

Journal of
AIDS and HIV Research

Volume 7 Number 9 October, 2015

ISSN 2141-2359



*Academic
Journals*

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Full Length Research Paper

Determinants of human immunodeficiency virus (HIV) infection in Nigeria: A synthesis of the literature

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Received 7 April, 2015; Accepted 21 September, 2015

Nigeria has an estimated 3.5 million human immunodeficiency virus (HIV) positive individuals, ranking third worldwide. This study analyzes the determinants of HIV infection to enable improvements in HIV programming in Nigeria and other developing countries. The methodology used is a literature review of grey and electronic databases of reviewed journals, analyzed in terms of an adapted version of Dahlgren and Whitehead's (1991) determinants of health model. A total of 43 publications (14 reports and 29 articles) were reviewed. Political, work environment, healthcare service, social network, lifestyle, and gender determinants are predominant over others. The level of political commitment to HIV control is extremely low: over 90% of funding is from foreign sources. Stigmatization leads to delayed and inadequate treatment; and economic and social hardships for HIV-positive individuals. New infections are emerging at increasing rates among individuals engaging in sexual relationships such as men having sex with men (MSM) and female sex workers (FSW). HIV control in Nigeria is financially over-dependent on foreign intervention. Political action is required to formulate and implement a human immunodeficiency virus infection and acquired immune deficiency syndrome (HIV/AIDS) policy that provides legal, social, and economic support for people infected and affected by HIV/AIDS. Measures are required to inform about scientific safeguards against infection, and to reduce HIV stigma among the general population and healthcare workers in particular. Most-at-risk populations require education, legal and economic support, and access to effective health care without negative repercussions, in order to minimize new infections.

Key words: HIV, infection, determinant of health, Dahlgren and whitehead, Nigeria, synthesis, stigma.

INTRODUCTION

The human immunodeficiency virus (HIV) is a retrovirus that infects cells of the immune system, destroying their function. Sub-Saharan Africa continues to bear a disproportionate share of the global HIV burden. In mid

2010, about 68% of all people living with HIV resided in sub-Saharan Africa, a region with only 12% of the global populations (UNAIDS, 2011) It was estimated that 3.5 million in Nigeria in 2012, making Nigeria third among

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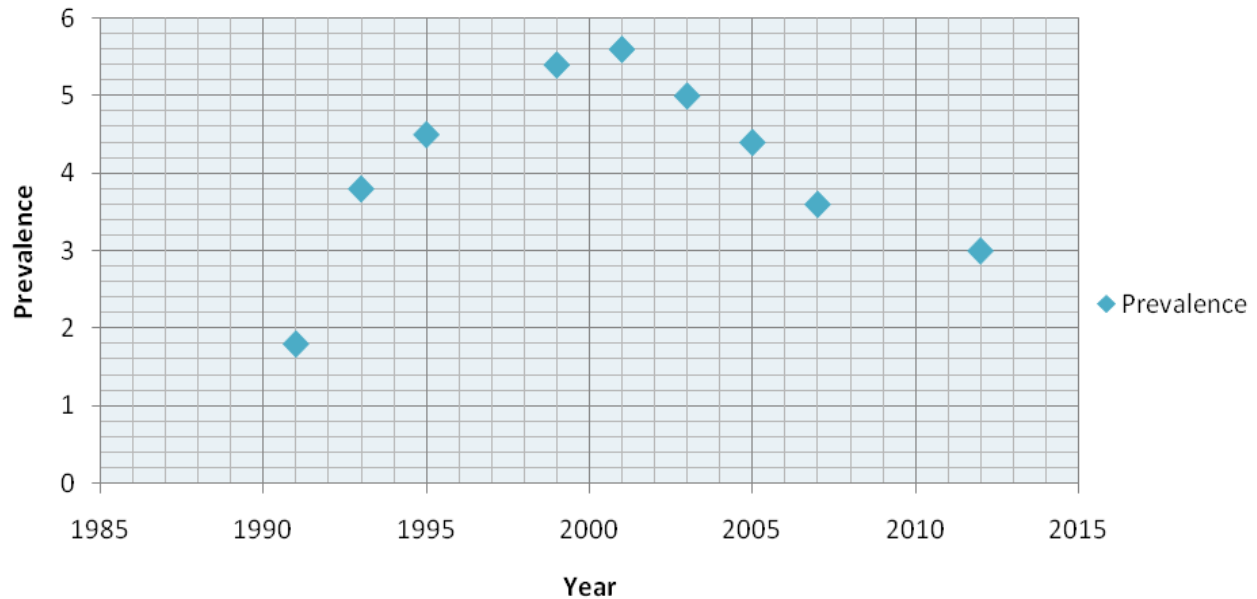


Figure 1. Trends in national HIV sero-prevalence rate, Nigeria, 1991-2012 (Source: NACA, 2009).

countries with the highest burden of HIV infection in the world after India and South Africa (NARHS Plus II, 2012). Figure 1 shows Nigerian sero-prevalence rates during the period from 1991 to 2012. National prevalence is gradually declining, from a high of over 5.5% in 2001 to about 3% in 2012, according to Nigeria's National HIV and AIDS and Reproductive Health Survey (NARHS Plus II, 2012). The survey also provided information for several demographics as follows. Urban prevalence was 3.2%, compared with 3.6% for rural areas. Among Nigeria's six geopolitical zones, South South had the highest prevalence at 6.3%, while South East had the lowest at 1.3%. The age groups with highest and lowest prevalence were 35 to 39 (3.6%) and 15 to 19, 40 to 44 and 45 to 49 (2.7%) respectively. There was no significant difference in prevalence between females (3.4%) and males (3.3%).

The leading route of HIV transmission in Nigeria is heterosexual intercourse (accounting for over 80% of new infections), followed by mother-to-child transmission. Of new adult infections, 38% can be attributed to female sex workers (FSW), injecting drug users, (IDU) and men having sex with men (MSM) which constitute 3.5% of the adult population (FMOH, 2010 and NSP, 2010). Additionally, IDU and MSM are growing in importance (NSP, 2010).

There has been a shift from viewing HIV risk as predominantly an individual behavior to viewing it as impacted by social, economic, political, and/or cultural determinants (Weine and Kashuba, 2012). Several social and economic factors have been shown to have significant impact on prevalence, including education level, wealth, and marital status. For purposes of

formulating policy and developing effective strategies against AIDS, it is clearly beneficial to have an accurate picture of the various determinants and their importance in contributing to HIV prevalence.

OBJECTIVE

This paper analyzes the determinants of HIV infection in Nigeria from a social perspective. The analysis follows Dahlgren and Whitehead's (1991) model of determinants of health of individuals in a population, which characterizes health determinants in terms of successive layers of societal influence (Figure 2). The innermost layer includes personal characteristics such as age and sex. The next layer includes personal factors, such as individual habits and lifestyles. The third layer of influences includes individuals' social interaction in the local community (with family, friends, neighbors, coworkers, healthcare workers etc.), The fourth layer comprises living and working conditions, including factors such as education, work environment, unemployment and healthcare. The outermost layer takes into account overall socio-economic, cultural and political factors.

MATERIALS AND METHODS

A literature review of relevant material on HIV and determinants of health was conducted. In particular, English language journal articles (published and grey) and reports between 2000 and 2015 were used. PubMed (Medline), Google Scholar, and e-Library were the search engines used to identify relevant articles. The search strategy paired the search term "Nigeria HIV infection" with various

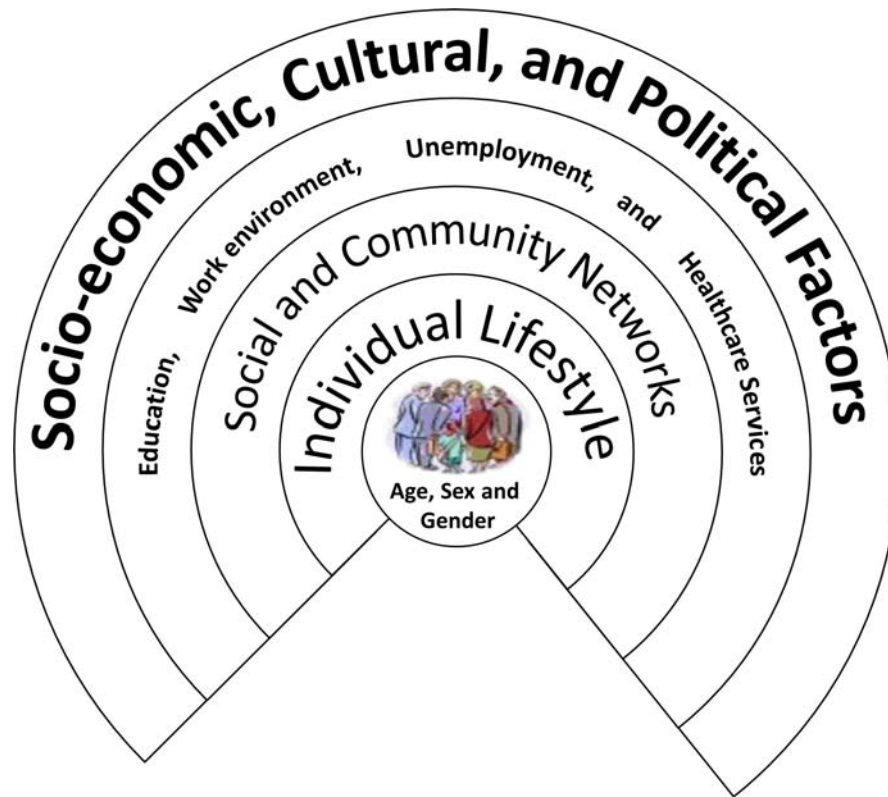


Figure 2. Dahlgren and Whitehead's model of health determinants (adapted from Dahlgren and Whitehead, 1991).

search terms related to the different factors indicated by Dahlgren and Whitehead's model. A comprehensive list of the search terms used is given in the Appendix. Cited articles were searched for references to additional studies, and priority was given to primary source articles. Additionally, nine country-specific reports on HIV were reviewed: national demographic and health survey (NPC) 2009, NSP (2010 to 2015), IBBSS (2010), NARHS Plus (2007), FMOH (2008), NACA report (2005, 2009), WHO (2006), FGN (2009), FGN (2010), UNICEF (2010), WHO (2013), UNAIDS (2012), and PEPFAR (2012). A total of 43 publications were reviewed, including the fourteen reports listed above.

Determinants identified were analyzed according to Dahlgren and Whitehead's model of social determinants of health described above and depicted in Figure 2. Although Dahlgren and Whitehead's general scheme was maintained, there are some differences in the specific factors considered. For example, political factors were added to the outermost layer, while agriculture and housing were not included among living and working conditions due to non-availability of relevant articles. In the following discussion, determinants from the outermost layer are presented first, progressing successively inward.

RESULTS AND DISCUSSION

Socioeconomic

When the Nigerian population is classified according to

wealth, out of five wealth categories a prevalence of about 3.6% was recorded in the two wealthiest categories as compared to 2.9% for the poorest (NARHS Plus II, 2012). The 2008 NDHS respondents in the highest wealth quintile had the highest comprehension that condom use will protect against HIV and that HIV-negative faithful partners can reduce chances of getting the AIDS virus. However, risky sexual practices are higher among men and women in the highest wealth quintile (NPC and ICF Macro, 2009).

A study conducted by Mahal et al. (2008) details the serious economic challenges that HIV-affected households in Nigeria are likely to face compared to their HIV-negative counterparts. These include the likelihood of substantial income losses, increased burden of care-giving, as well as higher out-of-pocket healthcare spending. Even with subsidies and free healthcare services such as HIV counseling and testing, antiretroviral therapy and care from support groups, direct and indirect annual per capita income losses from ill health for PLWHIV were estimated at 21,589 naira (U.S. \$116), as compared to 3,853 naira (\$21) for HIV negative individuals. Similarly, the annual hospitalization rate was 27.04% for PLWHIV as against 4.44% for HIV negative persons. Frequency of illness in PLWHIV was 4 times

higher than for HIV negative persons. Annual estimated healthcare expense for PLWHIV was 10,729 Naira (\$58) per capita; versus 1,329 Naira (\$7) for HIV negative persons (Mahal et al., 2008). Inability of infected persons to meet socioeconomic demands in Nigeria contributes to the spread of the infection.

Cultural practices

Widespread traditional practices which increase risk of HIV infection include polygamy and wife inheritance, facial marking/tattooing (the use of contaminated instrument increases risk of infection) and ghost marriage (in which a deceased husband's relative steps in as sexual partner for the widow) (Ugwu, 2009). Due to cultural gender inequalities, women often cannot negotiate condom use with their husbands or sex partners: this fact should be interpreted in light of findings from NARHS Plus II (2012) that HIV infection was significantly higher (5%) among respondents that reported not using condoms. The practice of sex in exchange for gifts also promotes higher risk of HIV infection: the risk was more pronounced for males in rural areas, and for females in urban areas (NARHS Plus II, 2012).

Female genital cutting (FGC) includes procedures that intentionally alter or cause injury to the female organs for non-medical reasons (WHO, 2013). Findings from NARHS (2005) shows that female genital cutting is more prevalent in the southern part of Nigeria than the northern part, with South West and South East each recording that over 50% of females are circumcised (Table 1). According to UNICEF (2010), FGC in Nigeria is often carried out by traditional birth attendants using unsanitary knives and other sharp instrument in unhygienic conditions which could transmit HIV. In addition, Monjok et al. (2007) have illustrated how FGC increases risk of HIV infection.

Male circumcision (MC) has also been practiced for centuries. In resource-poor settings, most circumcisions are still done outside the formal health sector as a rite of passage into adulthood or as a religious observance (WHO, 2006). A study conducted by Illiyasu et al. (2012) reveals that 368 of 375 respondents reported being circumcised. The majority (97.8%) favour continuation of the practice, while approximately 73% of the respondents agreed that circumcised men still need to employ condoms during sex for protection against sexually-transmitted infections (STIs), including HIV. A total of 22.1% respondents pointed out problems associated with the availability and the standardization of circumcision services at health facilities, which explains widespread reliance on traditional circumcisers (Table 2)

Political

The National agency for the control of AIDS (NACA)

(successor to the National Action Committee on AIDS) is at the apex of linked government institutions in the multisectoral HIV/AIDS response architecture. NACA is mandated to provide overall coordination of the national response. However, the financial commitment from the Nigerian government has been low, and funding is externally dependent. In 2007 and 2008, 85.4 and 92.3% (respectively) of funding for HIV/AIDS activities in Nigeria came from international organizations (NACA, 2010).

At the state and local government levels, there are critical shortfalls in managerial capacity. Political interference in the coordination structure distorts relationships and linkages of institutions at several levels (NACA, 2005). One example of adverse political influence is the overconcentration of HIV prevention efforts in urban communities, as against rural areas where knowledge is grossly inadequate. Another example is the inadequate level of programme implementation focusing on youth categories such as in-school, out-of-school and students at higher learning institutions (FGN, 2010).

Little progress has been made on the implementation of a National HIV/AIDS policy, including a HIV/AIDS workplace policy. This encompasses rights of employees (particularly PLWHIV) and their families, such as issues of confidentiality, healthcare, testing, benefits and discrimination due to stigma (FGN, 2009). Gender inequities in HIV programming are not surprising, given the gender inequity that is prevalent in Nigerian public service (PEPFAR, 2012).

Education

According to NARHS Plus II (2012), prevalence was higher among people with primary and higher education (3.0% and above), compared with people who had either Qur'anic (2.4%) or no formal education (2.5%). The 2008 NDHS showed that among women and men of age 15 to 49, those with higher education engaged in higher levels of high-risk sexual behavior in the previous year (NPC, 2009). NARHS Plus II (2012) showed a similar correlation between higher education and higher HIV prevalence. Therefore, acquired knowledge does not inhibit infection, but effective application of knowledge gained. In a study conducted by Agaba et al. (2014), education level had no significant effect on the percentage of patients receiving treatment for HIV that were late presenters of the disease, or that first presented when they were already in the stage of advanced HIV disease (AHD). When grouped by education level (no formal education, primary/secondary, and tertiary), all three groups had rates of late presentation close to 85.5%, and rates of presentation with AHD close to 63%.

A study conducted by Risley et al. (2012) revealed an estimated 340,940 Nigerian teachers living with HIV, which negatively impacts the quality of education since PLWHIV experience increased illness and

Table 1. Knowledge and prevalence of FGM (FMOH, 2008).

Zone	Percentage of women who heard of FGM	Percentage of women circumcised	Types of circumcision		
			Type 1	Type 2	Type 3
North Central	36.0	9.6	1.2	64.6	2.5
North East	40.1	1.3	-	-	-
North West	25.1	0.4	-	-	-
South East	87.1	40.8	0.3	12.2	2.7
South South	82.5	34.7	3.0	66.0	7.5
South West	85.7	56.9	2.2	36.3	1.3

Table 2. Prevalence of male circumcision by sociodemographic characteristics, 2011 (Illiyasu et al., 2013).

Characteristics	Male circumcision (%)			χ^2 P-value
	Yes	No	Total	
Age group (years)				
<20	34 (97.1)	1 (2.9)	35 (100.0)	0.26 ²
20-29	99 (97.1)	3 (2.9)	102 (100.0)	
30-39	158 (98.1)	3 (1.9)	161 (100.0)	
≥40	77 (100.0)	-	77 (100.0)	
Total	368 (98.1)	7 (1.9)	375 (100.0)	
Religion				
Muslim	330 (98.2)	6 (1.8)	336 (100.0)	0.73
Christian	38 (97.4)	1 (2.6)	39 (100.0)	
Total	368 (98.1)	7 (1.9)	375 (100.0)	
Ethnicity				
Hausa	228 (98.3)	4 (1.7)	232 (100.0)	0.62 ²
Fulani	70 (98.6)	1 (1.4)	71 (100.0)	
Yoruba	25 (98.2)	1 (3.8)	26 (100.0)	
Igbo	11 (100.0)	-	11 (100.0)	
Others	34 (97.1)	1 (2.9)	35 (100.0)	
Total	368 (98.1)	7 (1.9)	375 (100.0)	
Marital status				
Single	354 (98.1)	7 (1.9)	361 (100.0)	-
Ever married	14 (100.0)	-	14 (100.0)	
Total	368 (98.1)	7 (1.9)	375 (100.0)	

absenteeism from work (FHI, 2004).

Work environment

According to IBBSS (2010), HIV prevalence was 27.4% among brothel-based female sex workers (BBFSW), followed by 21.7% among non-brothel-based female sex

workers. A study on condom use rate in brothels in Nigeria conducted by Anyanti et al. (2003) reveals that only 57% of BBFSW used condoms consistently with all clients. Adherence to condom use depended on the level of intimacy with the sex partner, and the amount paid by the client for sex. Other occupational subpopulations measured by IBBSS include transport workers (2.4%), military (2.5%), and police (2.6%). Muhammad et al. (

2010) found that among male prison inmates, with highest and lowest prevalence were 10 to 20 (7.1%) and 41 to 50 years (4.0%), respectively. A study on HIV infection by Azuonwu and Obire (2011) conducted among patients at the Nigeria army hospital, air force clinic and police clinic in the Niger Delta region of Nigeria showed that HIV prevalence was highest among air force personnel (20%) while army and police were both at 12%.

The study also showed slightly higher HIV prevalence amongst female (16.7%) than male (14.3%) counterparts, although the difference was not statistically significant.

Aniebue and Aniebue (2011) reported that HIV screening is still low among Nigerian long distance truck drivers (LDTD), despite their high-risk sexual conduct. Also, Sunmola (2005) showed that only 32.3% of LDTD reported ever used a condom in sexual relationships.

Agaba et al. (2014), found that among occupational categories, civil servants who received treatment for HIV had the highest percentage of late presenters (88.3%, $p < 0.001$) and presenters with AHD (66.1%, $p = 0.001$). This could be related to civil servants' fear of losing their jobs; or, it might be due to the fact that civil servants are predominantly male, and males showed significantly higher rates of late presentation and AHD than females. Owolabi et al. (2012), have documented that dismissal from workplace may indeed occur as a consequence of disclosure.

A study conducted in Benin-City by Aisien and Shobowale (2005) showed poor adherence on the part of health care workers (HCW) to standard precautions in dealing with HIV/AIDS patients. This was partially due to ignorance and lack of the proper materials. Medical instruments were often not properly sterilized; hand-washing before medical examinations was frequently not performed; needles and medical wastes were frequently not properly disposed; and protections from potentially infectious blood during surgery were deficient. Almost 40% of the HCW in the study felt that they were at high risk for developing HIV due to their working at a health facility.

Unemployment

According to Agaba et al. (2014) unemployed patients who received treatment were at higher risk for late presentation (84.3%, $p = 0.009$) and presentation with AHD (61.4%, $p = 0.05$) than employed patients. In a study of patients receiving highly active antiretroviral therapy in Jos, Nigeria, unemployed patients were found to have significantly higher risk of rapid mortality. Unemployed patients were also much more likely to be lost to follow-up, implying that they were likely to have discontinued treatment (Desilva et al., 2009).

Health care services

One author's (AJO) experience as a research coordinator

for Global Fund Round 5's HIV counseling and testing (HCT) component confirms that HCT is a key entry point for client's knowledge of HIV status, which invariably leads to treatment for positive patients. But because of stigmatization and discrimination, HCT service points at health centers are shunned by many that might benefit. The poor thus go without testing, while the rich travel abroad for testing and treatment that they could obtain in Nigeria. A study by Reis et al. (2005) found that health professionals displayed discriminatory attitudes and unethical behaviour towards patients with HIV, including denial of care and breach of confidentiality. Faced with these possible consequences, people prefer to remain untested, thereby increasing the infection rate.

A survey of the knowledge, beliefs, and attitudes of nurses and laboratory technologists in Lagos State, Nigeria showed that respondents' knowledge of HIV/AIDS was fairly good, but attitudes towards PLWA were rather less positive. 35.4% of respondents felt that PLWA were receiving the punishment they deserved, while 47.2% would not be willing to work in the same office with a PLWA. The study of Reis et al. (2005) conducted among health-care professionals in four Nigerian states confirms the presence of discriminatory attitudes, although only among a rather small minority. 8% agreed that treatment of patients with HIV/AIDS wasted precious resources. Aisien and Shobowale (2005) have linked discriminatory practices among health-care workers to fear of them contracting HIV: 33% were not comfortable providing health care services to HIV positive patients, while 64% were uncomfortable performing surgical procedures on HIV-positive patients.

In Nigeria, traditional birth attendants (TBA) play a significant role in the delivery of babies. However, over 22% of TBAs proffer unscientific methods for prevention of mother to child transmission (MTCT) while only 34.3% show interest in knowing the HIV status of their pregnant patient (Balogun and Odeyemi, 2010).

Social and community networks

In many cases, social networks have a negative impact on HIV prevalence, because of the stigmatization of and discrimination against people living with HIV (PLWHIV) (NACA, 2005). Prevalence among divorced/separated and widowed/widower are higher compared to other marriage categories, further adding to the stigma (Obi et al., 2010; NARHS plus II, 2012). Various causes contribute to social stigma (Odimegwu et al., 2013). HIV is associated with already-stigmatized groups such as sex workers and lesbians. HIV is often viewed as divine punishment for misbehavior. Many people are fearful of infection, due to ignorance about the mechanism of HIV transmission. For instance, in a survey performed by Odimegwu et al. (2013), 19% of respondents thought that HIV could be contracted by sharing food with an infected person.

Individual lifestyle

Sexual habits are decisive determinants of the risk of HIV infection. According to IBBSS Nigeria (2010), the HIV prevalence among MSM is 17.2%. MSM activity is typically conducted through underground networks, due to cultural, religious, and political ostracism: usually such activity is kept secret even from families. A large percent of individuals engaging in MSM identify as bisexual: so HIV among MSM may also contribute to HIV prevalence among heterosexuals (Allman et al., 2007). Ankomah et al. (2013) reported that in Nigeria, as in many other countries where HIV is transmitted mostly through heterosexual activities, the risk of transmission of HIV is largely determined by sex outside stable relationships. For individuals engaging in such practices, the risk is heightened when no protection is used. Thus the authors concur with Ankomah et al. (2013) that promotion of condom use for those engaging in higher-risk sexual activities should therefore be a major preventive strategy (Tables 3 and 4).

Age

Age of sexual debut plays a significant role in an individual's exposure to HIV infection. According to John et al. (2013), condom usage among age 13 to 14 years who had their first sexual experience was 36.1%, and 37.6% of them had more than one sex partners. A similar study conducted by Pettifor et al. (2009) showed that condom use at first sex experience increases with increase in age among female and male of ages 15 to 19 and 20 to 24 years, it was found that 46.6% (female) and 56.2 (male) among ages 15 to 19 did not use condom as against 58.6% (female) and 62.6 (male) of age 20 to 24 years. Agaba et al. (2014) found that male patients were significantly older than female patients: median ages were 38 and 31, respectively ($p < 0.001$).

Sex and gender

In Nigeria, gender roles are in every sector which increases or reduces chances of HIV infection. Particularly, women are vulnerable to the infection because of their role in procreation and their generally subordinate position in society. They typically lack equal access to education, health, training, independent income, property and legal rights which have serious implications for their right to access to knowledge on HIV/AIDS. These measures can be taken to prevent transmission of the HIV infection, as well as their ability to protect themselves (NSP, 2010).

Women are motivated to undertake HIV counseling and testing (HCT) before delivering their babies (Galadanci et al., 2014). These observations support the FMOH (2006) report that the results of periodic national surveys among

ante-natal clinic attendees showed a progressive increase in the adult HIV sero-prevalence rate. Similarly, a study by Akhigbe et al. (2010) illustrated that there is a marginal gender preference in the prevalence of HIV seen in females due to a higher number of the gender utilizing the HIV counseling and testing (HCT) service. Agaba et al. (2014) found that significantly higher percentages of males receiving treatment were late presenters (90.1% versus 83.3% for females, $p < 0.001$) and presenters with AHD (70.4% versus 59.2%, $p < 0.001$). This may be due to increased fear among males of stigmatization (Alubo et al., 2002).

A qualitative study conducted by Mbonu et al. (2010) documented significant differences in attitudes towards HIV-positive individuals based on the infected person's sex. Typically, HIV-positive women are blamed and labeled as "flirts"; while HIV-positive men are excused, and their infection is attributed to nonsexual causes such as haircuts (Mbonu et al., 2010).

Among women with symptoms of STI (including HIV), 15.8% have never married, as compared to 6.4% for their male counterparts. This can be explained by different social attitudes towards extramarital sexual activity of men and women, as well as inadequate knowledge of STIs among vulnerable, inexperienced women (NARHS Plus II, 2012).

CONCLUSION

The result of the analysis identified political, healthcare service, social networking, lifestyle, and gender determinants as predominant over others.

In Nigeria, there are political structures for HIV control at all Government levels (Local, State and Federal) which are intended to execute comprehensive HIV control programmes that include behavioural change communications and healthcare services. However, effectiveness has been limited due to poor coordination, political interference and inadequate political will as evidenced by underfunding by the government.

Healthcare services for MSM patients are impaired due to stigma, discrimination and criminalization of MSM in Nigeria. Despite the illegal status of MSM, the needs of MSM patients should not be neglected. Infection rates among FSW (either brothel-based or non-brothel) are similarly exacerbated due to stigma. Even among patients with regular employment, fear of stigma produces high incidence of late presentation of the disease, thus delaying treatment, reducing survival rates, and causing further increases in infection rates. Social stigma, over and above the economic and physical burden imposed on AIDS patients, produces a crushing weight, and only worsens the mortality and prevalence of the disease. Feeble government policies have done little to lessen the burden. The prevention of MTCT of HIV at health facilities and TBAs requires a multi-stakeholder approach. Inadequate of HIV/AIDS awareness and low

Table 3. Demographic characteristics of men who engage in extramarital relationships (Ankomah et al., 2013).

Variable	Frequency n = 642	Percentage
Age of respondents (years)		
15-19	16	2.5
20-24	59	9.2
25-34	254	39.6
35-49	261	40.7
50-64	52	8.1
Condom use during last extramarital sex		
Did not use condom	345	53.7
Used condom	297	46.3
Education level		
No formal education	52	8.1
Primary	203	31.6
Secondary and higher	387	60.3
Religion		
Islam	191	29.8
Christianity	424	66
Traditional/others	27	4.2
Ethnicity		
Hausa	46	7.2
Igbo	62	9.7
Yoruba	191	29.8
Others	343	53.4
Residence		
Rural	398	62
Urban	244	38
Multiple nonspousal sex		
No	317	58.4
Yes: have sex with nonspouse	325	41.6
Sex in exchange for gift		
Never had sex for gift	479	74.6
Have had sex for gift	163	25.4
Alcohol consumption		
Every day	89	13.9
Once a week or less	267	41.6
Others	286	44.5
Away from home for more than 1 month in the last 12 months		
No	370	57.6
Yes	272	42.4

Table 4. Bivariate analysis of condom use in extramarital sex (Ankomah et al., 2013).

Variable	Condom use in extramarital sex (%)		Total	P-value from χ^2
	Used condom	Did not use		
Respondents' age (years)				0.187
15-19	56.3	43.7	16	-
20-24	45.8	54.2	59	-
25-34	48.4	51.6	254	-
35-49	46.7	53.3	261	-
50-64	30.8	69.2	52	-
Education				<0.0001
No formal education	23.1	76.9	52	-
Below secondary	36.9	63.1	203	-
Secondary and higher	54.3	45.7	387	-
Locality				<0.0001
Rural	39.4	60.6	398	
Urban	57.4	42.6	244	
Religion				0.813
Islam	44.5	55.5	191	-
Christian (Catholic and Protestant)	47.2	52.8	424	-
Others	44.4	55.6	27	-
Ethnicity				0.03
Hausa	39.1	60.9	46	-
Igbo	46.8	53.2	62	-
Yoruba	55	45	191	-
Others	42.3	57.7	343	-
Alcohol intake				0.484
Every day	43.8	56.2	89	-
Sometimes	49.1	50.9	267	-
Never	44.4	55.6	286	55.6
Away from home for more than 1 month in the last 12 months				0.037
Yes	42.7	57.3	370	-
No	51.1	48.9	272	-
Motivation variables				
Self-assessment/appraisal of contracting HIV				0.513
High risk	41	59	39	-
Others	46.6	53.4	603	-
Condom protects against STI/HIV and prevents unwanted pregnancy				<0.0001
Agreed	51.2	48.8	541	-
Disagreed	19.8	80.2	101	-

Table 4. Cont'd.

Are you embarrassed to buy condoms?				<0.0001
Not embarrassed	52.1	47.9	401	-
Embarrassed	36.5	63.5	241	-
Misconception about HIV transmission				0.004
Yes	40.8	59.2	338	-
No	52.3	47.7	304	-
Opportunity variables				
Condom affordability				<0.0001
Agreed	53.2	46.8	536	-
Disagreed	11.3	88.7	106	-
Condoms easy to obtain				<0.0001
Agreed	52.6	47.4	519	-
Disagreed	19.5	80.5	123	-
Know how to wear a condom?				<0.0001
Yes	62.7	37.3	445	-
No	9.1	90.9	197	-
	Ability variables			
Know someone who died of AIDS				0.108
Yes	51.7	48.3	172	-
No	44.3	55.7	470	-
Know that AIDS has no cure				0.012
Yes	48.6	51.4	529	-
No	35.4	64.6	113	-
Know that healthy-looking persons can be HIV-positive				<0.0001
Yes	50.8	49.2	510	-
No	28.8	71.2	132	-
	UNAIDS			
Condom use and remain with one uninfected partner				<0.0001
Yes	51.9	48.1	503	-
No	25.9	74.1	139	-
Discussed condom with partner?				<0.0001
Yes	69	31	381	-
No	13	87	261	-
Can convince partner to use condom?				<0.0001
Yes	60.7	39.3	460	-
No	9.9	90.1	182	-

Abbreviations: AIDS, acquired immunodeficiency syndrome; HIV, Human Immunodeficiency Virus infection; STI, sexually transmitted infection, (Ankomah A. et al 2013).

and low standards of practice among TBAs are of special concern.

The promotion of condom use is one strategy that could significantly decrease infection rates. No research

was found on the use of female condoms, but awareness and utilization are limited in Nigeria.

LIMITATIONS

Dahlgren and Whitehead's determinant of health model was helpful in suggesting possible determinants of infection. Not all of the specific factors considered by Dahlgren and Whitehead were used due to non-availability of related articles; and other factors were added based on the authors' judgment of their importance.

ACKNOWLEDGEMENT

This study was supervised by the International course in health development of the Royal Tropical Institute, Amsterdam, the Netherlands. The National Agency for the Control of AIDS (NACA) in Nigeria made available national reports for the study.

Conflicts of interest

The authors declare no conflict of interest.

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APPENDIXES

Search strategies Key words used for PubMed (Medline)

1) Nigeria HIV infection and gender norms

((("nigeria" [MeSH Terms] OR "nigeria" [All Fields]) AND ("hiv infections" [MeSH Terms] OR ("hiv" [All Fields] AND "infections" [All Fields]) OR "hiv infections" [All Fields] OR ("hiv" [All Fields] AND "infection" [All Fields]) OR "hiv infection" [All Fields])) AND (("sex" [MeSH Terms] OR "sex" [All Fields] OR "gender" [All Fields] OR "gender identity" [MeSH Terms] OR ("gender" [All Fields] AND "identity" [All Fields]) OR "gender identity" [All Fields]) AND norms [All Fields]) AND ("2003/10/07"[PDat]: "2013/10/03" [PDat]).

2) Nigeria HIV infection and age factor

("nigeria" [MeSH Terms] OR "nigeria" [All Fields]) AND ("hiv infections" [MeSH Terms] OR ("hiv" [All Fields] AND "infections" [All Fields]) OR "hiv infections" [All Fields] OR ("hiv" [All Fields] AND "infection" [All Fields]) OR "hiv infection" [All Fields])) AND ("age factors" [MeSH Terms] OR ("age" [All Fields] AND "factors" [All Fields]) OR "age factors"[All Fields] OR ("age" [All Fields] AND "factor" [All Fields]) OR "age factor" [All Fields]) AND ("2000/01/01" [PDAT] : "2013/12/31" [PDAT]).

3) Nigeria HIV infection and (social support or social network)

((("nigeria" [MeSH Terms] OR "nigeria" [All Fields]) AND ("hiv infections" [MeSH Terms] OR ("hiv" [All Fields] AND "infections" [All Fields]) OR "hiv infections" [All Fields] OR ("hiv" [All Fields] AND "infection" [All Fields]) OR "hiv infection" [All Fields])) AND ("social support" [MeSH Terms] OR ("social" [All Fields] AND "support" [All Fields]) OR "social support" [All Fields] OR ("social" [All Fields] AND "network" [All Fields]) OR "social network" [All Fields]).

4) Nigeria HIV infection and education

((("nigeria" [MeSH Terms] OR "nigeria" [All Fields]) AND ("hiv infections" [MeSH Terms] OR ("hiv" [All Fields] AND "infections" [All Fields]) OR "hiv infections" [All Fields] OR ("hiv" [All Fields] AND "infection"[All Fields]) OR "hiv infection" [All Fields])) AND ("education" [Subheading] OR "education" [All Fields] OR "educational status" [MeSH Terms] OR ("educational" [All Fields] AND "status" [All Fields]) OR "educational status" [All Fields] OR "education" [All Fields] OR "education" [MeSH Terms]).

5) Nigeria HIV infection and socioeconomic

((("nigeria" [MeSH Terms] OR "nigeria" [All Fields]) AND ("hiv infections" [MeSH Terms] OR ("hiv" [All Fields] AND "infections" [All Fields]) OR "hiv infections" [All Fields] OR ("hiv" [All Fields] AND "infection" [All Fields]) OR "hiv infection" [All Fields])) AND socioeconomic [All Fields]).

6) Nigeria HIV infection AND politics

("hiv" [MeSH Terms] OR "hiv" [All Fields]) AND ("nigeria" [MeSH Terms] OR "nigeria" [All Fields]) AND ("politics"[MeSH Terms] OR "politics" [All Fields]).

7) Nigeria HIV infection AND government

("hiv" [MeSH Terms] OR "hiv" [All Fields]) AND ("nigeria" [MeSH Terms] OR "nigeria" [All Fields]) AND ("government" [MeSH Terms] OR "government"[All Fields]).

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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Received 26 January, 2015; Accepted 11 June, 2015

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.

ACKNOWLEDGEMENT

The Authors thank the Bauchi State Ministry of Health, Rahama Women Initiative Bauchi State, Abubakar Tafawa Balewa University Teaching Hospital and the Bauchi State Agency for the control of HIV/AIDs, Tuberculosis/Leprosy and Malaria (BACATMA) for their assistance in making this research a success.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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