

Impact of ART Use on Labour Force Participation among PLWHA Using ART in Southern Highlands HIV/AIDS Program in Tanzania

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Abstract

This is the retrospective cohort study which was conducted to analyse the impact of ART on labour force participation by 2829 PLWHA using ART at in Tanzania from 2005 to 2011. Quantitative method of research was applied and review of patients' record was used to collect data. The results revealed that 92.4% of PLWHA registered on ART belong to working age group i.e. 15 – 65 years old (t-statistical value = 4.9 and p - value = 0.0002). There were 92.0% PLWHA who were able to work before ART, but labour force increased to 99.5% after PLWHA initiated on ART (correlation coefficient, $r = 0.999$, p-value < 0.001). The researcher concluded that majority of PLWHA using ART belongs to the working age group, and ART increases PLWHA labour force participation. The researcher therefore recommended that ART is worth continuing on with the universal population coverage. The study has some limitations as it assessed only one benefits of ART that is labour force participation of PLWHA.

Key words: PLWHA, Antiretroviral therapy, labour force participation, resource limited setting

1. Introduction

The human immunodeficiency virus (HIV) infection that causes Acquired Immunodeficiency Syndrome (AIDS) epidemic has been identified as the primary public health concern worldwide especially in many developing countries where it is affecting most Sub-Sahara African Countries. The first cases were reported in 1981 in USA and today more than 30 years later, the latest global and regional picture on HIV and AIDS shows that an estimated 36.9 million people worldwide had HIV infection by 2014 (WHO, 2015). Nearly 30 million people have died of AIDS-related causes since the beginning of the epidemic (WHO, 2014). WHO (2014) also reported that there were 2.0 million new HIV infections in 2014.

Sub-Saharan Africa remains the centre of the epidemic with 25.8 million PLWHA, and 1.4 million new infections in 2014 (UNAIDS, 2015). Tanzania is one of the Sub- Sahara African countries with high HIV prevalence, facing a mature, generalized HIV and AIDS epidemic. In Tanzania, recent data based on household surveys, the HIV prevalence in adults aged between 15 – 49 years estimated to be 5.1% in 2011 (Tanzania HIV/AIDS and Malaria Indicator Survey [THMIS], 2011/12). However, according to UNAIDS (July 2014), it has been estimated that HIV prevalence in Tanzania is 4.8%.

Although there is no cure for HIV infection, antiretroviral therapy (ART) is the recommended currently available treatment for HIV infection. In the era of ART, in 2014, AIDS-related deaths fell down to 1.2 million from a peak of 2.3 million in 2005/2006 and reduced significant number of new infections each year as it was expected without ART (WHO, 2014). This study was set to establish the impact of ART on labour force participation by PLWHA using ART.

1.1 Distribution of HIV Infection among Age Groups

Trends in HIV Infection diagnoses from 2001 to 2010 in USA, Washington, show that the majority (57%) of HIV infection diagnoses were reported in people between the ages of 30 and 49 years old (Massachusetts Department of Public Health Office of HIV/AIDS, 2011). UNAIDS (2004) reported that youth between the ages of 15-24 who are of productive age group had been especially hard hit by HIV infection worldwide. For instance, most young people of 15-24 ages, living with HIV/AIDS are 62% in Sub-Saharan Africa, followed by 18% in South East Asia, 6% in Eastern Europe/Central Asia, and Latin America (UNAIDS, 2004).

1.2 ART intervention coverage

In the era of ART, advances toward universal access to treatment, care and support services had been a significant achievement in 2009, whereby more people especially adults and adolescences reported to receive antiretroviral therapy in all regions of the world than at any previous time in the epidemic given the considerable challenges that accompanied the flattening of global funding for HIV programs in low and middle-income countries (Global Report, 2010). Since ART program started to be implemented in Tanzania from 2004, the ART coverage for PLWHA eligible to receive ART is only 50% (URT, 2012).

The progress toward ART universal access goals remained mixed, with substantially greater gains in some settings on certain aspects of treatment, care, and support than in others. According to *Progress Reports and*

UNAIDS estimates (2010), the number of children younger than 15 years receiving antiretroviral therapy had increased to 29% in 2009, however, coverage of children is less as compared with 37% coverage of adults.

1.3 HIV impacts and benefits (Outcomes) from ART

In general, five different aspects of the economic impact of AIDS can be established (Haacker, 2002 and 2004):

- Impacts on key macroeconomic variables (GDP, average incomes, savings and employment);
- The household level impact, focusing on household incomes (rather than average incomes), poverty, and income distribution;
- The micro-level impact on firms and other enterprises, focusing on output, productivity, and investment;
- The fiscal impact on government revenues, spending (and specifically spending related to HIV/AIDS) and the budget balance; and
- HIV/AIDS affects commercial sectors like tourism.

In addition to health and social benefits of ART use to PLWHA, economic benefits has been noted and measured in a number of ways as reported by Drummond et al. (1987). Economic benefits from ART can be measured as direct benefit (e.g.. savings in health care costs), and indirect benefit (e.g. adults are able to return to work, improved productivity and GDP growth/economic development, decreased retirement due to HIV/AIDS, and children are able to attend school regularly).

Basing on these types of benefit of ART intervention, different studies have demonstrated the positive economic benefit from ART in developed countries like in USA and Europe, and in a range of resource-poor settings, including Cameroon, Cote d'Ivoire, India, Kenya, Malawi, Senegal, Botswana, South Africa and Uganda (Larson et al. 2008; Thirumurthy et al, 2008; Habyarimana et al, 2009). For instance, private sector companies, such as the Electricity Company of Cote d'Ivoire, have reported both health benefits, cost savings and improved productivity as a result of providing ART to employees. In the 2 years following the introduction of comprehensive HIV/AIDS care with ART in Electricity Company of Cote d'Ivoire, there was 94 per cent decrease in absenteeism, and 81 per cent decrease in HIV-related hospitalizations, Moreover, prior to beginning treatment, only 12.5% of Cote d'Ivoire Electricity Company workers were able to perform full duties (Eholie & Nolan, 2003), but after 1 year on ART this proportion increased to 84% and after 2 years increased to 91% (p-values not reported).

It is obvious that inequality between rich and poor nations regarding access to HIV care and treatment constitutes a “moral scandal” as many experts and policy-makers continue to argue that improved access to ART is not a good investment choice in developing countries because money targeted to improving public health in developing countries has to be spent, as elsewhere, where it can yield the highest returns (Ainsworth & Teokul, 2000; Creese, Floyd & Alban, 2002).

Papers in the second part of the book by Moatt et al (2004) critically review these major “economic” arguments that have been raised against bridging the North-South gap in access to HIV treatment. These papers show that these arguments are indeed based on a very limited rationale. All papers in the book by Moatt et al (2004) bring evidence to support the idea that scaling up access to ART and other effective treatments for HIV can be a rational and well-thought economic choice for developing countries. This book tries to convey the message that denying access to ART is not only bad ethics and public health, but also bad economic policy.

1.4 Problem Statement, Purposes and Justification of the Study

1.4.1 Problem statement

Although different studies have shown that ART has many benefits such as increasing body immunity and reducing morbidity and mortality to PLWHA (McNaghten, et al, 1999; Mocroft, et al, 2000), saves costs of 2,200 life - years per 1000 PLWHA using ART and leads to improved productivity in developed countries (Mazzotta, 2012), ART intervention is relatively new in developing countries including Tanzania and it is still uncertain about the outcomes of ART to PLWHA using ART in developing countries which have limited resources, keeping in mind that antiretroviral drugs are expensive compared to other HIV interventions such as HIV prevention (Masaki, et al 2003; Creese, et al, 2002). This gap leads to low allocation of funds for ART intervention in developing countries. In the Southern Highlands HIV/AIDS Program in Ruvuma Region, Tanzania, there has been flat funding (i.e. fixed annual budget) of USD 1,098,046 from President's Emergency Plan for AIDS Relief (PEPFAR) (PEPFAR Budget in Ruvuma, 2010- 2012), resulting into the ART coverage for PLWHA eligible to receive ART to be only 50% in Tanzania (URT, 2012). Thus, there is a need to establish economic impact of ART in Tanzania.

1.4.2 Purposes of the Study

The purpose of this study was to assess the benefits from use of ART among PLWHA at Songea Regional Hospital in Ruvuma Region in Tanzania. In order to understand whether ART is beneficial or not, this study was set to establish labour force participation among PLWHA using ART before and after ART use.

1.4.3 Justification for research

Economic evaluation of the Southern Highlands HIV/AIDS Program in Ruvuma Region in Tanzania was required to demonstrate if the ART intervention makes the best use of funds made available for the program so that the policy makers can make informed decisions on the optimal allocation of scarce resources for scaling up of ART intervention. The current economic evaluation evidence on HIV interventions particularly ART for Tanzania is generally very scarce or totally missing (Robberstad & Hemed, 2010). Lack of this evidence is particularly striking for treatment and care of patients with HIV/AIDS.

1.5 Research Question, Hypothesis and Research Objective

1.5.1 Research Question

This paper aims to answer the relationship-based quantitative research question which states: *What is the association between the use of ART and labour force participation among PLWHA using ART?* Attempt to answer this research question was done through testing a research hypothesis.

1.5.2 Hypothesis

Basing on the stated research question above, the following hypothesis was formulated:

Null hypothesis (H0): There is no association between use of ART and labour force participation restored among PLWHA using ART.

Alternative hypothesis (H1): The use of ART increases labour force participation among PLWHA using ART.

1.5.3 Study Objectives

The study objective was to explore if labour force participation among PLWHA using ART is restored.

1.6 Conceptual Framework of Economic Consequences of HIV/AIDS and ART Use

Figure 1 depicts theoretical framework which focuses on the health, social and economic consequences of illness like AIDS and ART intervention use.

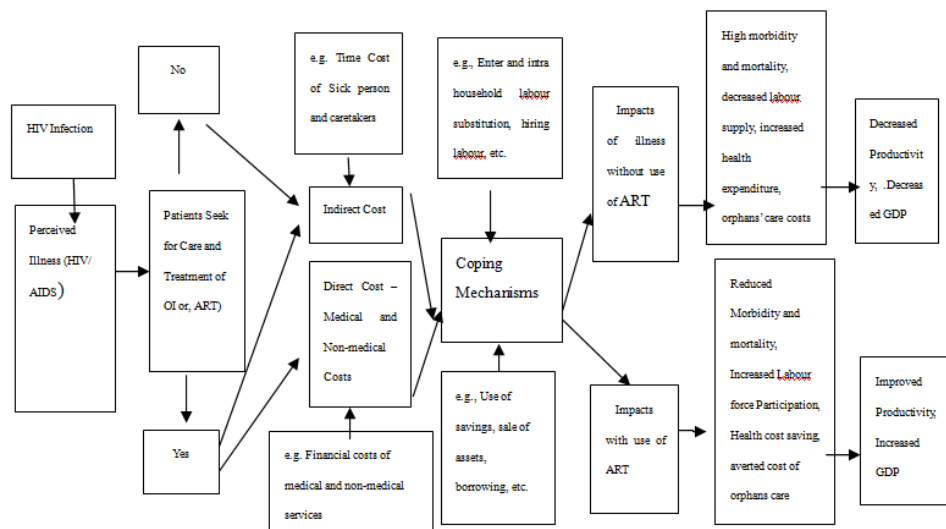


Figure 1. Conceptual framework of economic consequences of HIV/AIDS and ART use
 Source. This framework was adapted and modified from simplified flow-chart of key issues relating to the economic and social consequences of illness from the study by McIntyre and Thiede (April, 2003) to review the studies dealing with economic and social consequences of high medical expenditure with a special focus on the medical poverty trap.

In designing an economic evaluation of an intervention such as HIV/AIDS care and treatment, the first step required is to try to understand the health and social-economic consequences of HIV/AIDS and then understand

impact of ART intervention (Roura, et al, 2009), finally net benefit is also analysed. With this conceptual framework, cost and benefits from ART for individuals, households, companies and nation at large are elaborated.

2. Methodology

In this chapter the research methodology used in the study is described. The study design, the geographical area where the study was conducted, and the population and sample are elaborated. The instrument used to collect the data, including methods implemented to maintain validity and reliability of the instrument and data analysis are also described. Furthermore, definitions of study variables and ethical consideration of the study have been included in the chapter.

2.1 Study Design

This study is of a quantitative relationship based retrospective non experimental cohort study design. The model provides numerical data to determine the relationship between two variables of ART intervention which are ART use by PLWHA (independent or causal variable) and labour force participation as outcome of ART intervention (dependent or result variable) for a cohort of PLWHA on ART by using descriptive and inferential statistics to test statistical hypotheses. Inferential statistics used here include frequency inference, probability models (i.e. confidence interval, t-test, and p-value) and correlation.

The assumption was that the data are obtained from a *Gaussian population distribution (i.e. Normal Distribution)* since all PLWHA who were registered to use ART in the program were involved in the study and the sample used in the study was higher than the expected minimum sample size which can be obtained from the sampling formula. Thus, parametric statistical test (i.e. *Pearson correlation coefficient*) was used to establish association between the two study variables.

2.2 Sampling Method

The target population for this study included PLWHA who were registered for ART in Ruvuma Region, Tanzania. From the 60 ART Centers in Ruvuma Region, Songea Regional Hospital was inconveniently selected for the study. Songea Regional Hospital was chosen for this study to be carried out because it is the referral hospital for residents from Ruvuma Region in Tanzania and it has larger number of patients adequate for the required sample of this study. The sample that was used from Songea Regional Hospital was a cohort of 2829 PLWHA registered to use ART. Hence, the study sample size taken to be used was more than that of the required minimum sample size.

The estimated minimum sample of this study was 2,303 calculated by the use of the formula of study sample, which is $n = 4P(100-P)/\epsilon^2$ (Kirkwood BR, 1992; Dawson et al, 2001). Where:

n = required minimum sample size of PLWHA using ART for the study

p = Estimated proportion of PLWHA using ART who are currently surviving, 67% (WHO, 2010)

ϵ = Standard error

Therefore, the calculated sample size was

$$n = 4P(100-P)/\epsilon^2$$

$$n = 4 \times 67(100-67)/1.96^2$$

$$n = 268 \times 33 / 3.8416$$

$$n = 8844 / 3.8416$$

$$n = 2,302$$

2.3 Selection and exclusion criteria of study participants

Selection of a study sample of participants was done for patients who were initiated on ART at least six months before data collection. The sample was drawn from the patients' registers and a computerized record system. To ensure that the sample is representative, the easiest way was simply to include all patients who initiated ART during a specified study period. Thus the study sample was comprised of all patients who initiated ART at Songea Regional Hospital i.e. from 1st January 2005 to 31st December 2011. Therefore, the required data was captured retrospectively for a maximum period of 7 years (84 months) as calculated from 1st January 2005 when ART was initiated at Songea Regional Hospital to the last consultation done in the period between 1st October 2011 and 31st December 2011. The only patients who were excluded from the cohort were those reported to have transferred to another treatment sites, lost to follow up and stopped ART before the beginning of the study as their outcomes were not known.

2.4 Data Collection

Data collection for this study was carried out from 1st October 2011 and 31st December 2011. The researcher collected required information for the study by doing retrospective (historical) review of patients' charts,

accounts books, pharmacy record, laboratory records, radiology records and store records of purchased or donated equipment. The information collected was about the utilization of HIV/AIDS services, and benefits gained (i.e. labour force participation) by PLWHA receiving ART. The data collected from paper based was also entered into the National AIDS Control Program Electronic Database which is an Access Microsoft Computer Program ready for analysis

2.5 Data Analysis

During the data analysis of this study, from the raw data entered into the database, descriptive statistical results were obtained first by creating queries of variables of interest from the database. In addition, Microsoft Excel (Spread sheet) was used as well to compute study results and creation of graphs. However, manual calculations using a *hand calculator* were performed where necessary. Finally, estimate of labour force participation by PLWHA using ART as ART outcome was done.

2.6 Legal Issues and Rights of the Study Participants

Since this study was based on retrospective data, informed consent was not required and no individual participants were subjected to any harm. As far as the confidentiality was concerned, to preserve the confidentiality, service providers (i.e. medical recorder and data clerk) working in ART clinic were used to extract the data from the medical records. Moreover, no personal identifier such as patients' names was used on data collection form. Thus, patient's records enrolled for the study were reviewed by using patients' ART unique identification number as a reference; name of patients were removed. In addition, the recorded data in database were only accessed by the data clerk. To ensure more confidentiality, data clerk and medical recorder, who extracted data, were excluded from the data analysis.

3. Study Results and Discussion

In this chapter, data analysis was carried out leading to the presentation of the empirical results of this project. The analysis process includes ordering, manipulating, and interpreting data to obtain answers to the research questions. This stage constitutes a fundamental link in the research project chain whereby raw data is processed into usable information, allowing for a discussion of the empirical findings, and an evaluation of hypotheses.

3.1 Demographic Background Information of PLWHA Initiated on ART

Information on sex and age was reviewed for all PLWHA who were initiated on ART. A total number of 5,804 PLWHA were noted to have been registered on ART at antiretroviral clinic at Songea Regional Hospital from its catchment area between January 2005 and December 2011. Female PLWHA who were initiated on ART were found to be 3749 (64.5%), while only 2054 (35.5%) were male patients. Regarding age of PLWHA who were initiated on ART, the median age was 34 and age range was 1- 62 years. Age group of ≥ 15 years old (i.e. working age group) was composed of 5365 patients making 92.4%, while age group of < 15 years old (i.e. non-working age group) was composed of 439 (7.6%). These data are presented in Table 1. Unpaired t (one-tailed t) test and statistical significance results on the data of working age group were found to have t- statistical value = 4.9 and p-value = 0.0002) at 95% confidence level. This result, by conventional criteria, the difference is considered to be extremely statistically significant.

Table 1. Demographic Characteristics of PLWHA using ART

Demographic characteristics		Observation	Per cent (%)
Sex	Males	3055	35.5
	Females	3749	64.5
	Total	5804	100
Age (years)	< 1	43	0.8
	1 - 4	142	2.4
	5 - 14	254	4.4
	≥ 15	5365	92.4
	Total	5,804	100

This result is similar to the Global Report (2010) which shows that in the era of ART more people especially adults and adolescences that are of working age group are reported to receive antiretroviral therapy in all regions of the world than at any previous time in the epidemic. Specifically in developing countries set up, the study which was done in South Africa to assess economic evaluation on impact of widespread antiretroviral treatment found that the majority of PLWHA using ART were of the age between 26 (44.68%) and 35 (54.17%) years of age (Kevany, 2005). This age group belongs to working age.

3.2 Follow up Status on Retention of PLWHA Using ART

Of 5804 PLWHA registered on ART, 2397 (41.4%) were retained in the ART program service since initiated on ART (1 - 7 years period), and were still alive and on ART during the study period. Other patients were transferred out to newly established HIV clinics close to their residence, 1,517 (26.1%); lost to follow up, 1404 (24.2%); died while using ART, 432 (7.4%) and stopped ART (0.9%). These results are presented in Table 2. From these data, our study sample for further analysis was 2829 PLWHA registered to use ART composed of PLWHA still on ART and attending clinic under the study (2397) plus those died (432) while using ART from the that clinic.

Table 2. Follow up on Retention Status of PLWHA who had been on ART at Songea Regional Hospital

Patients status	Frequency	Percentage (%)
Still on ART and Alive at Songea Regional Hospital	2397	41.4
Stopped ART	54	0.9
Transferred out to other ART Centres	1517	26.1
Died while using ART	432	7.4
Lost to follow up/unknown	1404	24.2
Total	5804	100

3.3 Labour force participation by PLWHA using ART at Songea Regional Hospital.

On the follow up of functional status of 2829 PLWHA who were registered and retained on ART (i.e. PLWHA who were still on ART during the study period and those died while using ART), patients' response to treatment was assessed by the attending clinician and was recorded in the patients' chart as working, and not working. Thus, classification of patient's baseline functional status was noted as working before ART (WBA) and not working before ART (NWBA), while follow up functional status at the last visit during the study period noted as Working after ART (WAA) and not working after ART (NWAA). These distributions of patients using ART by functional status categories at baseline and follow up period are presented in Table 3.

Table 3. Labour Force Participation by PLWHA Before and After Using ART

Year of ART Initiation	Total PLWHA Retained on ART	ART Patients on Labour force before ART (WBA)	ART patients not on Labour force before ART (NWBA)	ART patients on Labour force after ART (WAA)	ART patients not on Labour force after ART (NWAA)
2005	207	204	3	207	0
2006	302	294	8	299	3
2007	306	272	34	306	0
2008	520	461	59	519	1
2009	435	404	31	433	2
2010	379	356	23	376	3
2011	248	215	23	244	4
Total (%)	2397	2206 (92.0%)	191 (8.0%)	2384 (99.5%)	13 (0.5)

After the researcher analysed the restoration of labour force of a cohort of PLWHA by assessing functional status before and after initiating ART as one of benefits of PLWHA from using ART, it was found that there were 92.0% PLWHA who were able to work before ART but labour force increased to 99.5% after PLWHA initiated on ART. These results show that majority of PLWHA were being initiated on ART earlier before full - brown AIDS. However, ART outcomes suggest high levels of improvement or stabilization for most of patients to their full capacity to participate in labour force. In general, it was found that a pattern of labour force participation by PLWHA around the time of ART initiation was low while thereafter there was an increase of labour force participation (See Figure 2). This decline in labour force participation by PLWHA in the time leading up to treatment initiation was substantially reversed after ART was started

Further analysis was done using correlation analysis to measure the strength of a linear or monotonic relationship between an independent and dependent variables. Then statistical significance of correlation coefficient was evaluated using p - values (Neter, Wasserman, & Kutner, 1989). The conventional cut-off for the p - value of 0.05 was used. The results of correlation analysis were observed that the linear regression was positive and it

was found that the strength of association between the variables is very high and that the correlation coefficient is highly significant different close to +1 ($r = 0.999$, $p < 0.001$).

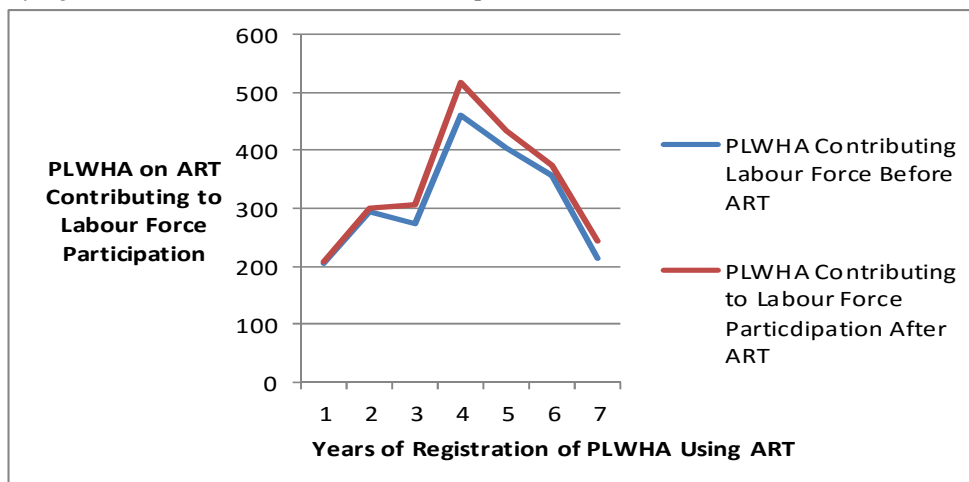


Figure 2. Labor force participation by PLWHA before and after ART.

These results showed that increase in labour force of PLWHA using ART was attributable to use of ART. This means that though ART does not cure AIDS, but it can increase the labour force of the PLWHA. Thus, with statistical analysis these results using regression analysis, it was observed positive association between two variables that the more PLWHA initiated on ART the more labour force participation and vice versa (See Figure 3).

Returning of PLWHA on ART to labour force participation, in turn can result in saving health care costs because the program makes the person healthier, improved productivity, significant improvement in the overall household incomes of PLWHA and GDP growth rates because PLWHA are able to return to work, decreased absenteeism and decreased retirement due to HIV/AIDS. Thus the introduction of scaled-up ARV-treatment programs has the potential to help reverse the breakdown of family life and enterprises in high-prevalence, low-income settings, to mitigate the economic impact of the epidemic, as people become well enough to work again. The modelling study by Ventelou, Arrighi, Greener, Lamontagne, Carrieri, & Moatti (2012), which was done on GDP growth during the era of ART up to 2030 across the three countries (Swaziland, Cameroon and Tanzania) found that by the simulation scaling-up strategies for universal access to ART, which are more costly in the short term, remain the best economic choice in the long term.

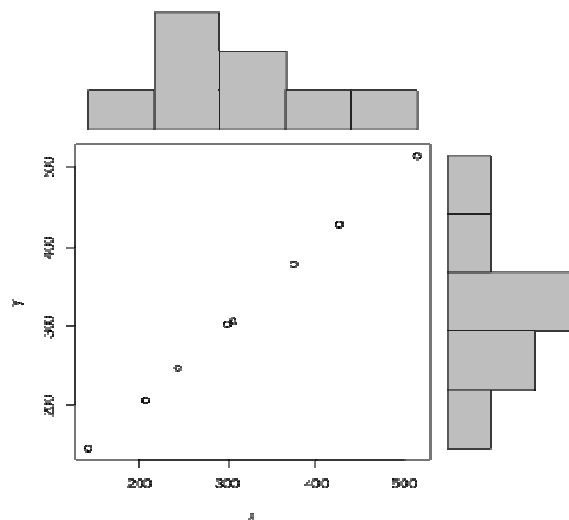


Figure 3. Linear regression of labour force by PLWHA before and after ART

The finding from this study agreed with other findings revealed in the literature review, which show that the treatment of HIV/AIDS using ARVs is beneficial. Pilot studies have demonstrated the positive economic benefit from ART in a range of resource-poor settings, including Cameroon, Cote d'Ivoire, India, Kenya, Malawi,

Senegal, Botswana, South Africa and Uganda (Larson et al. 2008; Thirumurthy et al, 2008; Habyarimana et al, 2009). Universal provision of ART had also shown to have a positive impact on health service expenditure and economic development (Eholie, 2002). For instance, private sector companies, such as the Electricity Company of Cote d'Ivoire, have reported both health benefits and cost savings as a result of providing ART to employees. In the 2 years following the introduction of comprehensive HIV/AIDS care with ART in Electricity Company of Cote d'Ivoire, there was 94 per cent decrease in absenteeism, and 81 per cent decrease in HIV-related hospitalizations. Moreover, prior to beginning treatment, only 12.5% of Cote d'Ivoire Electricity Company workers were able to perform full duties (Eholie & Nolan, 2003), but after 1 year on ART this proportion increased to 84% and after 2 years increased to 91% (p-values not reported).

3.4 Limitations of the study

In this study, as with any study of this nature, there are some limitations that need to be spelled out. This study used retrospective longitudinal approach rather than using prospective longitudinal approach which is more reliable. In addition, only one ART benefit such as labour force participation of PLWHA using ART had been considered in this study. This undermined the amount of other benefits gained from ART.

Finally, the sample is not designed to be representative at the national level or at the regional level, but rather to reflect the situation in a treatment centre where the study was conducted. However, the strength of sampling of this study is that all patients who were initiated on ARVs in the centre were selected for the study, excluding those transferred out, lost to follow up and stopped ART.

4. Conclusion and Recommendations

The conclusion of this study is based on the two research questions set to be answered by this study. From the above findings of this present study, the researcher came up with the following conclusions and recommendations:

4.1 Conclusion

Basing on the research question of this study, demographic results of this study showed that the majority of PLWHA using ART are of the age more than 15 years old which is the working age group. The non-working age group represented very small percentage, while working age group appeared to be the potential users of ART.

Through follow up of physical health functioning of PLWHA using ART, this study provides evidence on how ARV therapy affects positively the labour supply of AIDS patients. By examining change over time the physical functional features among PLWHA using ART who were working and those who were not working at baseline and after follow up, separately, revealed a significant positive pattern of change towards contribution to labour force participation at 7 years follow-up assessments.

Using data from this present study, the researcher concluded that PLWHA have significantly higher labour supply after the initiation of treatment as compared to before initiation of ART. Importantly, these results suggest that with ART treatment, the labour supply of AIDS patients can recover from AIDS severe illness. These results provide evidence that ARV therapy has significant economic benefits and can influence a range of policy decisions to support on use of ART by PLWHA.

4.2 Recommendations

From the above findings and conclusion of this present study, the researcher came up with the following recommendations:

4.2.1 Policy implication

The results of the study showed ART to be beneficial by improving labour for participation by PLWHA and thus have implications for policy making. The individuals with HIV/AIDS should be supported through ART policy and financing ART intervention to enrol on the ARV treatment programme so that more PLWHA can access to ART and enjoy the benefit received from ART and hence increase overall national economic benefit.

4.2.2 Recommendations for further research

The results of this study found that there is an increase in labour force participation by PLWHA using ART. However, the study did not support any noticeable economic effect of ART or HIV care because assessment was limited to assessing physical working status or labour force participation of PLWHA using ART at the onset and after use of HIV care. Thus, the researcher recommends further examination to more fully evaluate the economic effects of HIV treatment such as productivity, income, and overall economic status. Moreover, further research needs to be done to confirm the long term effects of ART since the result of this present study are from the short term cohort of 7 years old only.

This study assessed the PLWHA who were initiated on ART when having CD4 count less than 200cells/ μ l and

found ART to be of economic benefit. As WHO and country policies move towards starting patients on ART with higher CD4 counts (≤ 350 cells/ μ l) ART will be started among people who are healthier. Therefore, future research will be needed to examine how this may modify the effects of ART on work status and other effects related to economic impacts.

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