HIV/AIDS in Lagos State: An Assessment of its Catastrophic Health Expenditure effect on Household in Lagos State, Nigeria

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Abstract
The debates on the impact of HIV/AIDS and its concomitant health care spending on households' welfare has been ongoing for decades. Households are feeling the adverse effect of the burden of AIDS with respect to loss of their productive members, increased out-of-pocket expenditure and temporary or permanent loss of earnings. Consequent upon these, this study investigates the impact of HIV/AIDS and its associate catastrophic health expenditure on households' income in Lagos State, Nigeria. The dataset was drawn from 780 people living with HIV/AIDS in eight medical centre's. The information is analyzed using descriptive statistics and logistic regression technique. The finding indicates that HIV/AIDS affected households experience catastrophic health care spending. Though, more predominant among households with female headship. Furthermore, the logistic regression results reveal that, household income is negatively and significantly impacted by asset sale, productive members infection, unemployment, man-hour loss, caregiver activities, underage labour and death of victim. Based on the outcomes, the study suggests that government as a matter of concern should put in place, policies that would protect household against financial shock cause by chronic illnesses.

***Keywords*:** HIV/AIDS, Catastrophic Health Expenditure, Household Income, Logistic Regression

JEL Classifications: D1, I12, J10

Introduction
For more than three decades, one of the epidemics that threaten the social fabric of most nations especially developing countries is the HIV/AIDS scourge. AIDS is a chronic life-threatening illness caused by an etiologic virus called Human Immuno-deficiency Virus (HIV). The HIV illness has evolved from just a merely health issue to a serious developmental problem. The epidemic has morphed into a leading reversal of human development in man's history, as it has drastically reduced life's expectancy and negated gains in human capital development and aggregate output growth in the worst hit

countries (Osobase, 2016). Globally, about 36.9 million people are living with HIV/AIDS (PLWHAs), while 940,000 people have died of AIDS related illness in 2017 (Joint United Nations Programme on HIV/AIDS [UNAIDS], 2018; World Health Organisation [WHO], 2018). From these statistics, Nigeria accounts for 8.4 per cent of HIV/AIDS cases (3.1 million PLWHAs) and 16 percent (150, 000) of AIDS related-death cases. Based on the above facts, Nigeria is ascribed as one of the nations with the highest new infection rate in sub-Saharan Africa nations and second largest country burden with HIV epidemic globally (UNAIDS report, 2018).

The first HIV case in Nigeria was recorded in 1986 in Lagos state (Nasidi & Harry, 2007; Awofala & Ogundele, 2016). Since then, Lagos is plagued with high HIV/AIDS infection rate and several AIDS-related death. For instance, with an estimated population of 20 million people (end of 2015) and HIV prevalence rate of 4.1 per cent (end of 2015), Lagos state is pegged among the top twenty states with high HIV incidence (Olofinji, 2015; Obinna, & Olowoopejo, 2016 & NACA, 2018). Recently, six states in Nigeria account for 41% of PLWHAs, these include: Kaduna, Akwa Ibom, Benue, Oyo, Kano and Lagos (National Agency for the Control of AIDS [NACA], 2017 & Avert, 2018). These reports show that Lagos is still facing high HIV incidence, despite the state government effort to reduce the spread of the illness. Though, quite a number of factors have been adjudged to be responsible for this high prevalence. Top among these, are the daily migration of people from others states and nations, rising poverty and unemployment rate and high population growth (Lagos State AIDS Control Agency, 2012; Samuels et al., 2012).

As pointed out earlier, the individuals and households are the most vulnerable to HIV/AIDS scourge. The household shocks relate to the fact that the most economically active members, who are household heads or preparing to assume the role of household heads are mostly affected. The psychological and emotional effects, as well as other opportunistic infections, linked with the illness negatively affect the sick person's ability to participate actively in productive activities. The time off from work or continuous drop in working hours, implies decline in the financial contribution of that individual to household income. This might translate to continuous drop in income or permanent income loss when AIDS mortality occurs. In much same way, household experiences income shock when other adult members spend less time in productive activities or leave the labour force to care for the sick. The man-hour loss due to care giving activity and absent from work affects household production and earnings.

From another perspective, income yielding assets are diverted for the purpose of financing new financial demand resulting from health treatment and expenditure. The rise in health-related expenditure above a certain income level, gives rise to what is called catastrophic health expenditure/spending (CHE). In the words of Puteh and Almualm (2017), CHE refers to health care expenditure that threaten the household's financial capacity to maintain and sustain its subsistence needs. To buttress the above, Sharifa, Wan and Yasmin (2017) opined that CHE is any spending on health treatment that stands as a threat to household financial resources, preventing the household from maintaining the basic subsistence needs. That is, CHE occur when total health care expenditure is greater that a distinct level of household income, thereby expenditures for shelter, education, etc, are diverted or utilized for health care upkeep. Throwing more light on the issue, World Health Organisation (WHO) report stress that, once health spending or out-of-pocket expenditure (OPE) is equal or greater than 40 percent of household's non-subsistence income, CHE is experienced (WHO, 2016).

The phenomenon of CHE is identified by Etiaba et al. (2016) to have adverse effect on HIV/AIDS affected households because of the chronic-nature and health expenditure-demand of the illness. For instance, when household spend equal or more than 40 percent of their financial resource on health care, this act reduces expenditure for other basic needs (such as food, rent, tuition fees, transport fare, etc). The expenditure-switch in favour of health-care demand might also undermine household productive asset, thus, causing household to be financially incapacitated to actively involved in viable productive activities. This phenomenon will further promote income decline and purchasing power instability especially among households living at the threshold or below the poverty-line.

Based on the aforementioned analysis, there are ample studies on the impact of HIV/AIDS scourge on household means of livelihoods (see Iya et al., 2012; Musinguzi, 2012; Natalia et al., 2014; Etiaba et al., 2016 & Onwujekwe et al., 2016). But only few (Adeyemi, 2007 & Samuels et al., 2012) have centred on HIV/AIDS vulnerabilities, family support systems and social protection responses in Lagos state. By and large, these studies have shown that certain factors are responsible for household susceptibilities to HIV/AIDS, without taking an in-depth analysis of the cost-burden of the illness on household. Therefore, it is reasonable to cover up for this scholarly gap, by exploiting the impact of HIV/AIDS via catastrophic health-expenditure on household income in Lagos State of Nigeria. More importantly, this study is germane as it throws more light on how the duration of living with HIV/AIDS and rising health-care cost bring about income loss among affected households. Similarly, it will aid

proper policies formulation by the State and Federal government on how to assist households facing CHE. Furthermore, it addresses issues relating to mean income and expenditure levels of households affected with HIV/AIDS and coping strategies adopted by these households. This study is designed into five parts: section one deals with the introduction; section two, literature review; section three, research methodology; section four, result presentation and discussion, while section five is the conclusion and recommendations.

Literature Review

There is a growing literature on increasing health expenditure caused by HIV/AIDS incidence and the concomitant effect on household means of livelihoods (Barennes et al., 2015; Onwujekwe et al., 2016; Poudel et al., 2017). Some of such studies are reiterated herein.

For instance, in Limpopo province of South Africa, Oni et al. (2001) conducted a survey on seven villages using a random sampling of 680 respondents. The T-tests revealed that HIV/AIDS bring about direct loss of annual income of the sick person; loss of earnings by caregivers, as well as financial loss faced by non-caregiver members of the households. The authors appeal to the government to put up poverty eradication programmes and projects, especially in rural areas so as to consolidate household income-based. In the same vein, Naidu and Harris (2006) estimated the cost of HIV/AIDS burden on 113 households in urban Soweto of South Africa. The descriptive statistics result suggests that financial expenditure of morbidity and mortality is approximately two to three times higher for affected households as against non-affected households. Also, the finding indicates that the financial expenses incur by all households from AIDS mortality is 15 times greater than the expenditure experience from other forms of morbidity.

Accordingly, Collins and Leibbrandt (2007) employed 152 respondents to estimate the financial impact of HIV/AIDS on poor households in three low income provinces (Langa, Diepsloot & Lugangeni) in South Africa. The findings from the descriptive statistics suggested that funeral expenditure takes almost seven months of income earned by household. Also, it was observed that about 80 per cent of the household might lose half or more of their household income when the highest income earner dies. Going by the result, the authors suggest that households are completely uninsured and called for innovative financial tools that will be beneficial to address this inadequacy. In like manner, Musinguzi (2012) using a cross sectional survey of 613 HIV/AIDS respondents, studied the impact of HIV/AIDS on household food production in Bushanyi district of Uganda. The multinomial logit regression result indicates that head of household age, educational level, religion and

different forms of income have significant impact on the effect of HIV/AIDS on food production of households. Also, the further finding indicate that HIV/AIDS diminishes earning of affected households.

In view of other studies, Zhang et al. (2012) utilized 866 PLWHAs to examined the factors associated with per capita income (PCI) of households in three provinces (Yunnan, Anhui & Henan) of rural China. The linear regression result shows that occupation status, large family size and HIV status of respondents have significant impact on household per capita income. However, age, gender, educational level, number of PLWHAs and role of respondents in the household do not significantly associate with household income per capita. Therefore, the authors called for improved work place policy and government initiative so as to increase income of PLWHAs and help reduce the economic burden of HIV/AIDS on households. In a related study, Natalia et al. (2014) assessed the impact of HIV/AIDS on household income in Dodoma Municipal in Tanzanian using a random sample of 150 PLWHAs. The finding from the descriptive statistics indicates that respondents with low financial status experiences income decline due to greater part of their income (62%) spent on medications and transportation. However, income fall is more predominant among high financial status respondents as they spend 64 per cent of their income on special foods and transportation. Therefore, authors called for joint multidisciplinary efforts from all stakeholders (Non-government and government organisations) to overcome the problems of HIV/AIDS.

In a similar manner, Osobase et al. (2018) investigated the impact of HIV/AIDS on household income in Lagos State of Nigeria, using a sample size of 891 respondents. The study employed descriptive statistics and logistic regression analysis for the empirical analysis. The findings indicate that asset sales, health care expenditure and productivity loss significantly increase income decline among the sampled households. In contrary, remittance was found to significantly reduce the odd of income decline. Based on the findings, the study called for more empowerment programme and cash transfer package for households accommodating PLWHAs.
As well, Barennes et al. (2015) carried out a survey on out-of-pocket (OOP) expenditure among 320 PLWHAs in Lao People Democratic Republic, using 150 respondents affected with catastrophic health expenditure. The multivariate outcome suggested that ethnic group, being poor and long distance away from medical centre increases the odd of catastrophic health expenditure (CHE) among respondents. However, highest wealth quartile, living alone and being on antiretroviral treatment (ART) reduces it. In like manner, Etiaba et al. (2016) investigated the burden of CHE on 1500

HIV/AIDS households in three states (Anambra, Akwa Ibom and Adamawa) of Nigeria. The chi-square result shows that HIV/AIDS health care spending have catastrophic effect on household's welfare at 10 and 40 per cent thresholds in all three states. Coupled with other studies, Onwujekwe et al. (2016) examined the burden of HIV/AIDS expenditure on households using 1200 PLWHAs in three states of Nigeria. Based on the chi-square result, it is observed that rural participants incurred more CHE than their urban counterparts. However, urban dwellers spend more on medical care than the rural participants. Following this outcome, the authors suggested that policy and programme that will reduce the burden of CHE on income of PLWHAs and their households should be carried out.

Along similar line, Poudel et al. (2017) assessed the economic burden of HIV/AIDS on 415 PLWHAs in six districts of Nepal. The regression results submitted that occupation, household income, respondent's health status, residential districts etc. are key determinants of HIV/AIDS direct costs. While ethnicity, respondent's health status, resident districts and sexual orientation are major determinants of household's productivity costs. In conclusion, the study called for provision of income generating program and social support for individuals and household's affected by HIV illness.

Following the extant studies revealed, it is observed that there is still scanty literature on the impact of HIV/AIDS on household welfare in Lagos state especially dealing with catastrophic health expenditure which this study is focus on. This view, therefore makes this study unique and worth undertaking.

Research Methodology

Theoretical Framework and Model Specification

This study draws from the simple Neoclassical growth model to explain the link between HIV/AIDS health spending and household income (See Cuddington, 1993a; Masha, 2004; Ojha & Pradhan, 2010). Taking it from the micro level, household income (Y_{it}) is express as a function of capital (K_{it}), labour (L_{it}), and technological progress (A). Where 'i' and 't' imply household 'i' at time 't'. Mathematically, this is depicted as;

$$Y_{it} = f(K_{it}, L_{it}, A_t) \quad (1)$$

Following the works of Knowle and Owen (1995), Ojha and Pradhan (2010) and Ngepah (2012), both capital (K_{it}) and labour (L_{it}) are disaggregated respectively. Capital is divided into human capital (HC) and physicals/productive capital (PH). However, labour is split into healthy labour

(HL) and unhealthy labour (UL). Re-writing equation (1), this will take this form:

$$Y= f (HC_{it}, PH_{it}, HL_{it},, UL_{it} , A_{it}) \quad (2)$$

The equation (2) is a unified theoretical framework that is augmented with selected socio-economic and demographic variables (DV) as obtained from extant literature (See Iya et al., 2012; Musinguzi, 2012; Zhang et al., 2012 & Osobase et al., 2018). The equation (2) informs the model specification and is redefine as:

$$Y= \beta_0 + \beta_1 HC_{it} + \beta_2 PH_{it} + \beta_3 HL_{it} + \beta_4 UL_{it} + \beta_5 A_{it} + \beta_6 DV \quad (3)$$

The demographic variables (DV_{it}) are decomposed into duration living with HIV/AIDS ($DLHA_{it}$), sex of household head ($SexH_{it}$), employment status of household head (ES_{it}), out-of-pocket health expenditure (OPEX), man-hour loss due to absence from work (Mhl_{it}), caregiving activities (CG_{it}), government support via free access to medical drugs and services ($GVSU_{sit}$), under age labour ($UAGE_{it}$) and AIDS related death (DEA_{it}). Rewriting equation (3), will give:

$$Y= \beta_0 + \beta_1 HC_{it} + \beta_2 PH_{it} + \beta_3 HL_{it} + \beta_4 UL_{it} + \beta_5 A_{it} + \beta_6 DLHA_{it} + \beta_7 SexHt_{it} + \beta_8 ES_{it} + \beta_9 OPEX_{it} + \beta_{10} MHl_{it} + \beta_{11} CG_{it} + \beta_{12} GVSUt_{it} + \beta_{13} UAGE_{cit} + \beta_{14} DEA_{it} + \varepsilon \quad (4)$$

Where;

Y_{it}: Household income level. This refers to the total income earned/received by the adults' household members (see Iya et al., 2012; Zhang et al., 2012). The household income in equation 1.4, is estimated by comparing the income level before the HIV illness and the current income level of the household. When the difference between the income level before the illness and current level is negative, one (1) is assign to such variable, otherwise, positive value will take a dummy variable of zero (0).

HC_{it}: Human capital variable captures the educational status of the household head (Adeoti & Adeoti, 2008; Musinguzi, 2012). The educational level is key in the model because it determines which participant (educated or not-educated), experiences income decline the most. It takes the value one, if the household head has no formal education and zero otherwise.

PH_{it}: The physical or productive capital (HP) measures the household asset holding (Oni et al., 2001; Iya et al., 2012). The illness may impact on asset through its possible sale. This takes the value one, if the household sell asset or else zero.

HL_{itt}: The healthy labour variable captures the household member(s) within ages 18–60, who are not infected with the HIV virus (Oni et al., 2001; Hilhorst et al., 2004; Zhang et al., 2012). This takes the value one, if there is one productive adult member, and otherwise zero, if there are more than one economic active members in the household.

UL_{it}: Unhealthy labour captures household member(s) within 18–60 years infected with HIV/AIDS (Oni et al., 2001; Hilhorst et al., 2004; Zhang et al., 2012). This includes the respondent. It takes the value zero if the respondent is the only person infected with HIV, otherwise one, if more than one adult is infected.

A_{it}: The technological progress variable capture household head current or past work experience (Mbaeh et al., 2015). It takes the value one, if there is no work experience and zero otherwise.

$DLHA_{it}$: Duration of living with HIV/AIDS: It capture the number of years that the respondents has been living with the illness (Zhang et al., 2012).

$SexHt_{it}$: Sex of household head. Sex as an explanatory variable is crucial, because it reveals who is more vulnerable to the scourge (Musinguzi, 2012). One is assigned to female head while zero to male head.

ES: Employment status of household head (See Ojha & Pradhan, 2010). It is included in the model to shows which status experience income decline the most. Thus, one is assigned to unemployed household head while zero to employed.

$OPEX_{it}$: Out-of-pocket-expenditure. This captures the amount spend by household on health care-related issues due to the illness. When health expenditure is equal to 40 or above 40 percent of non-food spending, catastrophic health spending has occurred (WHO, 2016; Sharifa et al., 2017). Thus, one is assigned to health expenditure above 40% of non-food spending, otherwise zero for spending below 40 percent.

Mh_{it}: Man-hour loss; these variable captures labour loss by the respondent due to absence from work as a result of the illness (Ghailan et al., 2010). One is assigned to loss of productive time due to the illness, if not zero.

CG_{it}: Caregiving activities. It measures the time spent to take care of the sick member by other household member/s not infected with the ill (Pitayanon et al., 1994; Iya et al., 2012). This takes the value one if caregiver activity is present otherwise zero.

$GVSU_{it}$: Government, NGOs and other establishments free medical services and drugs. It takes the value one, if the participant has no access to free drugs and medical services otherwise zero.

$UAGE_{it}$: Underage labour or household member/s working for a living. Present of under-age labour in the household will take the value one likewise zero.

DEA: Death due to AIDS related illness (see Zhang et al., 2012). It captures the number of household member/s that has died due to AIDS illness. Thus, one is assigned to AIDS mortality in the household otherwise zero if no mortality is experienced.

β_0: Intercept

β_1, β_2, β_3, β_4, …, β_{14}: Regression parameters of predictor variables.

ε: Error term.

Research Design

To obtain the target respondents and right responses, both descriptive survey design and group-administered survey (GAS) were employed for the field survey. Both approaches are site-based surveys which avail the researchers the opportunity to administer questionnaire to each respondent in the various medical centres. These methods enable the respondents to ask questions about the survey and such responses are documented.

Area of Study

The study is carried out in Lagos State of Nigeria. The State is ascribed the second most populous state and still remain the commercial hub of the nation (Olusegun, 2010; LSASA, 2009/10; Lagos State Economics and Financial Update-report, 2013). As noted by Samuels et al., (2012), Lagos is located within the South West States (SWS) of Nigeria and classified as one burdened with high HIV/AIDS prevalence rate (NACA, 2014). As at 2010/11, the State HIV/AIDS prevalence rate was pegged at 5.1 per cent, with an urban prevalence rate of 5.9 per cent (LSACA, 2012). According to the report of Lagos Bureau of Statistics ([LBS], 2016), 9% of Lagosians are illiterate, and 2% of school-age (2–17 years) children are out of school. Still, Lagos unemployment rate is given as 15%, with a Senatorial spread as 14%, 15% and 16% in Lagos Central, Lagos East and Lagos West districts, respectively. The LBS report as well states that given the same Senatorial distribution, 8%, 11%, and 9% of household heads are unable to provide necessities to the members of their families on food, clothing, and shelter, respectively. While 10% of Lagosians live in partially completed and uncompleted buildings, 77% of Lagos residents are tenants, and 50% of Lagosians still use an unconventional method of electricity (Akinyetun, Alausa, Odeyemi & Ahoton, 2021). Lastly,

the state comprises twenty (20) Local Government Areas (LGAs), in which the sample size is drawn.

Sampling Technique

The study was a cross-sectional site-based survey of PLWHAs in eight Local Government Areas (LGAs), randomly selected. These LGAs are: Ajeromi-Ifelodun**,** Alimosho, Eti-Osa, Lagos Island, Lagos Mainland, Surulere, Ikeja and Ojo**.** Similarly, purposive sampling was employed to draw eight treatment and medical centres/sites. The selected centres are Ajeromi General Hospital (Ajeromi), Alimosho General Hospital (Alimosho), Police Hospital Falomo (Eti-Osa), Ikeja General Hospital (Ikeja), General hospital (Lagos Island), Military Hospital, Yaba (Lagos Mainland), Nigeria Navy Hospital (Ojo) and Swann Support Group in Ojuelegba (Surulere). The study area were selected due to high HIV/AIDS prevalence burden and easy access of data from Network of People Living with HIV/AIDS (NEWPLAN) in the State. The target population comprised PLWHAs, who are registered members in the various treatment centres in Lagos State. The accessible population are adult male and female within age 18 - 65 years.

Sample Size Determination and Instrument

The Bartlett, Kotrlik and Higgins (2001) table for sample size determination was adopted to determine the respondents. Thus, Bartlett et al. (2001) noted that a sample size of 384 is appropriate for any study that the population figure is greater than 10, 000. The study therefore, employed convenient sampling technique to draw 1200 respondents for the analysis. From each treatment site, 150 respondents were drawn to make up the aggregate sum of 1200. The unit of analysis used in the study is HIV/AIDS infected individual or any adult individual, who is a representative of the affected household. The targeted household is defined as household where at least one family member had been lost to AIDS related illness, household in which one family member had suffered from HIV/AIDS illness and household that had suffered the impact of both illness and death over the last five years (Agatha, Walingo & Othuon, 2010).

As noted, each household has two informants, who are within the age group of 18 - 65 years, as classified by the International Labour Organisation (ILO) reports (2006, 2015) as the economic active population of a country. The data was collected by means of structured questionnaires. The closed-ended questions were mostly adopted because they provided an opportunity for a wide range of geographical area to be covered.

On ethical ground, clearance letters were obtained from the following institutions: University of Lagos, Akoka, Lagos State Health Service Commission (LSHSC), Lagos State AIDS Control Agency (LSACA) and Network of People Living With HIV/AIDS (NEPWHANs). The researchers employed eight (8) counsellors who assisted in the field survey. The counsellors were given stipend while respondents were served snacks for the time spent in completing the questionnaires.

Method of Data Analysis.

The binary logistic regression (BLR) technique is employs to predict the odd of income decline among household in Lagos state. The BLR is a type of regression which is applied when the predicted variable is dichotomy while the predictors are of any form (Hosmer & Lemeshow, 2000). As noted by Roy and Guria (2008), BLR usually applies the Maximum Likelihood Estimation (MLE) after the dependent variable is transformed into logit variable. More explicitly, the dependent variable in logistic regression function usually takes the value of one (1) with a probability of success ω or otherwise zero (0) with a probability of failure as 1 – ω. Using equation (4), the task of estimating the parameters is achieved by using log-odd ratio such that:

Odds = ω_i = Aggregate household income decrease due to HIV/AIDS illness (5)

1 - ω_i Aggregate household income do not decrease due to HIV/AIDS illness.

$$\text{Logit}(\omega_i) = \beta_0 + \beta_1 HC_{it} + \beta_2 PH_{it} + \beta_3 HL_{it} + \beta_4 UL_{it} + \beta_5 A_{it} + \beta_6 DLHA_{it} + \beta_7 SexHt_{it} + \beta_8 ES_{it} + \beta_9 OPEX_{it} + \beta_{10} MDL_{it} + \beta_{11} CG_{it} + \beta_{12} GVSUt_{it} + \beta_{13} UA_{cit} + \beta_{14} DEA_{it} + \varepsilon \quad (6)$$

Therefore, equations (5) and (6) were re-specified as:

$$\text{Odds} = \frac{\omega_i}{} = \beta_0 + \beta_1 HC_{it} + \beta_2 PH_{it} + \beta_3 HL\_AO_{it} + \beta_4 UL_{it} + \beta_5 A_{it} + \beta_6 DLHA_{it} + \beta_7 SexHt_{it}\ 1\text{-}\omega_i + \beta_8 ES_{it} + \beta_9 OPEX_{it} + \beta_{10} MDL_{it} + \beta_{11} CG_{it} + \beta_{12} GVSUt_{it} + \beta_{13} UA_{cit} + \beta_{14} DEA_{it} + \varepsilon \quad (7)$$

The BLR is justified for the study, based on the fact that it is very robust and it proves to be an effective tool of estimating predicted variable from the probabilities of dichotomous and demographic variables. Similarly, this technique has been tested to be useful clinically (Yussuff *et al*., 2012), especially in this form of research where the estimated outcome is the probability of occurrence of an event to the probability of it not occurring

(William *et al*., 1993). Furthermore, the Statistical Package for Social Sciences (SPSS, 20.0) was employed for the empirical analyses.

Presentation and Discussion of Results

Overall, the finding shows that 1200 questionnaires distributed, only 780 copies were deemed valid which represent 65 percent response rate. Quite shocking, 64% of the participants receive treatment outside the LGAs of their residence (see Appendix one). Interestingly, most of the respondents are female, within age group 36-41 years, and married. About 45% of the respondents are from Yoruba ethnic group while petty traders dominate the survey. Male household head's dominate the study and a greater percentage (86) of them have one form of education or the other. About 62% of the participants (males) are employed in one form of occupational activities or another. Over two-quarters of the respondents are from household size of five (5) and above. A good number of the participants get infected within the last four (4) years (2015/16 when the study was done), while 65% of the household has only one member infected with the HIV illness (Table 1).

Table 1i: Selected Characteristics of Households with PLWHAs

Characteristics	Nos.	%	Mean Income (₦)	Mean Food Expenditure (₦)	Mean Non-Food Spending (₦)	Mean Health Exp (₦)	Mean Catastrophic Health Spending (%)
Gender							
Female	520	67	41396.6	27493.7	13902.9	5887.8	52.3
Male	260	33	57942.7	30444.9	27997.8	5345.1	42.2
Age							
18-23	55	7	56327.7	29860.4	26467.3	4437.3	42.2
24-29	97	12	38247.8	23033.1	15214.7	4311.9	44.0
30-35	139	18	40683.9	25610.9	15073.0	5121.8	51.2
36-41	244	31	50750.4	32227.9	19055.3	6340.8	48.0
42-47	162	21	45957.2	28021.7	17935.5	6012.1	51.9
48 and above	83	11	51807.6	28588.2	23219.5	6698.8	51.9
Marital status							
Unmarried	300	38	47110.4	27671.3	19439.2	5205.0	46.3
Married	321	41	47517.6	29299.0	18623.5	5946.2	51.5
Divorced/Separate	83	11	45663.1	28800.1	16863.0	5737.4	45.3
Widowed	76	10	44934.6	27837.0	17097.7	6643.4	52.4
Ethnic Groups							
Yoruba's	352	45	46457.8	28595.9	18231.2	5219.6	49.7
Igbos	267	34	44899.3	25929.1	18970.2	5544.4	47.3
Hausa's	82	11	50671.2	32304.1	18367.0	6063.5	49.0
Others	79	10	51835.9	32590.0	19245.9	8057.0	50.7
Occupations							
Government workers	122	16	51967.6	33002.6	18965.0	5772.0	52.1
Petty Traders	204	26	41436.7	25896.7	15540.0	6021.3	50.8
Family Business	92	12	48402.6	28449.5	21366.2	5650.0	45.4
Private Employees	113	14	45796.9	29067.4	16729.4	4849.2	47.3
Farmers	22	3	57500.4	32791.4	24709.0	3915.9	34.5
Students	72	9	49167.1	27380.7	21786.4	7377.1	53.7
Others	46	6	43478.7	27325.4	16153.2	4462.0	50.0
Unemployed	109	14	49220.6	27994.3	21226.3	5766.1	45.5

Source: Author computation (2019)

Table 1ii: Selected Characteristics of Households with PLWHAs (Contd.)

Characteristics	Nos.	%	Mean Income (₦)	Mean Food Expenditure (₦)	Mean Non-Food Spending (₦)	Mean Health Exp (₦)	Mean Catastrophic Health Spending (%)
Head of Household							
Male	597	77	47590.0	28556.2	19251.6	5495.8	47.7
Female	183	23	44699.9	28220.3	16479.5	6395.4	52.8
Head Education Level							
No Basic Education	111	14	42117.5	25206.4	16911.1	5368.0	50.1
One forms of education	669	86	47707.4	29020.1	18881.6	5763.1	48.7
Head_Employs_Status							
Not Employed	298	38	45262.2	27328.7	17933.5	5075.4	46.8
Employed	482	62	47932.0	29187.6	19014.0	6097.3	50.2

Source: Author computation (2019)

Further outcome has shown that households where caregiving activities are absence as well as those who do not receive remittance from relatives and friends dominate the survey. However, respondents who received support from the government (that is free drugs and therapy) were very high (96 %). A greater number of the households (78%) does not sell their assets, likewise over two-third of the households were not involved in underage labour (child labour) activities.

Table 1iii: Selected Characteristics of Households with PLWHAs (Contd.)

Characteristics	Nos.	%	Mean Income (N)	Mean Food Expenditure (N)	Mean Non-Food Spending	Mean Health Exp	Mean Catastrophic Health Spending (%)
Household Size							
1 and 4	335	43	48167.6	29462.8	18704.8	5434.7	47.4
5 & above	445	57	45966.7	27735.6	18523.2	5911.8	50.0
Duration with HIV							
1-4 years	378	48	46780.8	28418.7	18362.2	5206.9	46.9
5-8 years	288	40	46920.6	28579.3	18792.6	5782.1	49.0
9 years and above	114	12	47325.0	28414.8	18910.2	7174.6	55.3
Number of PLWHAs							
Only respondent (1)	510	65	46261.2	27704.5	18556.7	5853.0	47.8
2 and more	270	35	48141.2	29937.3	18685.4	5430.8	51.1
Caregiver Activities							
No Caregiver present	501	64	47996.4	28090.1	20165.8	5770.1	47.9
Present of Caregiver/s	279	36	44964.6	29172.9	15791.7	5593.3	50.7
Received Remittance							
Yes	340	44	43209.2	27243.9	15965.3	4292.3	47.9
No	440	56	49773.2	29430.5	20638.1	6799.9	49.7
Support from Government							
No	31	14	50161.7	30258.1	19903.7	9854.0	57.6
Yes	749	96	46777.5	28403.7	18547.3	5535.2	48.5
Asset sales							
No	607	78	47629.8	28610.9	19233.1	5981.2	48.3
Yes	173	22	44393.4	28009.2	16384.3	4744.4	50.8
Under_age labour							
No	521	67	47555.1	27758.0	20046.7	5975.8	48.4
1	131	17	46412.6	32151.3	14261.3	5723.7	52.5
2 and above	128	16	44805.1	27645.7	17159.4	4595.2	47.2
Death due to AIDS							
None	633	81	46818.8	28462.3	18561.8	5799.7	48.3
1	86	11	42674.8	25628.7	17046.1	5140.7	53.3
2 and more	61	8	53852.9	32650.5	21202.4	5541.1	48.8

Source: Author computation (2019)

Accordingly, the report shows that about 19% of the households have lost at least one family member to AIDS. The Table 1i also shows the household mean income, food expenditure, non-food expenditure, health expenditure and catastrophic health spending which emanated from out-of-pocket expenditure

on health care. From the outcomes, it is observed that male household head tend to have higher mean income and consumption expenditure than female head of household. Catastrophic health expenditure (CHE) was more predominant among female household head than their male counterpart, likewise the highest CHE (57.6 %) is among respondents who do not receive support and aids from the government. In this regards, the outcome indicates that government support plays major role in reducing the burden of HIV/AIDS and catastrophic health spending on households. The Table 2 shows the binary logistic regression of declining household income on selected household's characteristics. As observed, declining income was significantly higher in households where asset is sold when compared to the reference category ($p<0.01$).

Table 2i: Binary Logistic Regression (BLR) of Selected Characteristics of PLWHAs on Declining Income of Household in Lagos State (n=780)

Characteristics	B	S.E.	Wald	Sig.	Exp(B)	95% C.I.	
Head Education (HC)						Lower	Upper
No formal Education	Ref						
With One form of Education or the other	0.261	0.228	1.314	0.252	1.298	0.831	2.029
Household Asset Sale (PH)							
Sold Asset	1.465	0.229	40.801	0.000	4.326	2.76	6.78
Do not sell household asset	Ref						
Adult (18-60 yrs) Without HIV (H_L_AO)							
One adult member without HIV	0.069	0.212	0.106	0.745	1.071	0.707	1.622
More than one adult members without HIV	Ref						
Adult (18-60yrs) With HIV (UL)							
More than one adult Infected	0.801	0.175	20.858	0.000	2.228	1.58	3.143
Only the Respondent is infected	Ref						
Duration Living With HIV/AIDS (DLHA)							
9 years and above	0.21	0.247	0.726	0.394	1.234	0.761	2.003
5 – 8 years	-0.151	0.173	0.764	0.382	0.86	0.612	1.207
1 – 4 years	Ref						
Work Experience of Head (A)							
Without work Experience	0.418	0.223	3.508	0.061	1.519	0.981	2.354
With work Experience	Ref						
Sex of Household Head (SEXH)							
Female	0.442	0.193	5.236	0.022	1.555	1.065	2.271
Male	Ref						
Employment Status of Household Head (ES)							
Unemployed	0.483	0.165	8.524	0.004	1.621	1.172	2.241
Employed	Ref						
OPEX							
Health spending equal or greater than 40 %	0.114	0.164	0.487	0.485	1.121	0.814	1.544
Health spending lesser than 40 %	Ref						
Man-hours Loss due to HIV/AIDS (MHL)							
Absence from work	1.21	0.177	46.828	0.000	3.354	2.371	4.743
Do not absent from work	Ref						
Caregiver Activities (CG)							
Present of caregivers	1.188	0.18	43.461	0.000	3.282	2.305	4.672

Absence of caregivers: Ref

Source: Author computation (2019)

Table 2ii: Binary Logistic Regression (BLR) of Selected Characteristics of PLWHAs on Declining Income of Household in Lagos state (n=780) (Contd.)

Characteristics	B	S.E.	Wald	Sig.	Exp (B)	95% C.I.	
Government Support (GVSU)							
Do not received support	-0.232	0.43	0.29	0.59	0.79	0.339	1.857
Received support from the government	Ref						
Underage Labour (UA)							
Present of underage labour	1.345	0.19	51.25	0.00	3.84	2.656	5.547
Absent of underage labour	Ref						
AIDS related Death case (DEA)							
Household has experienced AIDS death	0.969	0.22	18.67	0.00	2.63	1.698	4.088
No record of AIDS related death	Ref						

Source: Author computation (2019)

Similarly, households with more adult infected with HIV are more likely to experience income decline by 2.228 times when compared with those with a single adult infected. The odd of income decline was higher among female head of households (1.555) as against male household head. In the same vein, declining household income was considerably greater in household where the head is unemployed (1.621) than where the head is employed. More so, respondents who have absent themselves from work are more likely to face income decline by a factor of 3.354 times when compared with those who do not. Also, household with caregivers (CG) are more burdened with income fall when match with their counterparts who are without caregivers. That is, there is significantly income decline by a factor of 3.282 times in households where caregivers are present against those not present.

The outcome (Table 2i), still suggests that there is greater income decline (of about 3.838 times) in household where child labour (UA) takes place as against the reference category. In like manner, household where AIDS death is recorded have significantly income decline of about 2.634 times when compared to household without death record. However, neither educational level of household head (HC), adult member without HIV/AIDS (HL), duration living with HIV/AIDS (DLHA), work experience of household head (A), catastrophic health expenditure (CHE), nor government support (GVSU) significantly predicted household declining income.

Discussion and Implications of Findings

Following the descriptive outcomes, it was observed that 64% of the respondents receive drugs and therapy outside the Local Government Areas (LGAs) of their residence. This might be attributed to fear of stigmatization or

discrimination by the participants, due to the HIV/AIDS status. However, if this act is not urgently check, there might be erroneous computation of HIV/AIDS statistics/figure among LGAs. Similarly, this might bring about misallocation of financial and material resources to locality that needs less of such aids.

In the surveyed centres, female participants made up 67 % of the respondents. This implies that female respondent tends to make themselves more available for HIV/AIDS screenings and treatments than their male counterparts. With regards to financial status, male respondent has higher mean income than female, likewise play dominate role as household head. However, female participant has high health expenditure and greater catastrophic health spending (CHE) than the male. The female vulnerabilities to the illness substantiate previous studies by Sangosanya and Siyanbola (2005), Reneth and Matshe (2006), Ijaiya et al. (2009) and Ghailan et al. (2010), that women are more vulnerable to the scourge than their male counterparts. The reason is that there is cultural and economic power-imbalance between men and women that often play out in favour of male and their relationship can be exploitative or might involve gifts or money in exchange for sex. In sum, the outcome in Table 4.1 reveals that CHE is threatening the means of livelihood of PLWHAs, as all the estimated CHE values of household characteristics have figures above 40%. This result is supported by WHO (2016) report that, household is experiencing CHE when health care spending is equal or greater than 40 percent of household's non-subsistence income.

The BLR findings (Table 2) also reveal that household who sells their belonging (asset) tend to experience greater income decline when compared with household who do not (reference category). This finding conforms with existing literature that argued that, asset sale is one form of coping strategies adopted by affected household when there is loss of income and other options to generate earning are out of reach (Mutangadura 2000; Iya, et al., 2012; Natalia et al., 2014 & Shyamala, 2015). Often times, productive and physical asset sale has the implications of adversely impacting on labour productivity, which in turn incapacitate household financially. The long run effect is that marginally poor household will be pushed to extreme poverty (Slater &Wiggins 2005; Arrehag et al., 2006).

In other outcomes, there is greater financial decline in household where more than one individual is infected with HIV. This result supports the work of Oni et al. (2002) and Zhang et al. (2012) that, there is higher labour and monetary risk when more than one household member is infected with HIV illness. Hence, the adverse effect is noticed on decline in household labour

productivity, production and welfare. In a related result, gender of household head significantly predicts declining income. This is consistent with existing studies, though female household heads are more prone to income fall than male (see Iya et al., 2012). On the contrary, Casale (2005), Mather et al. (2003) and Yamano and Jayne (2004) find greater income decrease among male than female. The reason being that when male households' heads get infected with HIV/AIDS, often they wouldn't be able to work but the female counterpart still take the challenge to work and assist the household financially. Further result indicates that the odd of income decline is higher among the unemployed than employed individuals. This result supports the finding of Ogunmefun (2008) and Levinsohn et al., (2011), who noted that, PLWHA are less likely to secure job opportunities. As a result, the unemployed are financially incapacitated to take care of themselves and their loved ones when compared with the employed individuals.

Another striking result is the man-hours loss (MHL) variable which support greater income decline among households where respondent absence themselves from works as against the reference category. This is also consistent with other related studies that agree that absence from work due to illness reduces man-hour labour which negatively reduces firm revenue and households' income (Kongsin et al., 2001; Naidu & Harris, 2006; Tham-Agyekum et al., 2011; Fox, 2012; Iya et al., 2012). Further results also depict more financial decrease in household where caregiving activities are practiced. This upshot does conform with economic literature, as caregiving activities usually consume time and resources of affected household (Musinguzi, 2012; Natalia et al., 2014).

As well, there is greater income diminish in household where underage labour (UA) occur. Following the outcome, it is noted that, child labour exposes children to negative coping strategies which further expose the household to other health hazard, in turn, the household faces income fall in the long run (Foster & Williamson, 2000; Mutangadura, 2000; Bangura, 2001; Kaschula, 2008). In the study, the AIDS-related death variable (DEA), as expected, positively and significantly predicts the dependent variable. This result submits that more financial threat will be notice in household where AIDS death is recorded than in household where there is no AIDS death case. One simple explanation for this outcome points to the fact that AIDS related death comes with unexpected shock, such as debt prior to the death of the individual; mourning, funeral and burial ceremony costs. These activities eat deep on household financial resources and might drag averagely poor household to live below the poverty line. Based on the outcome of this research, it can be

deduced that HIV/AIDS via household demographic, socioeconomic and health profiles significantly predict income decline in Lagos state.

Conclusion and Recommendations

This study examines HIV/AIDS in Lagos state, and its catastrophic health expenditure effect on household income using 780 respondents obtained from eight treatment centre's. The data was analysed using descriptive statistics and logistic regression technique. One striking revelation is that, over (60) sixty per cent of the participants travel outside their LGAs of resident to receive therapy and drugs. This outcome submits that non-disclosure of HIV/AIDS status by respondents to relatives and friends is still high. Besides, the descriptive statistics outcome also advances that catastrophic health expenditure adversely associates with household non-subsistence income. Likewise, the BLR finding suggests that HIV/AIDS via asset sale, members infection, unemployment, man-hour loss, caregiver activities, underage labour and death of victim increases the odd of income decline among households. However, educational level of household head, adult member without HIV/AIDS, duration of living with the illness, work experience of household head and out-of-pocket expenditure positively increase household income decline, though not statistically significant to predict income.

Following the aforementioned results, the study noted that there is the need for government to review existing HIV/AIDS survey tools, particularly at the LGA levels in order to achieve accurate HIV/AIDS statistics in each LGA and the States. Also, policymakers should pursue sound, effective and efficient social protection scheme for the poor in order to prevent negative coping strategies (such as child labour, prostitutions, etc.), that contribute to the rising HIV/AIDS incidence. As a policy suggestion, free health care service alongside financial support for affected households would be a welcome development. This should follow multi-dimensional selection criteria in order to reach the poorest group of household's accommodating PLWHAs. Finally, the government as a matter of concern should put in place, policies that would protect household against financial shock cause by chronic illnesses. This will serve as financial protection for households vulnerable to the illness.

References

Adeoti, A. I., & Adeoti, J. O. (2008). HIV/AIDS and farms' production efficiency in Benue State, Nigeria. *Africa Journal of Biomedical Research*, 11,145-153. www.bioline.org.br/pdf?md08020

Adeyemi, O. E. (2007). HIV/AIDS and family support systems: A situation analysis of people living with HIV/AIDS in Lagos State. *Journal of Social Aspects of HIV/AIDS*, 4(3), 668-677.

Agatha, C. O., Walingo, M. A., & Othuon, L. (2010). Expenditure patterns on food and non-food items in HIV/AIDS affected and non-affected households in kisumu District, Kenya. *African Journal of Food Agriculture Nutrition and Development*, 10(4), 2345-2356.

Akinyetun, T. S., Alausa, J. A., Odeyemi, D. D., & Ahoton, A. S. (2021). Assessment of the prevalence of multidimensional poverty in Nigeria: Evidence from Oto/Ijanikin, Lagos State. *Journal of Social Change*, 13(2), 24–44. https://doi.org/10.5590/JOSC.2021.3.2.03

Arrehag, L., Durevall, D., Mirja Sjöblom, M., & De Vylder, S. (2006). *The impact of HIV/AIDS on the economy, Livelihoods and Poverty of Malawi. Country Economic Report*. Retrieved from www.sida.se/pdf/the-impact-of-hivaids-on-livelihoods-poverty-and-the-economy-of-malawi_1607.pdf&usg=AFQjCNE2JLKE4N1aDFEW_bdzftqDLWMGnw&sig2=pYNF9rzzjh5SMWP1dXk6iyg&bvm=bv.121421273,d.ZGg

Avert, (2018). HIV and AIDS in Nigeria. Retrieved from https://www.avert.org/professionals/hiv-around-world/sub-saharan-africa/Nigeria

Awofala, A. A., & Ogundele, O. E. (2016). HIV epidemiology in Nigeria. *Saudi Journal of Biological Sciences*, 25(4), 697–703 https://doi.org/10.1016/j.sjbs.2016.03.006

Bangura, Y. (1994). Economic restructuring: coping strategies and social change: Implications for institutional development in Africa. *Develop Change*, 25,785-825.

Barennes, H., Frichittavong, A., Gripenberg, M., & Koffi, P. (2015). Evidence of High Out of Pocket Spending for HIV Care Leading to Catastrophic Expenditure for Affected Patients in Lao People's Democratic Republic. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0136664

Bartlett, J. E., Kotrlik, J. W. & Higgins, C. C. (2001). Organizational research: Determining appropriate sample size in survey research. https://chuang.epage.au.edu.tw/ezfiles/168/1168/attach/20/pta_39317_692177_91008.pdf

Casale, M. (2005). The impact of HIV/AIDS on poverty, inequality and economic growth. Retrieved from www.gul.gu.se/public/pp/.../Casale%20Literature%20Review%20final%20version.pdf

Collins, D. L., & Leibbrandt, M. (2007). The financial impact of HIV/AIDS on poor households in South Africa'. *Supplementary report*, 7, 75-81. www.financialdiaries.com/files/CollinsLeibbrandtAIDS217.pdf

Cuddington, J. (1993). Modeling the macroeconomic effects of AIDS, with an application to Tanzania. *World Bank Economic Review*, 7(2), 173-189.

Etiaba, E., Onwujekwe, O., Torpey, K., Uzochukwu, B., & Chiegil, R. (2016). What is the economic burden of subsidized HIV/AIDS treatment services on patients in Nigeria and is this burden catastrophic to households? *PLoS ONE*, 11(12), e0167117. https://doi:10.1371/journal.pone.0167117

Foster, G., & Williamson, J. (2000). A review of current literature of the impact of HIV/AIDS on children in Sub-Saharan Africa. *AIDS Journal*, 14 (3), 275-284.

Fox, R. (2012). An investigation into the effects of HIV/AIDS on food security programmes undertaken by NGOs in South Africa. *Earth & Environment 8*, 106-133. www.see.leeds.ac.uk/misc/ejournal/Issue%208%20articles/8,%20106-133.pdf

Ijaiya, G. T., Bello, A. R., Ijaiya, M. A. & Raheem, U. A. (2009). Women living with HIV/AIDS and government spending on health care services in Sub Sahara Africa. *Indian Journal of Development and Research and Social Action*, 5(1-2), 151-161.

Ghailan, K., Jusoh, A., Rizal, M., Ezat, S., Ibrahim, F., Halil, J. & Aljunid, S. (2010). The impact of HIV/AIDS on households economy in Malaysia. *Global Journal of health Science*, 2(2), 142-145.

Hilhorst, T., Liere, M., Korrie, K., Abeda, F., Jolayemi, T. & Saror, S. (2004). Impact of AIDS on rural livelihoods in Benue State, Nigeria; Implications for policymakers. www.bibalex.org/Search4Dev/files/281705/113730.pdf

Hosmer, D., & Lemeshow, S. (2000). *Applied logistic regression* (2nd ed.). NY: Wiley & Sons.

ILO, (2006). Decent work and HIV/AIDS. World day for occupational safety and health. www.ilo.org/public/English/protection/trav/aids/pub/indicators.pdf.

ILO (2015). World report on child labour. Paving the way to decent work for young people. www.ilo.org/wcmsp5/groups/public/@ed_norm/@ipec/…./wcms_221513.pdf

Iya, I. B., Purokayo, S. G., & Yusuh, G. (2012). The effects of HI V/AIDS on production and income among rural households in Adamawa State of Nigeria. *Global Journal of Health Science*, 4(1), 245-252.

Kaschula, S. (2008). Wild foods and household food security responses to AIDS: evidence from South Africa. *Journal of Population & Environment*, 29, 162–185.

Knowles, S., & Owen, P. D. (1995). Health Capital and Cross-Country Variation in Income Per-Capita in the Mankiw Romer-Weil model. *Economic Letters*, 48, 99-106.

Kongsin, P. S., Jiamton, S., Watts, C., & Boonthum, A. (2001). Conducting a household survey on economic impact of chronic HIV/AIDS morbidity in rural Thailand. *Journal of Health Science*, 10(2), 276-289.

Lagos State AIDS Control Agency, (2012). Lagos tops HIV prevalence in South West Zone. http://dailyindependentnig.com/2012/11/lagos-tops-hiv-prevalence-in-swest-zone-lsaca/http://lsaca-nige-ria.org/

Lagos State AIDS Spending Assessment 2009-2010, (2009). Level and flow of resources and expenditures of the state HIV and AIDS response. www.lsaca-nigeria.org/wp-content/.../12/Lagos-State-SASA-report.pdf.

Levinsohn, J., Shisana, O., Mclaren, Z., & Zuma, K. (2011). HIV status and Labor Market participation in South Africa. *The Review of Economic and Statistics*, 95(1), 98-108.

Masha, l. (2004). *An economic assessment of Botswana's national strategies framework for HIV/AIDS 'in the macroeconomic of HIV/AIDS*. http://www.who.int/hiv/H1VCPNGA.

Mather, D., Donovan, C., Jayne, T.S., Weber, M., Mazhangara, E., Bailey, L., Yoo, K., Yamano, T., & Mghenyi, E. (2004). A Cross-country Analysis of household responses to adult mortality in rural Sub-Saharan Africa: Implications for HIV/AIDS mitigation and rural development policies. *Michigan State University, International Development Working Papers 82*. https://fsg.afre.msu.edu/papers/IDWP82.pdf

Mbaeh, E. K., Wafula, F. K., Munyi, C. M., & Njoroge, J. M. (2015). Impact of HIV/AIDS on hotel staff productivity in Kenya: A survey of selected hotels in North Coast. *Journal of Tourism, Hospitality and Sports, 3*(1), 7-12.

Musinguzi, B. (2012). Impact of HIV/AIDS on households' food production in Bushenyi District, Uganda. *International Journal of Social Science Tomorrow*, 1 (5), 1-5.

Mutangadura, G. B. (2000). Household welfare impacts of mortality of adult females in Zimbabwe: Implications for policy and program development. http://citeeerx.ist.psu.edu/viewdoc/download?doi=10.1.1.196.&rep=rep1&type=pdf

Naidu, V., & Harris, G. (2006). The cost of HIV/AIDS-related morbidity and mortality to households: Preliminary estimates for SOWETO. *South Africa Journal of Economics and Medical Science*, 9(3), 384-391.

Nasidi, A., & Harry, O. T. (2007). The Epidemiology of HIV/AIDS in Nigeria. www.apin.harvard.edu/Chapter2.pdf

Natalia, K, Majula, R. & Nanzia, F. (2014). The impact of HIV/AIDs on household income: The case of Dodoma Municipal, Tanzania. *International Journal of Scientific and Research Publications*, 4 (11), 1-6.

National Agency for the Control of AIDs, (2017). National Strategic Framework on HIV and AIDS: 2017-2021. www.nigeriahivinfo.com/fact_sheets/hiv_fact_sheet_2017.pdf.

National Agency for the Control of AIDs, (2014). Global AIDS response, Country Progress Report Federal Republic of Nigeria. www.unaids.org/en/dataanalysis/.../countryprogressreports/2014countries

National Agency for the Control of AIDS, (2015). Global AIDS Response Country Progress Report. http://www.unaids.org/sites/default/files/country/documents/NGA_narrative_report_2015.pdf

National Agency for the Control of AIDS, (2017). National Strategic Framework on HIV and AIDS: 2017-2021. https://www.avert.org/professionals/hiv-around-world/sub-saharan-africa/nigeria#footnote6nwz94kq

Ngepah, N. (2012). Production and health relationship in South Africa: The role of HIV/AIDS. A Paper presented at the CSAE Conference on Economic Development in Africa. 18th-20th March, South Africa. https://editorialexpress.com/cgi-bin/conference/download.cgi?db...CSAE2012.

Nwagwu, I., & Oni, T. (2015). Lagos and its potentials for economic growth. https://ng.boell.org/2015/07/02/lagos-and-its-potentials-economic-growth.

Obinna, C., & Olowoopejo, M. (2016, June 3). Number of HIV-positive people in Lagos drops. *Saturday Vanguard*. http://www.vanguardngr.com/2016/05/number-hiv-positive-people-lagos-drops/

Ogunmefun, C. A. (2008). The impacts of adult HIV/AIDS mortality on elderly women and their households in rural South Africa. *A thesis submitted to the Faculty of Humanities, University of the Witwatersrand*, in fulfilment of the requirements for the degree of Doctor of Philosophy. wiredspace.wits.ac.za/bitstream/10539/7071/1/Catherine_Ogunmefun.PhDthesis.ddf

Ojha, V.P., & Pradhan, B.K. (2010). The macro-economic and sectoral impacts of HIV and AIDS in India, A CGE Analysis. NCAER, UNDP India. www.ncaer.org/free-download.php?pID=226

Olusegun, O. (2010). *Lagos state HIV/AIDS response review (2006–2010) & Lagos State HIV/AIDS strategic plan (2010–2015)*. www.lsaca.org/wp-content/uploads/2012/03/final-ERPS.doc

Olofinji, L. (2015). *Population and habitation in Lagos State*. http://nigeriarealestatehub.com/population-and-habitation-in-lagos-state.html/

Oni, S. A., Obi, C. L., Okon, A. E., Thabede, D., & Jordaan, A. (2002). The economic impact of HIV/AIDS on rural Households in Limpopo Province, South Africa. *Unpublished paper*. www.repository.up.ac.za/bitstream//handle/2263/.../Oni_Economic(2002).pdf

Onwujekwe, O. E., Ibe, O., Torpey, K., Dada, S., Uzochukwu, B., & Sanwo, O. (2016). Examining geographic and socio-economic differences in outpatient and inpatient consumer expenditures for treating HIV/AIDS in Nigeria. *Journal of International AIDS Society*, 19(1), 20588. https://doi.org/10.7448%2FIAS.19.1.20588

Osobase, A. O., Nwakeze, N. M., & Dauda, R. O. S. (2018). The impact of HIV/AIDS on household income: A case study of Lagos State, Nigeria. *Near East University Journal of Social Sciences*,11(2), 2-31.

Pitayanon, S., Kongsin, S., & Janjareon, W. S. (1994). The economic impact of HIV/AIDS mortality on households in Thailand. www.iaen.org/impact/thai/thai.pdf>

Poudel, A. N., Newlands, D. & Simkhada, P. (2017). The economic burden of HIV/AIDS on individuals and households in Nepal: a quantitative study. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5259845/

Puteh, S.E.W., & Almualm, Y. (2017). Catastrophic health expenditure among Developing Countries. *Health Syst Policy Res.*, 4(1), 1-4. https://doi.10.21767/2254-9137.100069

Reneth, M., & Matshe, I. (2006). Impact of HIV & AIDS on agriculture and food security from Zimbabwe empirical analysis of two Districts in Zimbabwe. *FANRPAN Working Document*, Series Ref. Number, Nat Zim001.

Roy, S.S., & Guria, S. (2008). Diagnostics in logistic regression models. *Journal of the Korean Statistical Society, 37*(2), 89-94.

Samuels, F., Blake, C., & Akinrimisi, B. (2012). *HIV vulnerabilities and the potential for strengthening social protection responses in the context of HIV in Nigeria*. www.unicef.org/nigeria/HIV_sensitive_social_protection_the_case_of_Nigeria.pdf

Sangosanya, A.O.B., & Siyanbola, A.A. (2005). The socio-economic implications of HIV/AIDS on human resource development in Nigeria. A Paper presented at the *International Conference on Human Development (ICHD)*, Covenant University, Otta, 27th – 30th June.

Sharifa, E., Wan, P., & Yasmin, A. (2017). Catastrophic health expenditure among developing countries. *Health Systems and Policy Research,* 4(1), 1-5. https://doi.10.21767/2254-9137.100069.

Shyamala, N. (2015). Exploring the economic effects of HIV. *Indian Journal of Medical Ethnics*, 12, (2), 117-118. www.issuesinmedicalethics.org/index.php/ijme/article/view/2216/4725

Slater, R., & Wiggins, S. (2005). Responding to HIV/AIDS in agriculture and related activities. *Natural Resource perspectives*, 98, 1-6.

Tham-Agyekum, E. K., Amankwah, A.D., & Appiah, P. (2011). Perceived effects of HIV/AIDS pandemic on fishing-related livelihoods in the greater Accra Region of Ghana. *American-Eurasian Journal, Agricultural & Environ. Sci*., 10(3), 300-309.

United Nations Programme on HIV/AIDS, (2018). *Global HIV & AIDS statistics — 2018 fact sheet*. http://www.unaids.org/en/regionscountries/countries/nigeria

World Health Organisation, (2016). *HIV/AIDS fact sheets*. http://www.who.int/mediacentre/factsheets/fs360/en/

William, J. L., John, L.G., Harry, P. S., & Ralph, B.D. (1993). A comparison of logistic regression to decision-tree induction in a medical domain. *Biomedical Research, 26*, 74-97.

Yamano, T., & Jayne, T.S. (2005). Working-age adult mortality and primary school attendance in Rural Kenya. *Economic Development and Cultural Change*, 619-653.

Zhang, X., Zhang, Y., Aleong, T., Baker, T., & Fuller-Thomson, E. (2012). Factors associated with the household income of PLWHAs in China. *Global Journal of Health Science*, 4(3), 108-115.

Appendix

Sources	Ajeromi	Alimosho	Eti-Osa	Ikeja	Lagos Island	Lagos Mainland	Ojo	Surulere	Total
Agege	1	1	3	13	1	1	0	3	23
Ajeromi	46	1	1	0	6	3	0	5	62
Alimosho	3	42	4	41	2	5	3	2	102
Amuwo Odofin	2	2	0	0	5	2	6	3	20
Apapa	9	0	3	1	4	2	0	3	22
Badagry	2	5	2	0	0	3	19	1	32
Epe	0	0	9	0	5	0	0	3	17
Eti-Osa	0	0	13	0	17	2	0	2	34
Ibeju-Lekki	0	0	8	0	6	0	0	2	16
Ifako	3	2	1	13	3	3	1	2	28
Ikeja	0	0	4	30	2	0	0	0	36
Ikorodu	3	2	3	2	4	4	2	4	24
Kosofe	5	0	5	1	6	10	1	5	33
Lagos Island	2	0	4	5	31	2	1	10	55
Lagos Mainland	14	1	0	6	5	32	0	10	68
Mushin	4	0	1	0	2	2	0	8	17
Ojo	10	14	1	0	0	2	47	1	75
Oshodi-Isolo	4	0	2	16	2	6	0	10	40
Shomolu	4	0	2	4	2	9	0	6	27
Surulere	6	0	0	1	1	9	0	32	49
Aggregate	118	70	66	133	104	97	80	112	780
Response rate	78.6	46.6	44.4	88.7	69.3	64.6	53.3	74.6	65.01
% of Respondents receiving treatment outside their LGA	61	40	80.3	77.4	70.2	67	41.3	71.4	63.575