire was used to collect demographic information and weighing scale was used to measure the weights of the respondents. Their heights were measured using a locally constructed, standardized stadiometer. A38-item Food Frequency questionnaire (constructed by the authors) was used in collecting food frequency consumption of the respondents. Statistical analysis was done by computing frequencies, range, and means with their standard deviations using statistical package for social sciences (SPSS) version 16. Respondents' height-for-age and BMI-for-age were analysed using WHO AnthroPlus. Paired samples t-test was used to test for significant differences in mean weight gain, mean height-for-age and BMI-for-age before and after the intervention.

Ethical considerations

Ethical clearance was obtained from the Abubakar Tafawa Balewa University Teaching Hospital Bauchi. Written, informed consent and

Table 1. Nutrient content of food supplement (100 g).

Nutrient	Content
Moisture (%)	6.0
Energy (Kcal)	430.0
Protein (g)	33.2
Fat (g)	17.5
CHO (g)	35.0
Fiber (g)	3.5
Ash (g)	4.8

Table 2. Socio-demographic characteristics of the children.

Parameter	Frequency (f)	Percentage
Age		
Under 5	36	18.6
Above 5	158	80.1
Total	194	100
Sex		
Male	103	53.1
Female	91	46.9
Total	194	100
Educational status		
Nursery	20	10.3
Primary	80	41.2
Secondary	20	10.3
None	74	38.2
Total	194	100
Why not in school		
Lack of fund	18	24.3
Unwilling to attend	6	8.1
No admission	13	17.6
Guardian did not support	16	21.6
No time to attend school	14	18.9
No reason	7	9.5
Total	74	100

assent was obtained from the guardians, and children that were recruited for the intervention study. Full disclosure on the procedures, discomfort and benefits was made to them and strict confidentiality steps were adhered to.

Treatment given to the intervention group

Twenty children and their guardians were randomly selected for a food-based intervention in which a highly nutrient dense food ("Kwash-pap") was produced by the respondents and administered to the children. Respondents in the intervention group were taught

about the importance of good nutrition and its benefits, and also the importance of hygiene in relation to health. The guardians of the children were mobilized to purchase the items needed to produce the Kwash-pap powder (a combination of finger millet, groundnut, soybeans and crayfish) which they prepared themselves collectively under strict supervision and then shared (3.5 kg) for each child which lasted for four weeks. The product was packaged into 125 g each, and the amount administered 3 to 4 times daily. Compliance was monitored through phone calls. The children's weights and heights before and after the intervention were measured and the difference computed.

The Nutrient content of the food supplement was computed using Nigerian Food composition Tables (Ogunmodede, 2011) (Table 1).

RESULTS

Table 2 presents the socio-demographic characteristics of the guardians of the children. 114 (58.8%) had either a primary education or less while the rest had attained either secondary or tertiary education. Almost half of the 92 (47.4%) were petty traders while 30 (15.5%) were unemployed. About half 99 (51%) of the guardians were aunts to the children because many of them had lost both parents to HIV and AIDs.

In Table 3, the socio-demographic features of the orphaned children are shown. Majority 158 (80.1%) of the respondents were more than 5 years old, while more than half 103 (53.1%) were males. Of the proportion of students who were not in school, 34 (45.9%) reported either lack of fund or lack of support from the guardian as the reason for not being in school. Table 4 shows the living conditions of the respondents. More than half 103 (53.1%) of the respondents either had no toilet or were using bucket toilets or pit toilets. Almost equal proportions of the respondents were using borehole water and well water.

Table 5 presents the frequency of consumption of various foods by the respondents. The most frequently consumed cereals were rice 179 (92.3%) and maize 172 (88.7%), being consumed by most respondents between 2 to 4 times weekly. Beans 163 (84%) was the most frequently consumed legume, while yam 171(88.1%) was the most frequently consumed tuber. Meat and fish 130 (67%) versus 129 (66.5%) were the most frequently consumed animal proteins, while Water melon 145 (75.5%) was the most frequently consumed fruit, being consumed 5 to 6 times a week. Orange and garden eggs 147 (75.8%) versus 134 (69.1%) were also frequently consumed by the respondents. Table 6 presents the anthropometric status of the children. Thirty-four (17.6%) and 5 (2.6%) respectively were moderately and severely stunted, while 28 (14.4%) and 18 (9.3%) respectively were moderately and severely underweight.

Table 7 shows that there was no significant difference ($p = 0.199$) in the height-for-age of the children, whereas there were significant differences ($p = 0.035$), ($p = 0.000$) in their BMI-for-age and weight respectively before and after the intervention.

Table 3. The socio-demographic characteristics of the guardians of the children.

Parameter	Frequency (f)	Percentage
Age of guardians		
21-30	74	38.1
31-40	82	42.3
41-50	31	16.0
51-60	4	2.1
61-100	3	1.5
Total	194	100
Marital status		
Single	5	2.6
Married	107	55.2
Widowed	82	42.3
Total	194	100
Educational status		
Non formal education	38	19.6
Primary	76	39.2
Secondary	62	32.7
Tertiary	4	2.1
None	14	7.2
Total	194	100
Occupation		
Not employed	30	15.5
Farmer	33	17
Petty trader	92	47.4
Civil servant	36	18.6
Businessman	3	1.5
Total	194	100
Relationship with child		
Mother	53	27.3
Father	19	9.8
Aunt	99	51.0
Uncle	16	8.2
Others	7	3.6
Total	194	100
Duration of stay of child with guardian		
2 years	2	22.2
5 years	7	77.8
Total	9	100

DISCUSSION

In this study, there were more male respondents 105 (53.1%) than females 91(46.9%). This is similar to the findings in Uturu, Abia state where most of the orphans

were male 72 (60%) and 48 (40%) female (Enwereji, 2010) but in contrast with the study in Rakkai district of Uganda were Females constituted more than fifty percent of the study population (Kikafunda and Namusoke, 2006). Previous studies (UNICEF, 2005), have indicated that about 15% of orphans from HIV/AIDS are 0 to 4 years old, and the findings of the current study are in agreement with this age distribution. In this study, 59.2% of the children were not living with their parents which is in contrast with the 2008 Nigerian demographic and health (NDHS) report which stated that 12% of the Nigerian children under age 18 were not living with their biological parents. Most of the orphans not going to school said it was due to lack of fund and is comparable to the findings by Enwereji (2010) in Uturu, Abia state where the commonest reason for not being in school was lack of money.

The prevalence of underweight and stunting in this study were lower than the findings in western Kenya were 30 and 47% of the orphaned children were underweight and stunted respectively, (Bloss et al., 2002) and in South India where a stunting prevalence of 58% was observed (Padmapriyadarsini et al., 2009). Similarly, the levels of severe underweight and stunting in the current study are lower than the indication by Adeba et al. (2014) in Oromia in Ethiopia were 27.5% of the children were severely stunted and the proportion of severely underweight children in the study area was 28.7%. The lower prevalence of malnutrition observed in this study may be attributable to the impact of the HIV/AIDS support groups to which these children belong, which provide some nutritional support and other health services that may exert positive influences on their nutritional status. However, the levels of malnutrition in this study are still unacceptably high. Considering the fact that these children lost parents to HIV/AIDS, one may suggest that some of them could have been infected and therefore a combination of factors weakened the body's immunity as the child grew older, while HIV progresses to AIDS. (The HIV/AIDS status of the children, however, was not assessed in this study).

Malnutrition is often seen in environments of high prevalence of infections, HIV-AIDS represents this example (Ellen and Aaron, 2000). This, when coupled with the widespread lack of resources to meet the basic needs of the big families, contributes highly to malnourishment. The study revealed that HIV/AIDS orphaned children are malnourished and recommend that the extent of support from both Government and the international community to meet both children's and their care takers' needs be increased at all levels. This study has indicated that the most commonly consumed foods were starchy staples, again in agreement with the indication by Kikafundai and Namusoke in Rakkai Community (2006) that starchy (cassava, matooke, and yam) foods were the base of most of the respondents' diets.

Table 4. Living condition of respondents.

Parameter	Frequency (f)	Percentage
Type of house		
Concrete house with zinc roofing	77	39.7
Mud house with thatch roofing	21	10.8
Concrete house with thatch roofing	50	25.8
Mud house with zinc roofing	46	23.7
Total	194	100
Type of toilet facility		
No toilet	19	9.8
Bucket toilet	1	0.5
Pit toilet	83	42.8
Water cistern	91	46.9
Total	194	100
Water supply		
Borehole	98	50.5
Well	96	49.5
Total	194	100

Table 5. Food frequency consumption of respondents.

Food items	5-6x a week (%)	2-4x a week (%)	Once a week (%)	Once a month (%)	Rarely
Cereals					
Rice	15 (7.7)	179 (92.3)	-	-	-
Maize	6 (3.1)	172 (88.7)	15 (7.7)	1 (0.5)	12 (7.2)
Guinea corn	2 (1.2)	111 (66.9)	26 (15.7)	15 (9.0)	16 (11.1)
Millet	1(0.7)	84 (58.3)	23 (16)	20 (13.9)	55 (45.8)
Sorghum	1(0.8)	19 (15.8)	19 (15.8)	26 (21.9)	-
Legumes					
Beans	1(0.5)	163 (84)	24 (12.4)	6 (3.1)	10 (5.5%)
Soybeans	5 (2.8)	119 (65.7)	30 (16.6)	17 (9.4)	50 (41.3%)
Cowpea	7 (5.8)	23 (19)	41(33.9)	-	-
Roots/Tuber					
Yam	16 (8.2)	171 (88.1)	7 (3.6)	-	30 (15.7)
Cassava	5 (2.6)	73 (38.2)	47 (24.6)	36 (18.8)	102 (67.5)
Cocoyam	1 (0.7)	2 (1.3)	10 (6.6)	36 (23.8)	99 (66.9)

Table 5. Contd.

Water yam	3 (2.0)	5 (3.4)	5 (3.4)	36 (24.3)	-
Protein					
Meat	58 (29.9)	130 (67)	5 (2.6)	-	1 (0.5)
Fish	57 (29.4)	129 (66.5)	8 (4.1)	-	-
Egg	2 (1.0)	52 (26.9)	68 (35.2)	34 (17.6)	37 (19.2)
Chicken	-	2 (1)	32 (16.5)	72 (37.1)	88 (45.4)
Turkey	-	-	-	-	172 (100)
Fruits/Vegetable					
Orange	37 (19)	147 (75.8)	5 (2.6)	2 (1.0)	3 (1.5)
Watermelon	145 (75.5)	25 (13)	11(5.7)	7 (3.6)	4 (2.1)
Pawpaw	7 (3.6)	80 (41.5)	43 (22.3)	34 (17.6)	29 (15)
Banana	4 (2.1)	68 (35.1)	54 (27)	27 (13.9)	41 (21.1)
Pineapple	5 (2.6)	71 (36.8)	32 (16.6)	35 (18.1)	50 (25.9)
Apple	-	-	20 (10.4)	61 (31.8)	111 (57.8)
Pear	-	8 (4.2)	18 (9.4)	46 (24.0)	120 (62.5)
Carrot	4 (2.1)	129 (66.5)	39 (20.1)	13 (6.7)	9 (4.6)
Garden egg	36 (18.6)	134 (69.1)	18 (9.3)	4 (2.1)	2 (1.0)
Water leaf	1(0.5)	12 (6.3)	44 (23)	47(24.6)	87 (45.5)
Pumpkin leaf	29 (15)	96 (49.9)	42 (21.8)	120 (10.4)	6 (3.1)
Moringa leaf	61(31.4)	103 (53.1)	18 (9.3)	10 (5.2)	2 (1)
Spinach	65 (33.5)	116 (59.8)	10 (5.2)	2 (1)	1 (0.5)
Plantain	1(0.5)	69 (35.6)	65 (33.5)	36 (16.5)	27 (13.9)
Processed food					
Biscuit	14 (7.3)	106 (54.9)	32 (16.6)	27 (14)	14 (7.3)
Bobodrink	8 (4.1)	69 (35.8)	29 (15)	42 (21.8)	45 (23.3)
Bread	39 (20)	139 (71.6)	13 (6.7)	3 (1.5)	-
Prepared food					
Tuwomasara	57 (29.5)	101 (52.3)	30 (15.5)	5 (2.6)	1 (0.5)
Tuwoshinkafa	67 (34.5)	99 (51)	20 (10.3)	7 (3.6)	1 (0.5)
Miyankuka	60 (30.9)	111 (57.2)	18 (9.3)	4 (2.1)	3 (1.5)
Garri	35 (18)	113 (58.2)	29 (14.9)	14 (9.2)	-

Table 6. Anthropometric characteristics of children.

Parameter	Frequency (f)	Percentage
BMI for age (underweight)		
Normal	85	43.8
Mild (<-1SD)	63	32.5
Moderate (<-2SD)	28	14.4
Severe (< -3SD)	18	9.3
Total	194	100
Height-for-age (stunting)		
Normal	63	32.1
Mild (<-1SD)	92	47.7
Moderate (<-2SD)	34	17.6
Severe (<-3SD)	5	2.6
Total	194	100

Table 7. Table of difference in anthropometry before and after intervention in the intervention group.

Pre-intervention	N	Post-intervention	t	p-value
Mean BAZ	-0.64 ± 1.27	20	0.24 ± 0.61	-2.268 0.035*
Mean HAZ	-0.34 ± 1.13	20	-0.33 ± 0.77	-1.330 0.199
Mean weight	22.69 ± 5.98	20	23.68 ± 5.55	17.550 0.000*

The intervention program was to improve the nutritional status of children in the long term through the provision of knowledge transfer through nutrition education and the preparation of a nutrient-dense food from cheap, ubiquitous food items in the community to be administered to the children. This strategy produced significant improvements in the nutritional status of the children, comparable to the findings in Shiraz, Iran, where the frequency of children with lower BMI-for-age decreased significantly among girls who were given food supplements ($p=0.02$) (Joulaei et al., 2013).

Among the limitations of this study was the fact that the children's HIV/AIDS status was not determined. This is a possible confounding factor that can impact nutritional status negatively. Furthermore, documentation of the nutritional status of children orphaned by HIV/AIDS in Nigeria is sparse, hence the dearth of relevant local information to this study findings.

RECOMMENDATION

According to the findings of this study, the following recommendations are made:

- (1) In the case of unknown HIV status of children born from HIV infected mothers, nutritional and infant feeding support is essential.
- (2) To mitigate the socioeconomic impact of AIDS, communities must be able to identify children and

households most in need, prioritize their needs, and use local and external resources to increase their well-being and strengthen community safety nets.

(3) Ensuring ongoing care and support for orphans is critically important to their well-being. HIV-related programs need to include components for children and link with other child focus programs.

(4) Educational activities need to be linked to other interventions, such as nutrition and psychosocial, to have a holistic program that addresses influencing factors on children's ability to attend school and maximize the benefits of education.

(5) Appropriate government policies are essential for the protection and well-being of orphans and other vulnerable children and their families. These policies must contain clauses to prohibit discrimination of access to medical services, education, employment, housing, and protect the inheritance rights of widows and orphans.

(6) Finally, further studies should be carried out in assessing the nutritional status of children orphaned from HIV/AIDS in Bauchi metropolis and other communities.

Conclusion

This study revealed that the prevalence of stunting and underweight is high among children orphaned from HIV/AIDS, their diet is inadequate in quality nutrients as indicated by their food consumption pattern, and that food-based interventions can improve the nutritional

status of children orphaned by HIV/AIDs.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

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