THE IMPACT OF HIV/AIDS ON HOUSEHOLD INCOME: A CASE STUDY OF LAGOS STATE, NIGERIA.

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ABSTRACT

This study investigates the impact of HIV/AIDS on household income in ten Local Government Areas (LGAs) of Lagos State, Nigeria. The studied LGAs account for 59.5 percent of the population of the State. In line with this aim, the household income scale was applied to a sample of 1500 People Living With HIV/AIDS (PLWHAs). The estimation technique involves the use of descriptive statistics and logistic regression analysis. In all the LGAs, 60 per cent of the participants reside outside the LGAs where treatments are administered while women accounted for 65 percent of the respondents. Based on the household production theory and using logistic regression model, the results indicated that asset sales, health expenditures and productivities loss significantly increases the odd of income decline among the sampled households. In contrary, remittance was found to significantly decrease the odd of income decline. Particularly, the study elucidated the implications of participants receiving treatment outside the LGAs of dwelling and the implications of HIV on the Lagos State local economy, including Nigeria.

Keywords: *HIV/AIDS, Household Income, Logistic Regression, Lagos State*

ÖZET

HIV / AIDS'İN HANEHALKI GELİRLERİNE ETKİSİ: NİJERYA'NIN LAGOS EYALETİNDE BİR ALAN ÇALIŞMASI

Bu çalışma, Nijerya'nın Lagos Eyaleti'ndeki on Yerel Hükümet Alanında (YHA) HIV / AIDS'in hane halkı geliri üzerindeki etkisini araştırmaktadır. İncelenen YHA'lar Devlet nüfusunun yüzde 59,5'ini oluşturmaktadır. Bu amaçla, hane halkı gelir ölçeği, HIV / AIDS ile Yaşayan 1500 Kişi Örneğine (AİYK) uygulanmıştır. Tahmin tekniği, tanımlayıcı istatistiklerin ve lojistik regresyon analizinin kullanılmasını içerir. Tüm YHA'larda, katılımcıların yüzde 60'ı tedavilerin uygulandığı YHA'ların

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dışında yer alırken, kadınlar ankete katılanların yüzde 65'ini oluşturuyor. Hane halkı üretim teorisine dayanan ve lojistik regresyon modelini kullanan sonuçlar, varlık satışlarının, sağlık harcamalarının ve üretkenlik kaybının, örneklenen hanelerdeki gelir azalması olasılığını önemli ölçüde artırdığını göstermiştir. Aksine, havale gelir düşüşünün tuhaflığını önemli ölçüde azaltmıştır. Özellikle, çalışma, konutun YHA'ları dışında tedavi gören katılımcıların etkilerini ve Nijerya da dahil olmak üzere Lagos Devleti yerel ekonomisine HIV'nin etkilerini açıklamaktadır.

Anahtar Kelimeler: *HIV / AIDS, Hane Geliri, Lojistik Regresyon, Lagos Eyaleti*

1. Introduction

Over the past three decades, there have been numerous research on the impact of Acquired Immune Deficiency Syndrome (AIDS) and Human Immuno-deficiency Virus (HIV) on household means of livelihoods (Alemu & Bezabih, 2008; Kuyponiyi, 2008; Iya, Purokayo, & Gabdo, 2012; Zhang, Zhang, Aleong, Baker, & Fuller-Thomson, 2012; Baiyegunhi & Makwangudze, 2013; Feulefack *et al*., 2013; Natalia, Majula, & Nanzia, 2014). In spite of the findings of these studies, HIV/AIDS has continued to impact negatively on household welfare, with tragic consequences on the income level and living standard of affected households (Musinguzi, 2012, Gubwe, Gubwe, & Mago, 2015; Shyamala, 2015).

AIDS is a life-threatening illness caused by an etiologic virus called HIV. Since inception (1981- till end of 2015), about 78 million people globally have contracted HIV and approximately 39 million people have died of AIDS-related illnesses (Joint United Nations Programme on HIV/AIDS, 2016 & & World Health Organisation, 2016). Currently, global total of people living with HIV (PLWHs) is estimated to be 36.7 million in 2015 (UNAIDS, 2016). From these statistics, the Sub-Saharan Africa (SSA) region accounts for 70 per cent of this scourge and death cases (UNAIDS, 2016).

Unfortunately, Nigeria is not free from this epidemiological burden, as the first HIV case was reported in 1986 in Lagos State (Nasidi, & Harry, 2007 & Awofala, & Ogundele, 2016). Since then, several sentinel HIV/AIDS surveys have been carried out and recent statistics indicate that more than 3 million people are living with HIV (PLWHAs) at the end of 2015 (WHO, 2016 & Ilomuanya, et al., 2017). The country prevalence rate is geographic- ally heterogeneous across regions and states. For instance, with an estimated population of 20 million people as at 2015 (Nwagwu & Oni, 2015; Olofinji, 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 in the country (Federal Ministry of Health, 2015 &, NACA, 2015; Obinna, & Olowoopejo, 2016). Quite a number of factors have been identified to be responsible for the high prevalence rate in the state. These includes: daily migration of people from others states and nations, large commercial activities, rising poverty rate among low income earners, and high population growth (Lagos State AIDS Control Agency, 2012 & Samuels, et al., 2012). The major shocks of the epidemic relate to the fact that the most economically active household members (age group 15-49 years), who are household head or preparing to assume the role of head of household are mostly affected (UNAIDS, 2011; Iya *et al*., 2012 & Zhang, Zhang, Aleong, Baker, & Fuller-Thomson, 2012). 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 (Iya *et al*., 2012). The continuous drop in working hours of an infected person implies decline in the household income of the individual, which will translate to permanent loss of income when AIDS mortality occurs (Tibaijuka, 1997; Tekola, Reniers, Haile, Araya & Davey, 2008; Ilebani & Fabusoro, 2011 & Savio, 2014). To buttress this view, several theories (Household production theory, health production theory, classical and neoclassical growth model) have been conceptualized to explain how health factor affect labour, capital, technological progress and in turn income at the micro and macro level (See, Arndt, 2006; Weil, 2007; Ashraf, Lester, & Weil, 2008; Ngepah, 2012). For instance, Ojha and Pradhan, (2010) and Ngepah (2012), opined that income is under threat when HIV/AIDS related-sickness reduces the efficiencies of human labour, capital and skills of workers.

Amidst the income shock, is the rise in health care related expenses that later birthed catastrophic effect. The catastrophic effect of AIDS-related cost affect expenditures for other basic needs which undermine capacity to work and school, as member/s are under-nourish to actively involves in viable productive activities. In turn, household income earning power are adversely impaired. Sometime, the household tend to respond to this shock, by asset sales, buying food on credit, borrowing from relative and friends; migrate to other regions in search for jobs and withdrawing children from school to serve as under-age labour (Kwaramba, 1997; Booysen, 2004; Natalia *et al*., 2014 & Shyamala, 2015). In another instance, household experiences income changes when other adult members spend less time in productive activities or leave the labour force to care for sick member/s (Booysen & Bachman, 2003; Adeoti & Adeoti, 2008; Asenso-Okyere *et al*., 2011 & Kissi-Abrokwah, Agbesi, Andoh-Robertson & Tutu-Danquah 2015). Among other things, is the burden of stigmatization and discrimination of infected individuals in the work place, procurement costs, diet requirements alongside the long gestation periods

from HIV to AIDS; these diminishes decades of accumulated financial and other forms of household's capitals, thereby driving marginally deprived-resource households below the poverty line.

Following the consequences of HIV/AIDS scourge on household labour productivities, financial capital and other means of livelihoods. The aim of this study is to proffer a means of reducing the burden of HIV/AIDS on household income. To achieve this aim, the specific objective is; (i) to determine the mean income and per capita income of selected characteristics of household affected with HIV/AIDS, and (ii) to explore the impact of selected demographic and socio-economic profiles of household on declining household income in ten Local Government Areas (LGAs) of Lagos State. This work is structured into five parts. Section one contains introduction, section two deal with theoretical back ground and literature review, while section three explains the model specification and research methodology. Result presentation is in section four, as section five is conclusion and recommendations.

2. Literature Review

Quite a number of theories and models have been conceptualized to analyse the impact of ill- health on household income and means of livelihoods. For instance, the classical and neoclassical theory of growth have been adopted by several authors (Arndt, 2003; Masha, 2004; McDonald & Roberts, 2006; Okezie, Onyekanma & Baharuddin, 2011; Ngepah, 2012), to explain how illness such as HIV/AIDS affect factor inputs (Labour, capital and entrepreneurship), and output growth at the micro and macro levels. In similar way, Nafula and Were (2003) employed the neoclassical theory at the sectorial-level to explain AIDS mortality of labour which results into loss of skills and knowledge transfer from experience workers to non- experience workers. Likewise, Ford and Evans (2005) noted that in the event of HIV/AIDS shock, income is affected via death of active labour, decline in labour efficiency and diversion of out of-pocket expenditure (OOP) to medical care.

An extension of the classical and neoclassical growth theories are the Becker (1965) unitary household production theory and the Grossman (1972, 2000) health production theory. From the point of view of Becker's, household output is the production of goods and services by members of the household, for their own consumption, using household capital and unpaid labour. The incidence of HIV/AIDS is incorporated in this theoretical analysis when an active member or

breadwinner is infected with the illness. The sick person and other member/s (who acts as caregivers) tend to spend less time in productive activities; this phenomenon tends to affect household output as well as increases the cost of medical care for the sick. In line with Becker's theoretical analysis, is Grossman health production theory that tried to explain the gap between health which is considered as an output and medical care as one out of several inputs in health production. His study emphasises how people allocate resources to produce good health. Thus, Grossman theoretical underpinning stresses on the need for health expenditure, such as medical cost for HIV/AIDS in order to maintain and produce good health.

In line with the theoretical underpinning and reviews, Baggaley and Needham (1997) investigated the impact of HIV/AIDS among households in South Africa. The result reveals that affected household experience annual income decline of about 30–35 per cent when compared to unaffected households. In a related study, in Benue state of Nigeria, Hilhorst *et al*. (2004) employed a sample of 508 households to evaluate the impact of HIV/AIDS on rural household livelihood. The descriptive statistics result indicates that affected household loses income and other forms of contributions from the infected or dead member as well as those adults who serve as caregivers. The study called for urgent need of strengthening existing safety net internally.

Also, in Nigeria, Adeoti and Adeoti (2008) carried out a comparative study of HIVAIDS impact on 155 households (with and without HIV/AIDS) in rural areas of Benue state. The regression and variance parameters results show that farm profit, average gross revenue and average gross margin were lower in households with HIV/AIDS than farm household without the illness. Similarly, Mahal *et al*. (2008) did a study of 482 persons affected with HIV/AIDS and a random control group of 6400 persons in Oyo and Plateau States of Nigeria. The descriptive outcome advanced that the illness is associated with considerably loss of work time, rising morbidity rate, and indirect loss of income. The authors called for protection of financial assets of PLWHAs. In the same way, Odoemelam (2011), explore the effect of HIV/AIDS on productivity and welfare of 150 farm women in Abia state, Nigeria. The descriptive and inferential statistics (T-Statistics) demonstrated that, there is significant difference between the income of household with and without HIV/AIDS.

A study carried out by Iya *et al*. (2012), on 120 households in Adamawa state using descriptive statistics and logistic regression shows that out-of-pocket expenditure on health care increases the odds of income decline among households

accommodating PLWHAs. In Akwa Ibom state of Nigeria, Ofonime (2012) exploits the financial implications of HIV/AIDS scourge on 331 PLWHAs. The descriptive statistic shows that the median monthly income for all respondents were below $2 per day, thus the income shock of HIV/AIDS impact is high among the survey respondents. As well, Zhang *et al*. (2012) employed 866 PLWHA to examine factors associated with Per capita Income (PCI) of households in three provinces (Yunnan, Anhui and Henan) in rural China. The descriptive statistics and linear regression result indicate that there is higher PCI for respondents with HIV illness than those AIDS illnesses. Furthermore, Natalia *et al*. (2014) employed descriptive statistics to assess the impact of HIV/AIDS on household income in Dodoma Municipal in Tanzanian using a sample size of 150 PLWHAs. The finding demonstrated that respondents with low financial status experience greater income decline than high financial status respondents.

More so, Shyamala (2015) investigate the economic impact of HIV on 200 participants with and without HIV in India using descriptive statistics. The result indicates that household with HIV reported decline in income of about 50 per cent than household without HIV/AIDS. Another important revelation relates to the fact that female household head tend to experience greater decline in income than their male counterpart. Lastly, Kissi-Abrokwah, Agbesi, Andoh-Robertson, and Tutu-Danquah (2015) explore the impact of HIV/AIDS on 18 female respondents in Lower Manya Krobo District, Ghana using thematic analysis. Their outcome subject that the scourge and other related cost lead to significant loss or reduction of income of the infected person and other working adult members who act as caregivers.

Contrary to other findings, Das, Mukhopadhyay and Ray (2007) employed primary data of 371 households with HIV/AIDS and 479 households without HIV/AIDS to estimate family utility function of households in India. The OLS result revealed that there is no significant difference between per capita income of affected households and non- affected households. In line with the preceding view, the study by Feulefack *et al*. (2013) on 134 affected households in Uganda shows that treatment and improved health conditions of patient's cause's household income to increase by 30 to 40 per cent irrespective of the income quintile. The regression outcome suggested greater impacts of ART programme on incomes of households.

To this end, most studies on HIV/AIDS in Nigeria have focused on Northern, Eastern and South-South provinces of the country. Noticeable too is that descriptive statistics and OLS technique were mostly employed for the empirical analysis. To make up for this scholarly gap, this study employs logistic regression technique

(LRT) to estimate the odd that HIV/AIDS affect household income in Lagos state, Nigeria. The LRT is utilized because it ensures a more robust, efficient and consistent coefficient.

3. Research Methodology

Study Area

The study area is Lagos State, one of the most heterogeneous states, with multi-ethnic groups in the country. The state is defined by the Atlantic coastline in the south, the Republic of Benin in the west, while the north and east boundaries are shared with Ogun state (Olofinji, 2015). It occupies 3,577 square kilometers, of which 22 per cent or 787 sq. km is water (Adeyemi, 2007). With an estimated population of 22 million people, the state is considered the second most populous in Nigeria (See Lagos State Economics and Financial Update-report, 2013), and remains the commercial hub of the nation (Olusegun, 2010 & LSASA, 2009/10). The state comprises twenty (20) Local Government Areas (LGAs), which includes: Agege, Ajeromi-Ifelodun**,** Alimosho, Amuwo-Odofin, Apapa, Badagry, Eti-Osa, Epe, Ibeju-Lekki, Ifako-Ijaiye, Ikeja**,** Ikorodu, Kosofe, Lagos Island, Lagos Mainland, Mushin, Ojo, Oshodi-Isolo, Shomolu and Surulere**.**

Sample Technique

The simple random sampling technique was utilized to select ten LGAs from the twenty LGAs in the State. These LGAs comprise 59.5 per cent of the total population of Lagos State (Authors computation). The sample LGAs includes: Ajeromi-Ifelodun**,** Alimosho, Eti-Osa, Ikeja**,** Ikorodu, Lagos Island, Lagos Mainland, Mushin, Ojo and Surulere LGAs. Thereafter, purposive sampling was employed to draw ten treatment centres/sites from the existing Antiretroviral Therapy (ART) and Prevention of Mother-to-Child Transmission (PMTCT) facilities in each selected LGAs. The selected centres are Ajeromi General Hospital (Ajeromi), Alimosho General Hospital (Alimosho), Police Hospital Falomo (Eti-Osa), Ikeja General Hospital (Ikeja), Ikorodu General Hospital (Ikorodu), General Hospital (Lagos Island), Military Hospital, Yaba (Lagos Mainland), Good is Good Support Group, Lucina Hope Foundation (Mushin), Nigeria Navy Hospital (Ojo) and SWANN Support Group, Ojuelegba (Surulere). The choice of drawing ten sites is based on logistic reasons and easy access to data from the Network of People Living With HIV/AIDS in Lagos state.

Population, Sample Size Determination and Research Instrument.

The study population includes: all PLWHAs in the various treatment centres in Lagos state. The sample size is determine using Krejcie and Morgan (1970) and Bartlett, Kotrlik and Higgins (2001) tables for sample size determination. A sample size of 384 is appropriate for a population greater than 10, 000 (Bartlett, et al., 2001). For a more robust empirical analysis and outcome, the sample size is given as 1500 respondents. In each site, 150 respondents are drawn using convenient sampling technique. Each respondent is within the age group (18 - 65 years), as classified by the ILO report (2015) as the economic active population of a country. Each household has two informants. i., those who are primarily infected with the disease and ii., any adult person in full blown AIDS household with adequate knowledge of the household finances and welfare. Also, the researchers employed 12 co-ordinators (counsellors) who are executives of NEWPLHAN as appointed by the State Government, to administer the tools to all respondents in their respective treatment centres.

The data was collected by means of structured questionnaires. The instrument (Household Income Scale, HIS) was structured into four sections. The section 'A' contained respondent's demographic data. The section 'B and C' assessed the HIV/AIDS status and the income level of the household. While the section 'D' examined the household coping strategies. The closed-ended questions were mostly adopted for the study in order to cover a wide range of geographical area.

Ethical Consideration

Base on the nature of the study, ethical issue was put into consideration. 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) Lagos state branch. Prior to the survey, the respondents were brief about the study and those willing to partake were assured of utmost confidentiality of data provided. The research assistants were given stipend while respondents were served snacks for time spent in completing the questionnaire.

Model Specification

The Becker (1965) household production theory is conceptualized to provide

the basis for the income model of this study. Beck conceived the notion of household to be both producer and consumer of its own output. Household' in this context, comprises two or more people that dwell together, who acknowledged the authority of a man or woman who is the head, and every member maintain a unique food plan and are supported by at least one income-generating activity. Taking Beck theoretical underpinning into HIV analysis, let assume that the household (i) has three forms of inputs (Labour, capital and technological progress) to produce her output at time (t). This can be functionally written as:

$$Q_{it}=F(L_{it}, C_{it}, T_{it}).....1.1$$

Let Q_{it} , = Output, L_{it},=Labour, C_{it}, = capital and T_{it} =Technological progress)
From equation 1.1, both capital and labour are disaggregated respectively (See Knowle & Owen, 1995; Ojha & Pradhan, 2010 & Ngepah, 2012). The capital variable is categorized into human (E), natural, productive and physical capital. Particularly, it is assumed that natural, productive and physical capitals are asset holding of affected household and treated as one (AS). Also, the labour variable is segmented into healthy labour ($_hL$) and unhealthy labour ($_uL$). See Booysen and Bachmann, (2003), Matebesi and Meyer, (2004) and Russel, (2004). Let equation 1.1, be restated as:

$$Q_{it}=F(E_{it}, AS_{it}, {}_uL_{it}, {}_hL_{it,} T_{it}).....1.2$$

To buttress equation 1.2, the national income accounting analysis is utilized. In the national income equation, aggregate output (Q) is assumed to be equal to aggregate income. It is therefore assumed that the value of household output will be equal to the income. To reinforce this analysis, the United Nation Economic Commission Europe (2011) and Organization for Economic Cooperation and Development reports (OECD: 2015) defined household income as the monetary value of all goods produced by the households for own consumption as an element of self-employed income. Therefore, household output (Q_{it} =Y_{it}) is considered as household 'i' income at time 't' (Y_{it}). Rewriting equation 1.2 into functional form of the expression will be;

$$Y_{it} = f(E_{it}, AS_{it}, {}_uL_{it}, {}_hL_{it,} T_{it})……...….1.3$$

Where; household income (Y_{it}) is a function of educational attainment (E_{it}), household asset holding (AS_{it}), healthy labour (hL_{it}), unhealthy labour (uL_{it}) and technological progress (T_{it}).

The equation 1.3 informs the model for the empirical analysis. This is augmented by selected socio-economic and demographic variables (DV) as suggested by Masanjala (2006), Iya *et al*. (2012) and Zhang *et al*. (2012). This can be re-specified as:

$$Y_{it} = f(E_{it}, AS_{it}, {}_{u}L_{it}, {}_{h}L_{it,} T_{it,} DV_{it}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots 1.4$$

The demographic variables (DV_{it}) is decomposed into; sex of household head (Sex_{it}), non-household income (NI_{it}), health expenditures (H_{bit}), care giving activities by other household member/s (CGA), occupation of respondents (OC_{it}) and productivity loss (PL_{it}) .
The equation 1.4 is replaced with:

$$Y_{it} = \Omega_0 + \Omega_1 E_{it}, + \Omega_2 AS_{it} + \Omega_{3u} L_{it} + \Omega_{4h} L_{it} + \Omega_5 T_{it} + \Omega_6 Sex_{it} + \Omega_7 NI_{it} + \Omega_8 H_{bit} + \Omega_9 CGA_{it} + \Omega_{10} OC_{it} + \Omega_{11} PL_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1.5$$

Where: $\Omega_{0:}$: Intercept
Ω_1, Ω_2, Ω_3,. Ω_n: Regression parameters of predictor variables. The other variables are previously defined.

Measurement of Variables

With respect to equation 1.5, the household income is noted as the aggregate income earned by the household member/s in a given period of time, excluding remittance (See United States Internal Revenue Code, 2003& Craig, 2014). To measure the household income, the researchers compared two periods (before a member(s) gets infected with the illness and after/current HIV/AIDS status of the household). When the difference between the income values for the two periods (Current –Past) is negative, one (1) is assign to such variable, when it is positive a dummy variable that takes zero.

The human capital variable (E_{it}) captures the educational level of the household head. This takes the value 1, if the head has no formal education and otherwise 0. The assets holding (AS) captures the asset that is sold due to HIV/AIDS cost on member/s (Oni *et al*., 2001 & Natalia, et al, 2014). This takes the value 1, if assets are sold and otherwise 0. Accordingly, Oni *et al*. (2001), Hilhorst *et al*. (2004), Mahal *et al*. (2008) and Ghailan *et al*. (2010) in their diverse studies throw more light on HIV and labour nexus. Bringing that analysis on board, the unhealthy

labours variable ($_{U}L$) measures the total number of adult member (18-65 years) infected with the illness. It takes the value 1, if more than one adult is infected with the HIV (excluding the participant) and 0 otherwise. The healthy labours ($_{h}L$) capture the number of adult members not infected with the disease. It takes the value 1, if adult(s) member without HIV is absence and 0 otherwise. The technological progress variable (T_{it}) captures the current or past work experience of the respondents. It takes the value 1, if the participant has no work experience and 0 otherwise. See the studies of Rosen *et al*. (2006) and Mbaeh *et al*. (2015) on HIV/AIDS and workers skill and experiences. The sex of household head (Sex) intend to which sex experience greater income decline (See Iya *et al*., 2012). If the household head is a female, this takes the value 1, otherwise 0 for male. The non-household income (Remittance; NI_{it}) was emphasized by Naidu and Harris (2006) and Joyce *et al*. (2008). This is taken as the monetary value of gifts and aids received from relatives and friends. It takes the value 1 if household does not receive remittance, otherwise zero. The health care expenditures were explicitly discussed by Steinberg *et al*. (2002), Whiteside *et al*. (2006), Smit (2007) and Iya, et al (2012) in their respective studies. The health care expenditures (H_b) captures the aggregate amount spent on HIV/AIDS drugs, service fees, etc. It takes the value 1, if any cost is incurred & 0 otherwise. From previous literatures, it was revealed that the illness reduces the time spent by other member (s) on productive activities (Oni *et al*. (2001 & Hilhorst *et al*. (2004). Thus, the care giver activity (CGA) captures the hours per day spent by members for taking care of sick person/s. It takes the value 1, if adult member spends productive time caring for ill member/s and otherwise 0. Furthermore, the occupation of respondents (OC) was incorporated in the model to measures the occupational distribution of the respondents. The value 1 is assigned to respondents that are unemployed, and zero to those employed. Finally, productivity loss (PL) captures the numbers of days absent from productive activities. It takes the value 1, if the respondents took some days off within a month to attend medical care & 0 otherwise.

Method of Data Analysis

The Binary Logistic Regression Technique (LRT) is employed to predict the Odd/livelihoods of income decline among affected household in Lagos state. The LRT is a type of regression which is applied when the predicted variable is dichotomy while the predictor variables are of any form (Hosmer & Lemeshow, 2000). The dependent variable usually takes the value of one (1) with a probability of success ψ or otherwise zero (0) with a probability of failure as $1 - \psi$. Using the income equation 1.5, the log-odd ratio is such that:

Odds = ψ_i = Aggregate household income decline due to HIV/AIDS illness.....1.6

1 - ψ_i Aggregate household income do not fall due to HIV/AIDS illness.
Therefore, equations 1.5 and 1.6 can be specified as:

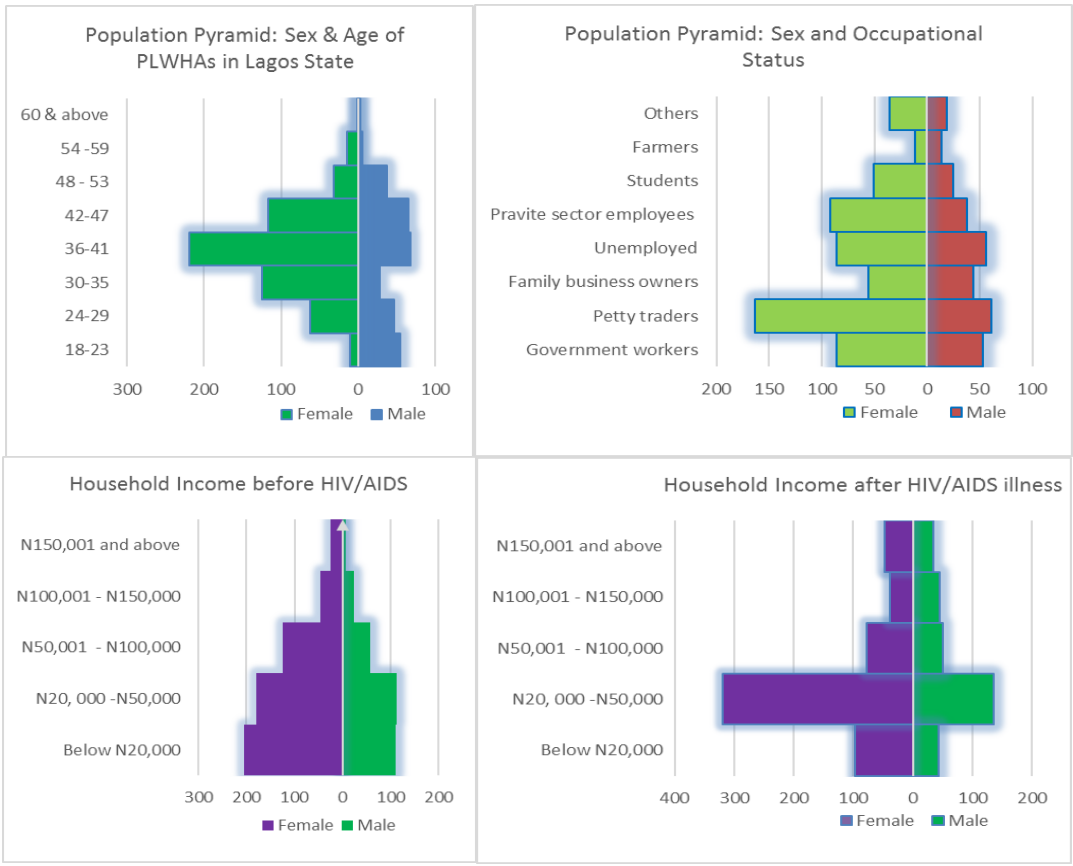
$$\text{Odds} = \frac{\psi_i}{1 - \psi_i} = \Omega_0 + + \Omega_1 E_{it}, + \Omega_2 AS_{it} + \Omega_{3u} L_{it} + \Omega_{4h} L_{it} + \Omega_5 T_{it} + \Omega_6 Sex_{it} + \Omega_7 NI_{it\ldots} + \varepsilon \ldots 1.7$$

The Logistic Regression Technique (LRT) is justified for the study because 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). Accordingly, only variables that pass the Wald Statistics criterion of 1 and 5 per cent are discussed in the empirical result.

4. Data Presentation, Interpretation and Discussion of Results

The descriptive statistics result suggested that only 891 (59.4%), of the 1242 questionnaires retrieved were deemed usable for the analysis. The data was aggregated according to locality/Local Government Area (LGA) of the respondents. The outcomes indicated that 60 per cent of the participants reside outside the Local Government Areas (LGAs) where treatment and therapies are received. In all the ten centres, female respondents within age group 36-41 dominate the study (Figure 1). This finding substantiates previous studies by 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. To buttress these views, Reneth and Matshe (2006) and Tham-Agyekum et al., (2011), agreed that the cultural and economic power imbalance between men and women often play out in favour of male, by implication, men demanding for sex sometime in exchange for money and gifts.

Figure 1: Population Pyramid showing Sex, Age, Occupation and Household Income



The occupational distribution outcome submitted that most respondents are petty traders. The income variable shows a dramatic shift of earning in both HIV scenarios. Before the illness, majority of the households earned income below ₦20, 000. However, after the HIV infection, most households are within the income scale of ₦20, 000-₦50, 000. Female respondents tend to be in the highest income scale of ₦150, 000 and above in both HIV scenario.

Household per capita income is obtained by dividing aggregate household income by the household size. The outcome suggested that Mean PCI was higher for male head of household (₦10569.40K=$53), compared to female household head (₦8880.50K=$45). Table 1 provides the household mean income and Per Capita Income (PCI) of selected characteristics.

Table 1: Selected Characteristics and Mean Income/Per Capita Income (PCI) of PLWHAs

Sex of Household Head (HH)	Nos.	%	Mean Income before HIV (₦)	Std Dev. (Before HIV)	Mean Income After HIV (₦)	Std Dev. (After HIV)	Mean PCI Before HIV	Mean PCI After HIV
Male	678	76	40760.1	38940.6	52153.8	46486.0	8260.4	10569.4
Female	213	24	47629.6	44543.2	43192.9	43226.6	9792.7	8880.5
Educational Status of HH								
No Basic Education	125	14	35480.5	37039.8	51720.4	47277.1	6860.1	10000.1
One Form of Education	766	86	43531.8	40869.2	49732.8	45654.6	8927.8	10199.5
Age Group								
18-23	66	7.4	31136.9	31486.2	60455.0	52577.7	6486.8	12594.8
24-29	109	12.2	51560.1	41071.8	47661.0	48086.4	9765.5	9027.0
30-35	153	17.2	46177.0	37874.3	47484.1	46368.6	9098.6	9356.1
36-41	287	32.2	37439.5	38528.1	50244.3	44385.3	8069.9	10829.9
42-47	182	20.4	45742.3	45521.8	47967.4	41786.7	9725.6	10198.7
48 and above	94	10.6	42234.5	41708.3	52766.4	49310.5	7591.0	9483.9
Employment Status								
Unemployed	332	37	45060.7	43774.0	38946.2	42030.5	9405.9	8129.5
Employed	559	63	40823.4	38261.3	56583.6	46808.1	8176.5	11333.0
Marital Status								
Unmarried	337	37.8	38442.6	37237.5	49852.1	46250.6	7497.2	9722.3
Married	373	41.9	46528.7	41524.3	54209.5	48063.1	9535.7	11109.9
Divorced/Separated	93	10.4	44946.7	42563.9	39193.9	37476.8	9976.2	8699.3
Widowed	88	9.9	37386.9	43733.6	44261.8	40744.1	7937.4	9397.0
Household Size								
1-4 persons	384	57	43802.6	42520.1	52591.6	48306.8	14110.7	16942.1
5 persons & above	507	43	41341.7	38783.1	48057.6	43870.6	6571.7	7639.2
Household Member with HIV								
Only Respondent	541	61	44751.0	42468.8	43614.1	42317.4	9113.5	8882.0
Two or more	350	39	38771.9	36826.9	59900.4	49314.0	7866.7	12153.6
Adult Member without HIV								
Adult Member Present	104		40914.0	41317.9	39663.9	38543.1	8384.4	8128.2
No Other Adult Present	787		42599.0	40335.1	51379.1	46595.1	8653.9	10437.6
Duration Living With HIV								
1-4 Years	378	42	45370.9	42153.5	46508.3	44652.9	9250.3	9482.2
5-8 Years	333	37	42297.8	40244.6	46066.5	40217.7	8565.1	9328.2
9 Years and above	180	21	36361.6	36413.3	64667.1	54666.7	7412.3	13182.3
Caregiver Activities								
No Caregivers	501	56	40659.2	43318.2	40639.1	37093.1	8218.8	8214.7
Present of Caregivers	390	46	44641.5	36320.1	62051.7	52779.1	9148.8	12716.8
Asset Sale								
No Asset Sale	655	74	40802.0	40215.5	45504.2	41841.0	8205.5	9151.2
Yes	236	36	46843.7	40780.8	62521.6	53670.7	9831.2	13121.6
AIDS Related Death								
No Death Case	633	71	42551.8	42333.2	43799.8	41243.4	8649.8	8903.5
Death case	258	29	42035.4	35407.9	65252.4	52661.1	8556.3	13282.1

The result also indicated that there is an increase of 67.03 percent in PCI (₦13282.10K=$67) of household who has lost a member to AIDS related death compared to those (₦8903.5K=$47) who hasn't. One singular explanation for this outcome might be that households who have encountered AIDS death tend to devoted little or no income to expenditure on health care while their counterparts tend to spend more on health-related drugs and services (See Table 1 for other results).

The logistic regression outcome is depicted in Table 2. Each model exhibits the odds ratio (Exp (B)), the coefficient (B) in parentheses, and an asterisk which represents the level of significance. For valid interpretation, a categorical variable is sometimes changed into a dummy variable. Particularly, the dependent variable, (household income), is coded one signifying declining household income and a code of zero to household income not reducing. The socio-economic variables are categorical; therefore, they are run as dummy variables such that each category of variable is assigned the values of 1 or 0.

In model one, which is the baseline model, five variables derived from the theoretical framework are estimated. From model one to seven, the asset sale variable (1.505, 1.492, 1.24, .890, .817, .819, and .740) is positively related to declining income. By implication, the odd of income decline is increased when household sell assets. Correspondently, households where assets are sold will experience greater burden of income fall than household where assets are not sold (4.5, 3.45, 2.44, 2.26, 2.267 & 2.095). This result substantiates the finding of Bollinger and Stover (1999), Oni *et al*., (2001), Mather *et al*. (2004), Slater and Wiggins (2005), Arrehag *et al*. (2006), Natalia *et al*. (2014), that perceived HIV/AIDS deplete household's financial resources through sale of assets especially productive and physical asset. In like manner, further result also indicated that households with more than one infected adult tend to face greater income decline than the reference category (1.49 & 1.51). This finding shows that when more adult's member fell ill, the level of involvement in productive activities tend to decrease while financial obligation to drugs and medical care tend to increased. The aftermath adverse effect will be observed on the income level of the households with more sick-adults.

The gender of household head variable and declining income is statistically significant at model two only. The result denotes that female household headed is more likely to face income decline than their man counterparts (1.59). This finding is in line with Iya *et a*l. (2012) study, but contrary to earlier results by Donovan et

al., (2003), Yamano and Jayne (2004) and Marisa, (2005), who agreed that income of male head of household is more adversely affected by the illness than female head. The statistical and negative trends of remittances (0.210, 0.271, 0.291, 0.291 and 0.268) were observed in model 2-7. The negative relationship between remittances and declining income suggest that remittances reduce the burden of HIVAIDS on household income. This work support extant studies that: non-household income (remittances) augment household income and reduced the adverse impact of the illness on affected household (Mutangadura, 2000; Desmond *et al*., 2000). Households who do not receive remittance were less likely to experience income declined than household who received. One singular explanation for this outcome might be that household who do not received remittances are more economically empowered with financial and material resources to take care of themselves than the reference category.

From model 4-7, health expenditure is positively related to declining income. This implies that out-of-pocket expenditures on health care increases the odd of household income decline. This result is not surprising as: Mano *et al*. (2006) Pitayanon *et al*. (1994), Whiteside *et al*. (2006) and Smit (2007), Ofonime (2012) and Natalia, et al. (2014), asserted that the long duration of HIV/AIDS illness and its associated health cost lead to decline or loss of household income and in turn deepen household poverty. The significant trends/odd ratios of health expenditure variable (6.991, 6.45, 6.453 & 5.884), suggest that the deadweight of income decline rest more on households who spend money on health care as against those who do. This notion is supported on the ground that households who allocated greater part of their purchasing power on drugs and therapies will experience greater challenges on income growth than those who do not allocated income on health-related goods and services.

Table 2: Odds Ratios for Binary Logistic Regression of Household Income Decline on Selected Profiles of PLWHAs and other Household Member(s) (At the State Level)

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**
Education (E_{it})**:**	'B' Exp (B)	'B' Exp(B)	'B' Exp (B)	'B' Exp (B)	'B' Exp (B)	'B'Exp B)	
Ref: Household head with formal education (E_{it})							
No formal education (1)	(-.18) .83	(-.21) .81	(-.23) .798	(-.249) .780	(-.197) .821	(-.19) .82	(-.14) .83
Household asset (SA_{it})							
Ref: No asset sale (SA_{it})							
Asset sale (1)	(1.5)* 4.5	(1.5)* 4.5	(1.24)* 3.45	(.890)* 2.44	(.817)* 2.26	(.82)* 2.3	(.74)*2.1
Unhealthy Labour (uL)							
Ref: One adult infected (uL_{it})							
More than one infected (1)	(.39)* 1.5	(.42)* 1.5	(.295) 1.34	(.150) 1.16	(.036) 1.04	(.036) 1.0	(-.11).89
Healthy Labour (hL)							
Ref: Present of adult member not infected with HIV (hL_{it})							
No adult member (1)	(-.37) .69	(-.38) .68	(-.41) .662	(-.194) .823	(-.217) .805	(-.22) .81	(-.29).75
Work experience (A_{it})							
Ref: With Work exp. (A_{it})							
Without work experience (1)	(.029) 1.0	(.04) 1.04	(.14) 1.15	(.425) 1.53	(.480) 1.62	(.48) 1.6	(.45)1.57
Sex. Ref: Male							
Female (1)		(.47)* 1.59	(-1.56) .210	(.340) 1.40	(.331) 1.39	(.33) 1.39	(.38) 1.5
Remittance (Non-household income, NI)							
Ref: Received remittances							
No remittances (1)			(-1.56)* .26	(-1.31)* .27	(-1.23)* .29	(-1.2)*.29	(-1.3)*.27
Health expenditures (Hb_i)							
Ref: Absence of health care &medical service costs (Hb_i)							
Incurred cost on health care & services (1)				(1.95)* 6.99	(1.86)* 6.45	(1.86)*6.5	(1.8)* 5.8
Care giving Activity (CGA)							
Ref: No adult caregiver							
Presence of Caregiver (1)					(.459)* 1.58	(.46)*1.58	(.231)1.26
Occupation (Occ)							
Ref: Employed							
Unemployed (1)						(.-01) .99	(.035) 1.04
Productivities Loss (PL)							
Ref: No absence from work							
Absence from work due to HIV illness (1)							(.915)*2.5
Constant	(-.039) .962	(-.148) .86	(.890) 2.44	(-.268) .765	(-.38) .68	(-.38) .68	(-.49) .61
Observations; 891. The reference category for each variable is in bold letter, P<.05*.							

a. Variable(s) entered on step 1: ELH,SA, UL, hL, Ait, Sex, NI, Hbi, CGA, OCC, PL
Source: Field survey 2014/15 (Author's computation 2015/16)

In model 5-6, the care giving parameters (0.459 and 0.459) relates positively with falling income of household. This implies that care giving activities by adult household member/s do reduce the income level of the household. This result do conform to health economic literatures, as care giving activities are assumed to consume time and resources of other uninfected active members, who spend working time and financial resources to take care of their sick love ones (Musinguzi, 2012; Natalia *et al*., 2014). Supporting this view, the odd ratio (1.583, 1.582) suggested greater income decline in households where caregiver's activities are found as against the base category. Furthermore, the productivity loss variable was added in model 7, and this (0.915) increases the odd of income decline in the result. This finding support the works of Naidu and Harris (2006) and Iya *et al*. (2012), who noted that prolonged HIV/AIDS illness results into workers' absenteeism from work, and the dramatic effect is observed on the income of the household. Lastly, on statistical trend (2.498), participants who absence themselves from work tend to face greater income fall than the reference group. Given the above analysis, it is worthwhile to note that HIV/AIDS illness is still threatening the income level of household accommodating PLWHA.

5. Conclusion and Recommendation

This research work provides evidence to support the general assertion that HIV/AIDS affect household income of PLWHAs, especially in Lagos State. The changing trends in the infected age group, marital status, occupations and duration of infection necessitate the need for governments to reconsider their interventionist policies to address the problem of demographics and purchasing power changes. For instance, more respondents were found to be petty traders, unemployed, government workers, private sector workers etc. The implication of this finding pushes to the fact that the illness is seriously threatening the transition from most risk groups such as commercial sex workers into the normal occupations. In turn, the odd of present and future tax revenue from this subsector to the government is threatened. Hence, the urgent need to critically address HIV/AIDS spreads and impacts at the micro-occupational level should be taken as first-class priority; else the LGAs, State and Country revenue structure and economic progress will be affected.

In addition, the empirical results demonstrate that there is likely to be more burden of income decline on households: who sell assets, have more adults infected, spend money on health-related drugs, female head just to mention a few. Therefore, there is the urgent need for the Lagos State Government to stimulate and increased antiretroviral drugs, financial and material aids whose demand are expected to

increase in future. The time to act is now, to prevent new infections, reduce AIDS mortality and support home-based care activities. This is possible when government policy measures are geared toward assisting affected households to maintain regular income through: skills empowerment and cash transfer programmes which can provide financial protection for the households. The government in collaboration with other social partners should try as must as possible to improve their financial and material aids to the Support Groups (NEWPHA) as it has been an avenue for some of the members to gain new skills and employment opportunities. Furthermore, this study observed that more respondents contacted the HIV/AIDS illness in the last three years (2013-2015). This implies that, new infection rate might increase among Nigerian, especially in the 2016-2017/18 periods when the country is being confronted with the phenomenon of recession and hardship. Lastly this study, advocates for more HIV/AIDS awareness and campaign programmes which should be carried out by the government and her agency in every sectors/spheres of the Nation.

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Appendix

Sex	Frequency	Percentage
Female	581	65.2
Male	310	34.8
Total	891	100.0