

Dietary pattern of people living with HIV/AIDS attending General Hospital Kafanchan, Kaduna State, Nigeria

Salamatu Ishaku

Department of Nursing Sciences, Islamic University in Uganda, Kampala Campus, Uganda.

Email: salamaishaku0507@gmail.com; Tel: +2347037079252.

Copyright © 2019 Ishaku. This article remains permanently open access under the terms of the [Creative Commons Attribution License 4.0](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Received 8th November, 2019; Accepted 5th December, 2019

ABSTRACT: Human immunodeficiency virus infection can lead to malnutrition, while poor diet can in turn speed the infection progression. As human immunodeficiency virus treatment becomes increasingly available in the poorest parts of the world, the question now is, how well the drugs work in people if they are short of food. This study unveiled information about the dietary pattern of people living with human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) attending antiretroviral clinic of General Hospital Kafanchan, Kaduna State, Nigeria. A cross-sectional survey design was carried out at the Antiretroviral Clinic of General Hospital Kafanchan, Kaduna with a sample size of 422 people living with HIV/AIDS selected by systematic sampling technique. Questionnaire was used to collect data with the help of two trained research assistants from the antiretroviral clinic to ensure objectivity and confidentiality. Data was analysed descriptively using frequency and percentages while chi-square was used to test for association between the socio-demographic variables; age, sex, marital status, highest educational attainment and occupation of the respondents with their dietary pattern, at 95% confidence interval using statistical package for social sciences version 20.0 computer software programme. Even though consumption of food rich in minerals and vitamins such as fruits and vegetables was 72.8% (300), eating twice per day was 54.6% (225) and taking adequate diet once per day was 51% (210), the dietary pattern of the respondents was considered to be average. The occupation of the respondents was found to have significant association ($p = 0.000$) with their dietary pattern. Adequate diet is very important for the people living with HIV/AIDS. Hence, people infected with HIV should make every effort to adopt healthy and balanced nutrition patterns in order to meet their increased protein and energy requirements and maintain their nutritional status.

Keywords: Antiretroviral clinic, dietary consumption, HIV adult patients, socio-demographic variables.

INTRODUCTION

In 2018, 37.9 million people globally were living with human immunodeficiency virus (HIV) while 32 million people have died from acquired immunodeficiency syndrome (AIDS)-related illnesses since the start of the epidemic (The Joint United Nations Programme on HIV/AIDS [UNAIDS], 2019a). UNAIDS and the National Agency for the Control of AIDS further stated that an estimated 1.9 million people are living with HIV in Nigeria (UNAIDS, 2019b). According to the publication made by the global HIV and AIDS organization [AVERT] (2019), East and South Africa are the regions most affected by HIV in the world and is home to the largest number of people living with HIV and this number continue to increase.

In this study, dietary pattern refers to what people living

with HIV/AIDS (PLWHA) eat in terms of their appetite, consumption of food rich in minerals and vitamins, the number of times they eat in a day and consumption of adequate diet. While the socio-demographic variables implies age, sex, marital status, highest educational attainment and occupation of the respondents.

When infected with HIV virus the body's immune system works harder to fight infection, this increases energy and nutrient requirements. In the early stages of infection, a person shows no visible signs of illness but later many of the signs of AIDS will become apparent, including weight loss, fever, diarrhea and opportunistic infections such as sore throat and tuberculosis. As a result, the person becomes malnourished, loses weight and is weakened

(Piwoz and Prebel, 2000). Nutrition education at early stage gives the person a chance to build up healthy eating habits and to take action to improve food security in the cultivation, storage and cooking of food. Good nutrition is also vital to help maintain the health and quality of life of the person living with AIDS (Piwoz and Prebel, 2000).

Malnourished people are less likely to benefit from antiretroviral treatment (Zachariah et al, 2006). According to the Open University (2019), poor nutritional status is one of the major complications of HIV and a significant factor that might lead people to develop full-blown AIDS. The Open University further explained that, in place where there are inadequate food supplies, many people who become infected with HIV may already be undernourished and their weakened immune system further increase their vulnerability to infection.

People infected with HIV should make every effort to adopt healthy and balanced nutrition patterns in order to meet their increased protein and energy requirements and maintain their nutritional status (Agriculture and Consumer Protection, 2013). According to an American corporation known primarily as an online publisher of news and information pertaining to human health and well-being [WebMD] (2019), healthy eating for PLWHA include eating a diet high in vegetables, fruits, whole grains, legumes, protein, carbohydrate and a little fat in all meals and snacks. Carbohydrate provides energy to the body, to get enough calories one need to consume 17 calories per pound of the body weight if the weight is maintained, 20 calories per pound if the person has opportunistic infection and 25 calories per pound if the person is losing weight (WebMD, 2019). Protein helps to build muscles, organs and strong immune system. To get enough of the right types of protein an HIV positive man needs to aim for 100 to 150 grams per day, an HIV positive woman need 80 to 100 grams per day, if the person has kidney disease he/she needs not more than 15 to 20% of calories from protein as too much can put stress on the kidneys. In addition, PLWHA should choose extra-lean pork or beef, skinless chicken breast, fish, and spread nut butter on fruits, vegetables, or toast, add cheese to sauces, soups, potatoes, or steamed vegetables, as well as add canned tuna to salads or casseroles (WebMD, 2019).

Vitamins and minerals are essential to keep healthy. They protect against opportunistic infections by ensuring that the lining of skin, lungs and gut remain healthy and that the immune system functions properly. Of special importance are vitamins A, C, E, certain B-group and minerals such as selenium, zinc and iron. A mixed diet should provide enough of these vitamins and minerals. Vitamin A is important to keep the lining of skin, lungs and gut healthy. Vitamin A deficiency increases the severity of disease such as diarrhea while infection will increase the loss of vitamin A from the body. Good vitamin A sources are dark green, yellow orange and red vegetables and fruits. These include spinach, cassava leaves, green peppers, carrots, papaya and mangoes. Vitamin A is also

contained in red palm oil, yellow maize, orange, sweet potatoes, egg yolks and liver (Agriculture and Consumer Protection, 2013). Vitamin C helps to protect the body from infection and aids in recovery. It is found particularly in citrus fruits such as oranges, grapefruit, lemons and mandarins. Guavas, mangoes, tomatoes and potatoes are also good sources of vitamin C. Vitamin E protects cells and aids resistance to infection. Foods containing vitamin E are green leafy vegetables, vegetable oil, peanuts and egg yolks. Vitamin B-group is necessary to keep the immune and nervous system healthy.

Vitamins, however, may be lost from the body through the use of certain medicines for the treatment of tuberculosis. Good food sources include white beans, potatoes, meat, fish, chicken, watermelon, maize, grains, nuts, avocados, broccoli and green leafy vegetables (Agriculture and Consumer Protection, 2013). Iron sources are green leafy vegetables, seed, whole-grain products, dried fruits, sorghum, millet, beans, red meat, chicken, liver, fish, sea food and eggs. Selenium is an important mineral because it helps to activate the immune system. Good sources include whole grains, maize, millet and dairy products such as milk, yoghurt and cheese. Meat, fish, poultry, eggs, peanut butter, dried beans, nuts and other protein-rich foods are also good sources. Zinc is also important for the immune system. Zinc deficiency reduces the appetite. The sources of zinc include meat, fish, poultry, shellfish, whole-grain cereals, maize, beans, peanut, milk and dairy products (Agriculture and Consumer Protection, 2013).

A study was conducted by Mgbekem et al. (2015) to assess the food consumption patterns and nutritional status of people living with HIV in Calabar. It was done in the Heart-to-heart clinic of the General Hospital Calabar using a sample size of 128 (50 males and 78 females), 50 HIV positive individuals on antiretroviral treatment (ART), 50 HIV positive individuals not on ART and 28 non infected individuals control group. Data was collected using physical assessment of height and weight and food frequency questionnaire. The result most pertinent to this study showed that, the most commonly consumed foods were cassava and cassava products, plantain, rice, bread, fish and some fruits and vegetables. Vegetables were consumed only 3 to 6 times a week. It was concluded that, there is complex synergistic relationship between HIV infection and nutrition. Poor food consumption pattern including inadequate micronutrients exposes individuals to opportunistic infections. ART with adequate food consumption could be the cheapest and easiest tool of managing HIV infection especially in resource limited countries like Nigeria and Calabar in particular.

Banwat et al. (2014) carried out a study titled an assessment of the nutritional knowledge, practice and status of adult HIV/AIDS patients attending an ART centre in Jos, North Central Nigeria. It was a cross sectional descriptive study with 250 patients on treatment in APIN clinic selected using systematic sampling technique.

Structured interview-administered questionnaire was used to gather the data. The result most pertinent to this study showed that, majority (55.9%) of the respondents felt protein was the most important food nutrient in their diet, 48% of the respondents spend up to 25 to 50% of their monthly income to ensure they have adequate nutrition, 22.9% stated satiety as the main factor affecting their daily dietary intake while the cost of food item was the major hindrance to ingesting a preferred food group. 45% of the respondents reported fruits and vegetables as the major components of their daily diet. It was concluded that the knowledge and practice of adequate nutritional intake was fairly good among the studied HIV/AIDS patients.

In their study, Onyango et al. (2012) assessed the nutrient status of HIV seropositive individuals attending clinic at Chulaimbo, Sub-district Hospital, Kenya. It was a prospective cohort study with a sample size of 497 HIV seropositive adults. They evaluate nutrient intake using 24 hours recall, food frequency checklist and nutrient status. The results most pertinent to this research study showed that majority of the patients had an average of three meals per day in the month of February, the mean intake of mineral and vitamin was below the recommended daily allowance (RDA) except for iron and thiamine. Majority had variety of vegetables, which may be attributed to vegetables being available and affordable compared to the other sources of food like animal sources. Majority had an inadequate dietary intake. This was because consumption of greater food diversity was not sufficient to reach the RDA. There was no statistical difference in the mean nutrient intake except for thiamine. It was concluded that there was inadequate nutrient intake reported among the HIV patients, except iron.

Martín-Cañavate et al. (2018) carried out a study on the dietary patterns and nutritional status of HIV-infected children and adolescents in El Salvador: A cross-sectional study. The sample size of 307 children and adolescents (2 to 18 years) receiving ART was used. Dietary data were collected through 24 hours recall and through a weekly food frequency questionnaire. The result showed that, more than a third of the study group (33.2%) was stunted, 3.3% were wasted and 10% were overweight or obese. Their diets were predominantly based on a high consumption of cereals, beans, eggs and processed foods and a low consumption of fruits, vegetables and dairy products. It was concluded that, institutionalized children were more likely to adhere to a healthy dietary pattern whereas children in poverty were more likely to have less varied and healthy diets, hence, the need to guide public policies to design healthy life style interventions for this population at risk.

Another study was conducted by Tesfaw et al. (2018) on the dietary diversity and associated factors among HIV positive adult patients attending public health facilities in Motta Town, East Gojjam Zone, Northwest Ethiopia. It was a facility based cross-sectional study design with 410 participants. Data was collected using semi-structured and

pre-tested questionnaire. The result that is related to this study showed that, the predominant food item consumed during this study periods were starchy staples (96.1%) and legumes (81.7%). Mobile cell phones, media exposure status in the household and nutrition counseling were significant factors associated with dietary diversified feeding. It was concluded that, efforts should be strengthened to improve the counseling services at each health institution and encourage the patients to use media for the source of information.

In order to ensure better health for the PLWHA, it is necessary to examine their dietary pattern. Therefore, the objective of this study is to examine the dietary pattern of PLWHA at General Hospital Kafanchan (GHK), Kaduna State, Nigeria. The following research question and hypothesis were developed in this study to provide answer to the problem under investigation.

Research question: What is the dietary pattern of PLWHA?

Hypothesis (H₀): There is no significant association between the socio-demographic characteristics (age, sex, marital status, highest educational attainment, occupation) of respondents and the dietary pattern.

METHODOLOGY

This is an institutional based descriptive survey design conducted at the GHK, Kaduna State, Nigeria. Kaduna State is one of the 36 states in Nigeria. The average number of PLWHA (1,766) that attended the ART clinic of GHK within a month was used for the study population. Systematic sampling technique using the attendance register as a sampling frame was used to draw the sample for the study and a sample size of 422 was obtained. Researcher-developed questionnaire was formed from literature search on the dietary pattern of PLWHA. A consultant physician in the HIV unit and two senior lecturers from the Department of Nursing Sciences University of Nigeria, Nsukka were given a copy of the instrument, purpose of the study and the research questions to assess the relevance of content, clarity of statements and logical accuracy of the instrument so as to establish the content validity. These specialists made various suggestions which were used to modify the questions before administration. To establish the reliability of the instrument, it was pilot tested on 42 PLWHA attending Rural hospital Kaura, Kaduna State. The data collected was analyzed using Spearman-Brown coefficient which gave a correlation coefficient of 0.81. Two trained research assistants from the ART clinic were used to assist the researcher with data collection in order to ensure objectivity and confidentiality. The researcher and the research assistants administered the questionnaire to each participant that met the inclusion criteria as they

Table 1. Dietary pattern of PLWHA (n = 412).

Items	F	%
Appetite for the past one month?		
Very Good	39	9.5
Good	299	72.6
Fair	53	12.9
Poor	21	5.1
Consumption of food rich in minerals and vitamins such as fruits and vegetables?		
Very Good	300	72.8
Good	112	27.2
Fair	0	0.0
Poor	0	0.0
Frequency of eating per day?		
Once	8	1.9
Twice	59	14.3
Three Times	225	54.6
Four Times or More	120	29.1
Frequency of taking adequate diet (having adequate amount of carbohydrate, protein, fat, vitamins (fruits and vegetables), roughages in one meal)?		
Once a Day	210	51.0
2-3 Times a Day	102	24.8
Once a Week	2	0.5
2-3 Times a Week	98	23.8

waited to be attended to in the clinic. For those who could not read and/or write, the researcher and the research assistants helped by interviewing the respondents guided strictly by the contents of the instrument and filled in the responses objectively as possible. Data collection lasted for a period of one month. The data were analyzed descriptively using frequency and percentages while chi-square was used to test for association. All the analyses were carried out using statistical package for social sciences (SPSS) version 20.0 computer software programme (SPSS inc.IL: Chicago, USA). Ethical approval was obtained from the ethical committee of Kaduna State Ministry of Health. All participants were fully informed of the objective and design of the study and a written consent was obtained for each participant before participating in the study. Respondents were assured that confidentiality and anonymity will be maintained in all information given.

RESULTS

As presented in Table 1, 9.5% which represented 39 respondents indicated having very good appetite for the past one month, 72.6% respondents representing 299 indicated good appetite for the past one month, 12.9% respondents representing 53 indicated fair appetite for the

past one month, while 5.1% respondents representing 21 indicated poor appetite for the past one month.

On consumption of food rich in minerals and vitamins such as fruits and vegetables, 72.8% representing 300 respondents described it as very good while 27.2% respondents representing 112 described it as good.

With regards to the frequency of eating per day, 1.9% respondents representing 8 fell in the category of once in a day, 14.3% representing 59 respondents fell in the category of twice per day, 54.6% representing 225 respondents captured thrice daily while 29.1% representing 120 respondents described it as four times or more daily.

In response to the frequency of taking adequate diet, 51% representing 210 respondents indicated that they take adequate diet once a day, 24.8% representing 102 respondents indicated that they take adequate diet 2 to 3 times daily, 0.5% representing 2 respondents indicated that they take adequate diet once a week while 23.8% representing 98 respondents indicated that they take adequate diet 2 to 3 times a week.

The result on Table 2 shows that there is no significant association between the respondent's age, sex, marital status and highest educational attainment with their dietary patterns ($p > 0.05$). But occupation of the respondents was significantly associated with the dietary pattern ($p = 0.000$).

Table 2. Chi-square test of association between the socio-demographic variables (age, sex, marital status, highest educational attainment, occupation) and the dietary pattern of PLWHA (n = 412).

Variable	Dietary Pattern			Total	X ²	P-value
	Very good	Good	Poor			
Age						
18-32years	3	33	5	41	2.689	0.847
33-47years	14	107	29	150		
48-62years	16	110	31	157		
63-77years	6	49	9	64		
Sex						
Female	21	215	52	288	5.354	0.069
Male	18	84	22	124		
Marital Status						
Married	30	236	60	326	0.293	0.864
Single	9	63	14	86		
Highest Educational Attainment						
None	7	37	8	52	4.168	0.654
Primary	7	73	24	104		
Secondary	17	133	28	178		
Tertiary	8	56	14	78		
Occupation						
Farming	9	128	19	156	33.588	0.000
Business	22	99	44	165		
Civil servant	8	40	11	59		
Student	0	24	0	24		
Housewife	0	8	0	8		

DISCUSSION

Majority of the respondents have good dietary pattern, good appetite for food and consumption of food rich in minerals and vitamins such as fruits and vegetables was very good. This is because of the nutritional education they often receive in the clinic on the importance of consumption of fruits and vegetables. The finding of Banwat et al. (2014) is in line with this finding that 45% of the respondents reported fruits and vegetables as the major components of their daily diet. The finding of Onyango et al. (2012) also supported this finding that, the most common consumed food sources were vegetables. This may be due to the vegetables being available and affordable in relation to the other sources of food like animal sources. However, contrary is the finding by Mgbekem et al. (2015) which revealed that, vegetables were consumed only 3 to 6 times a week. This could be associated with ignorance on the importance of vegetables by the respondents as a good number (50) of them were not yet on ART, hence, they may have not started benefiting from nutritional education counseling in the ART clinic.

With regard to the frequency of eating per day, majority of the respondents took three meals per day. This could be attributed to the fact that, the inhabitants of the study area are agrarian, hence, there is availability and access to affordable foods for the PLWHA in the area. In addition, majority of the respondents (307) falls within the age range of 33 to 62. This implies that they are working class people with a source of income and capable of providing the needed food for themselves. The finding of Onyango et al. (2012) supported this finding that majority of the patients had an average of three meals per day in the month of February even though the frequency reduced in the month of July. In contrast were the findings of Martín-Cañavate et al. (2018) that, more than a third of the study group (33.2%) was stunted, 3.3% were wasted and 10% were overweight or obese. These could be attributed to the study population being HIV children and adolescents who depends on others for their feeding.

Few respondents eat once a day. This could be due to the fact that 52 respondents indicated that they had no formal education, hence, it may be difficult for them to adhere to the dietary advice given to them at the ART clinic. Some may be poor to the extent that they may not

be able to provide more frequent meals for themselves. It is important to note that, poor dietary pattern can speed the HIV infection progression. Banwat et al. (2014) supported this finding that, 22.9% of the respondents stated satiety as the main factor affecting their daily dietary intake.

Average number (51%) representing 210 respondents take adequate diet (having enough amount of carbohydrate, protein, fat, vitamins and roughages) once a day. This could be attributed to ignorance on the side of the respondents on the preparation of adequate diet, as diversified farming is the dominant occupation in the study area. In support of this finding is the finding of Martín-Cañavate et al. (2018) that, diets were predominantly based on a high consumption of cereals, beans, eggs and processed foods. Banwat et al. (2014) also supported this finding that, majority (55.9%) of the respondents felt protein was the most important food nutrient in their diet, 48% of the respondents spend up to 25 to 50% of their monthly income to ensure they have adequate nutrition. The finding is further supported by the finding of Mgbekem et al. (2015) that, the most commonly consumed foods were cassava and cassava products, plantain, rice, bread, fish and some fruits and vegetables. A combination of these foods can give adequate diet. However, it was concluded that, institutionalized children were more likely to adhere to a healthy dietary pattern whereas children in poverty were more likely to have less varied and healthy diets. The finding of Tesfaw et al. (2018) is in contrast that, the predominant food item consumed during their study periods were starchy staples (96.1%) legumes (81.7%), which was attributed to media exposure, as the adults respondents who had media exposure were two times more likely to get good diversified diet compared to their counterparts. Also contrary to the finding is that of Onyango et al. (2012) that majority had an inadequate dietary intake. This was because consumption of greater food diversity was not sufficient to reach the recommended daily allowance.

The occupation of the respondents showed significant association with the dietary pattern. This is because the occupation of a good number of respondents was farming; others were students and house wives. PLWHA who were farmers were likely to be ignorant of adequate diet, and/or how to go about it. Significant number of PLWHA had primary education as their highest educational attainment. This means that their source of income is low thereby limiting their economic ability to purchase adequate food. This is a fact in this study as the frequency of taking adequate diet was low compared with the frequency at which meals were taken by the respondents. Even though the finding of Onyango et al. (2012) is in contrast, except for thiamine, there was no statistical difference in the mean nutrient intake. In contrast to the finding in this research, Tesfaw et al. (2018) noted that mobile cell phones, media exposure status in the household and nutrition counseling were significant factors associated with dietary diversified feeding.

Conclusion

Dietary pattern of PLWHA implies what they eat in terms of their appetite, consumption of food rich in minerals and vitamins, the number of times they eat in a day and consumption of adequate diet. Even though consumption of food rich in minerals and vitamins such as fruits and vegetables was described as very good by most of the respondents (72.8%), majority of the respondents have average dietary pattern. There is no significant association between age, sex, marital status and educational attainment and the dietary pattern of PLWHA ($p > 0.05$); but occupation of the respondents was found to have significant association ($p = 0.000$).

Recommendations

Based on the findings of this study, it was recommended that there is need for health workers to continue to enlighten PLWHA on the importance of consuming adequate diet. People infected with HIV should make every effort to adopt healthy and balanced nutrition patterns in order to meet their increased protein and energy requirements and maintain their nutritional status.

CONFLICT OF INTEREST

The author declares no conflict of interest.

REFERENCES

- Agriculture and Consumer Protection (2013). Special eating needs for people living with HIV/AIDS. Retrieved 11th May, 2014 from http://www.fao.org/3/y4168e/y4168e06.htm#P196_27560.
- AVERT (2019). HIV and AIDS in East and Southern Africa region overview. Retrieved 30th October, 2019 from <https://www.avert.org/professionals/hiv-around-world/sub-saharan-africa/overview>.
- Banwat, M. E., Yakubu, N. W., Olalude, E. O., & Ogunsakin, J. A. (2014). An Assessment of the nutritional knowledge, practice and status of adult HIV/AIDS patients attending an Art Centre in Jos, North Central Nigeria. *African Journal of Food Science and Technology*, 5(7), 156-162.
- Martín-Cañavate, R., Sonogo, M., Sagrado, M. J., Escobar, G., Rivas, E., Ayala, S., Castaneda, L., Aparicio, P., & Custodio, E. (2018). Dietary patterns and nutritional status of HIV-infected children and adolescents in El Salvador: A cross-sectional study. *PLoS one*, 13(5), e0196380.
- Mgbekem, M., Item, A., Emon, U. D., Ukam, N., Ojong, M., John, M. E., Eyong, U. E., & Chiotu, C. N. (2015). Food consumption patterns and nutritional status of people living with HIV in Calabar. *Pakistan Journal of Nutrition*, 14(10), 727-734.
- Onyango, A. C., Walingo, M. K., Mbagaya, G., & Kakai, R. (2012). Assessing nutrient intake and nutrient status of HIV seropositive patients attending clinic at Chulaimbo Sub-District Hospital, Kenya. *Journal of Nutrition and Metabolism*, Volume 2012, Article ID 306530, 6 pages.

- Piwoz, E., & Prebel, E. (2000). The benefits of good nutrition for people living with HIV/AIDS. Retrieved 30th October 2019 from <http://www.fao.org/3/y4168e/y4168e04.htm#TopOfPage>.
- Tesfaw, A., Jara, D., & Temesgen, H. (2018). Dietary Diversity and Associated Factors among HIV Positive Adult Patients Attending Public Health Facilities in Motta Town, East Gojjam Zone, Northwest Ethiopia, 2017. *Advances in Public Health*, vol. 2018, Article ID 6135482, 8 pages.
- The Open University (2019). Nutrition module: 12. HIV and Nutrition. Retrieved 12th November, 2019 from <https://www.open.edu/openlearncreate/mod/oucontent/view.php?id=325&printable=1>.
- UNAIDS (2019a). Global HIV & AIDS statistics – 2019 Fact Sheet. Retrieved 27th October, 2019 from <https://www.unaids.org/en/resources/fact-sheet>.
- UNAIDS (2019b). New survey results indicate that Nigeria has an HIV prevalence of 1.4%. Press Release. Retrieved 30th October, 2019 from https://www.unaids.org/en/resources/presscentre/pressreleasesandstatementarchive/2019/march/20190314_nigeria.
- WebMD (2019). Nutrition and HIV/AIDS. Retrieved 12th November, 2019 Available at <https://www.webmd.com/hiv-aids/guide/nutrition-hiv-aids-enhancing-quality-life#1>
- Zachariah, R., Fitzgerald, M., Massaquoi, M., Pasulani, O., Arnould, L., Makombe, S., & Harries, A. D. (2006). Risk factors for high early mortality in patients on antiretroviral treatment in a rural district of Malawi. *Aids*, 20(18), 2355-2360.