

UNIVERSITY OF GHANA

COLLEGE OF HUMANITIES

**ECONOMIC BURDEN OF HIV AND AIDS ON PRODUCTIVITY AND
HOUSEHOLD WELFARE IN GHANA**

BY

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Declaration

I, Daniel Epeh, do hereby declare that except for references to the work of others, which have been duly acknowledged, this thesis is the result of my own research carried out at the Institute of Statistical Social and Economic Research (ISSER), University of Ghana. This work has never been presented either in whole or in part for the award of any academic degree in this University or any other institution.




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We the undersigned supervisors certify that this is an original work we supervised the candidate to produce. We are convinced that this thesis meets the required standards set by the University of Ghana for the award of a Doctor of Philosophy Degree.

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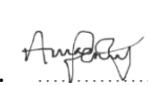
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Abstract

A chasm exists between HIV policy and effective implementation of interventions on the field calling to question Ghana's ability to meet the fast track 90-90-90 target which seeks to end AIDS by 2030. In contributing to the advocacy debate, this study aims to comprehensively appraise the economic impact of HIV on the Ghanaian society by addressing four concerns: Estimating the impact of HIV on the Ghanaian economy, explaining how HIV affects the economic conditions of Ghanaian households, computing the total societal cost for one person living with HIV in Ghana and illustrating how persons living with HIV and AIDS experience and cope with HIV.

The study deployed a sequential explanatory design to document the economic burden of HIV in Ghana. The pragmatic approach deployed a retrospective mixed methods technique which leveraged structural corroboration throughout the sections of the study for purposes of cross validation. To investigate the economic impact of HIV on GDP in Ghana for the period 1990 to 2019 a classical double log Cobb-Douglass function was used while the Cost of Illness approach (COI) was relied upon to compute the economic burden of HIV on households. The COI approach further allowed for the compounding of institutional and household costs to establish a unit cost of HIV per PLHIV in Ghana. Additionally, a narrative approach was used to appraise the intangible burden and coping strategies of PLHIV households for addressing pain and scaling up social participation for themselves and their caregivers.



Results

The study found an overwhelming burden of HIV in Ghana with significant opportunities to optimise HIV and AIDS interventions, bridging the gap between policy and practice without increasing the current investment portfolio for the national programme.

The study finds significant but declining growth inhibiting as well as welfare, freedom and productivity depleting effects of HIV and AIDS in Ghana. Noticeable differences between PLHIV households and the general population were found, confirming the abiding economic burden of HIV in Ghana. Disease intensity and productivity were not sensitive to many demographics except for pre and post diagnosis household welfare which showed significant influence on disease outcomes and longevity of PLHIV.

Catastrophic health expenditure (CHE) has declined over the years but remains high even among wealthy communities. Using the threshold of 40 percent ability to pay, 18 percent of all PLHIV in the Greater Accra region and 35 percent of all PLHIV in other regions experienced CHE. Unit costs of HIV per year amount to US\$1,380 out of which OOP household expenditure accounts for 77 percent. Indirect costs predominate OOP expenditure while institutional expenditure is accounted for primarily by direct costs. Two thirds of institutional expenditure is comprised of human resource and other overhead costs. Significant opportunities for scaling up cost effectiveness and improving compliance with ART protocols remain.

Dedication

I dedicate this thesis to all who have come before me, uncluttering the path which I now walk. To those who walk beside me sharing my sorrows and my joys. To those who will walk the paths which I now tread, may you find my uncluttering efforts satisfactory.

To the pillars and fixtures in my life, Guesla, Sena, Rini, Seli. To my parents, Mr. & Mrs. Dan-Dzide. To the people living with HIV (PLHIV) in Ghana and beyond, those who survive still, and those for whom adequate antiretroviral therapy (ART) came too late.



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LIST OF ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
ART	Anti-Retroviral Therapy
COI	Cost Of Illness
DHS	Demographic and Health Survey
HAART	Highly Active Anti-Retroviral Therapy
HIV	Human Immune deficiency Virus
GAC	Ghana AIDS Commission
GHS	Ghana Health Service
GSS	Ghana Statistical Service
LMIC	Lower Middle-Income Country
MoH	Ministry of Health
NACP	National AIDS control Programme
NMIMR	Noguchi Memorial Institute for Medical Research
PCA	Principal Component Analysis
PF	Production Function
PLHIV	People Living with HIV
SDG	Sustainable Development Goals
SES	Socio Economic Status
SSA	Sub Saharan Africa
UNAIDS	Joint United Nations Programme against HIV and AIDS

UNDESA United Nations Department for Economic and Social Affairs
WTP Willingness To Pay



CHAPTER ONE

INTRODUCTION

1.1 Background

Good health has been defined as the culminating point or nexus of complete physical mental and social well-being (World Health Organisation [WHO], 1946) . The WHO definition of health and wellness aptly expands health and wellness to include socio economic conditions and not merely the absence of disease. Romano in Engel (1960) furthers this position by characterising health and wellness as an individual’s capacity to live a balanced life, reasonably free from undue pain, disability and discomfort or the limitation of action and social capacity. Health and wellness are seen by the WHO not only as a human right but also as a fundamental pre-requisite for global peace and security. The linkages between development, health and economic status or welfare have been the substance of many academic endeavours. Identified relationships have revealed mutually reinforcing connections in which economically vulnerable communities have less access to care and a much diminished framework for fighting disease and ultimately improving community wellbeing (McIntyre, Thiede, Dahlgren, & Whitehead, 2006). Todaro and Smith (2015) suggest that when the quality of human lives and capabilities are raised through improvements in living conditions, health, self-esteem and freedoms, the development process is in motion. The connection between health, welfare and productivity is therefore promptly made. Indeed there is broad agreement that healthier populations lead to greater economic output and ultimately, even greater welfare creating a virtuous cycle (Forsythe, 2002) while negative coping strategies of unwell persons entrenches a vicious cycle which further degrades health status (Laar et al., 2015).

A more direct connection between health and productivity is alluded to by Bloom, Canning, Kotschy, Prettnner, and Schünemann (2019) who posit that health differentials account for about 10 percent of worker output variation across countries. This view could be said to be the driving force behind the inclusion of universal health coverage (UHC) as a sustainable development goal (SDG) and is supported by the United Nations Department of Economic and Social Affairs (UNDESA)(2017) which justifies the urgent need for action by estimating that half of the world's population has no access to basic health care while the majority of those who do, experience catastrophic health care payments. The WHO in Yeshiwas, Kiflie, Zeleke, and Kebede (2018) estimates these payments to be at least 10 percent of household budgets for 12 percent of the global population. Similarly, a health expenditure study for the period 2000 to 2010 involving 133 countries found the incidence of catastrophic health expenditure (health expenses exceeding 10 percent or 25 percent of household consumption) to be 9.7 percent in 2000, rising to 11.4 percent in 2005 and 11.7 percent in 2010 (Wagstaff et al., 2018).

Catastrophic health expenditure thus appears to be a global phenomenon, a situation which leads to financial hardship for many sufferers who are already poor and vulnerable and who are therefore much less able to engage in high risk-return productive investments which hold the greatest promise for shoring up their resources and shielding them from future health shocks (Holzmann & Jørgensen, 2001). A typical example of the adverse effects is seen in rural India where income smoothening efforts in response to economic shocks (including health) among the lowest wealth quartile led to 35 percent reduction in farm profits attributable to heightened risk aversion (Rosenzweig & Binswanger, 1992). Conversely, because a healthy human capital stock may easily connect the long term benefits that could accrue from investments in education and training, opportunities to optimise the productivity and income earning ability of the individual and society

as a whole may be leveraged (Bloom et al., 2019; Hena, Luan, Zhang, Wagan, & Adil, 2019; McIntyre et al., 2006).

The avoidance of financial hardship as a result of health care access is the substance of UHC (Naghdi et al., 2017). Health care access as a human right in Ghana is premised upon several national and international statutes, treaties and agreements including the 1992 constitution (Republic of Ghana, 1992), the SDGs, the Global Action Plan for Healthy Lives and Well Being, the Declaration on Primary Health Care in Astana (2018), the UHC 2030 Compact and the Political Declaration of UHC adopted at the UN High Level Meeting in September 2019 (MoH, 2019). According to the Ministry of Health (2020) Ghana's strategy for attaining UHC accordingly involves the participatory identification of a set of priority services including HIV and AIDS prevention, treatment and care services which are to be made universally available to all Ghanaians. The emphasis of service delivery under the UHC framework in Ghana is built around five (5) guiding principles and supports the view that certain "underlying social, structural, and political determinants of illness and health inequity" (Hawkes & Buse, 2016, p. 337) are as important in the quest for wellbeing as clinical and physiological determinants. The principles include targeting the poor and the vulnerable, particularly children, adolescents, women and the aged. They also include financial risk protection and strategic partnerships which ensure that access is effective and affordable constitute the second and third principles while decentralised management and domestic financing constitute the final two guiding principles of the UHC framework in Ghana.

Concerns abound over the ability of many countries in sub Saharan Africa (SSA) to accommodate the expenditure required for HIV and AIDS treatment and care (Itiola & Agu, 2018) due to the significant impact which the disease has on society. According to the Joint United Nations Programme against HIV and AIDS (UNAIDS)(2016), the global cost of the Acquired Immune

Deficiency (AIDS) response for the year 2020 is estimated at US\$26.2 billion with an estimated 2 million new infections expected that same year. Although the Human Immunodeficiency Virus (HIV) and its natural disease outcome AIDS, as a condition, does not feature among the top ten causes of hospital admissions in Ghana, it has consistently been listed among the top five reasons for in-patient mortality in Ghana (Ghana Health Service [GHS], 2017) . It constitutes a significant burden on the health, welfare, and productive systems of Ghanaian communities. Estimated AIDS mortality ballooned from 122 in 1980 to 11,797 in 2018 with approximately 334,713 persons infected in 2018 comprised of 305,199 adults and 29,514 children (Ghana AIDS Commission [GAC], 2019) . The condition is chronic and therefore requires on-going medical attention and/or limiting routine daily activities. This imposes a significant economic burden for families, households, and the nation.

The impact of HIV morbidity is felt through multiple channels; as the disease progresses, wastage sets in, sapping energy and weakened individuals find it increasingly difficult to undertake any strenuous job. Without Highly Active Anti-Retroviral Therapy (HAART) it is difficult for Persons Living with HIV (PLHIV) to keep their job, even in the absence of stigma. Consequently, incomes and savings decline rendering affected households vulnerable and compromising welfare (Asenso-Okyere, Asante, Tarekegn, & Andam, 2011). In East and Southern Africa some countries have lost about half of all their Gross Domestic Product (GDP) growth as well as all the progress made in life expectancy for about a decade (Bollinger & Stover, 1999). The resulting despair and penury in turn fuel new infections as affected households and individuals indulge in risky behaviour to manage the condition (Gillespie, Greener, Whiteside, & Whitworth, 2007; World Food Programme [WFP] & GAC, 2019).

In Ghana where HIV prevalence is less severe, the economic impact of the epidemic has not been comprehensively investigated. Inquiries into economic effects have largely been limited to Out-of-pocket payments by households on account of HIV (Asante, 2018). More aggregate studies such as the annual National AIDS Spending Assessment (NASA) consider the flow of funds from funding partners, whether local or international, through to the implementers of HIV and AIDS related activities. These studies cover both public and private sector investments in treatment and care but tend to be rather vague and unclear about unit costs per person for institutional costs of care (GAC, 2020a). There is therefore a dearth of knowledge about the cost of HIV beyond the household level. The economic impact of the disease on GDP and household productivity is unclear. The effect of the magnitude or intensity of the disease burden on household welfare has also not received much attention.

Considering the phenomenal cost implications of delayed action, it is believed that if the cost of HIV and AIDS is fully understood and documented, it would likely result, through sustained advocacy, in improved funding from national and local government sources as well as enhance mitigation of the barriers to economic growth, productivity and wellbeing at the national, household and individual level (Atun, Silva, Ncube, & Vassall, 2016; Itiola & Agu, 2018; World Bank, 2014).

1.2 Problem Statement

Eighty-eight percent of all new HIV cases in Ghana occur between the ages of 15 and 49. This age group constitutes the most productive segment of the Ghanaian population, a situation which has several developmental implications at the individual, community and national levels (GAC, 2018, 2023). As is the case with many health conditions documented in Ghana, the potential of HIV to negate the economic and development gains achieved thus far is significant. Huge expenditure outlays conceded for education and skill building are at risk of being lost with challenges for

transmission of all sorts of technical and cultural knowledge to younger generations because of HIV related premature mortality. Fatigue, lethargy, and opportunistic infections which plague PLHIV compromise productive hours with consequences for household income, consumption, leisure, and poverty writ large. Children and dependents are often unschooled, and families torn apart (Asante, 2018; Poku, Owusu, Mullen, Markham, & McCurdy, 2020).

Comprehensive data on the economic consequences of the HIV and AIDS epidemic are however scarce in Ghana. Some works on various aspects of HIV costing in Ghana, considered direct and indirect costs at institutional and household level (Asante, 2018; Asante, Poku, Owusu, & Zekeng, 2014; Rosen & Asante, 2010). They focused on cross-sectional data and were therefore unable to secure trends in expenditure over time or account for the pecuniary implications of indirect or intangible costs.

Where some reference to disease magnitude in terms of immunologic state at Anti-Retroviral Therapy (ART) initiation or time spent on ART was studied, the benefits of rapid and sustained access to care were demonstrated with a differential of 70 percent in cost declines after 4 years on treatment (Mikkelsen et al., 2017). Mikkelsen et al. also documented institutional treatment cost homogeneity across disease intensity categories using CD4⁺ cell count categories as a proxy over time. The Mikkelsen study however did not consider “Out of pocket” (OOP) costs which are complementary to the institutional costs and have been found to be gendered and excessive, constituting a barrier to care and treatment (Owusu, 2020; Poku et al, 2020; WFP & GAC,2019) . Cost and mortality impact are driven by ART (Korenromp et al., 2015) therefore many studies focussing on the economic costs of HIV focus on the direct costs of treatment to the exclusion of other costs.

The gap in comprehensive knowledge about the economic encumbrance occasioned by HIV and AIDS as experienced by the household and communities whose efforts enable clients to access institutional care over time remains. Mikkelsen et al. (2017) further estimated a direct cost of US\$113 per client in the clinical setting for the initial six months on antiretroviral treatment in Ghana. Although the study has been the only one thus far to have implemented robust linear regression models in costing HIV in Ghana to estimate the effect of time, its value is limited because the data are antiquated (study targeted only PLHIV who initiated ART in or before 2011) and other direct and indirect costs did not receive attention. A comprehensive unit cost of HIV and AIDS care in Ghana covering household and institutional (health care provider) costs therefore remains unknown.

Growth effects of HIV in Ghana have not attracted much attention either. Nonetheless inferences about the acuity and spread of the economic burden of HIV in Ghana are not unfounded and indeed can be perceived, as they have in other countries, at the level of national output as well as through household consumption and at the level of absenteeism related productivity losses (Rose et al., 2017).

Tenkorang et al, 2017 and later Owusu and Laar (2018) as well as Poku et al. (2020) all identified significant associations between socio economic status (SES) and HIV treatment and adherence as well as perceived and real HIV burden. Interestingly many of the studies revealed the desire to be accepted, to belong and group identity as major determinants of disclosure of serological status with significant implications for therapeutic success. A situation sadly reflected in the results of the 2008 Ghana Demographic and Health Survey (GDHS) which reports about a quarter (male, 21 percent; female, 25 percent) of Ghanaians being unwilling to care for family members with HIV in their own households. They were much less accommodating of other PLHIV particularly in relation to

PLHIV continuing to teach or to operate as vendors of fresh vegetables. The situation is even more dire for confidentiality of HIV status as about half of all Ghanaians (male, 58 percent and female 50, percent) reported being unwilling to keep a family member's HIV serological status secret (Ghana Statistical Service [GSS], GHS, & Inner City Fund Macro [ICFM], 2009). Undoubtedly Ghana's HIV environment is disempowering for PLHIV given that many rely on family and social support to confront livelihood challenges (Owusu & Laar, 2018) . Given the documented epidemic and clinical outcomes of non-disclosure and lack of adherence to treatment (Poku, Owusu, Mullen, Markham, & McCurdy, 2017), the budgetary implications for the national response to HIV are severe. This is so because Ghana's HAART programme is publicly funded with significant OOP payments which are devastating for PLHIV households (Asante, 2018; GAC, 2020b; WFP & GAC, 2019) .

The burden of HIV is felt within personal and productive relationships and thus warrants a surveillance mechanism to track the socio-economic status of affected persons if Ghana is to achieve Universal Health Coverage (UHC) amongst other SDG. The need for a sentinel mechanism which transcends clinical indicators to include socio economic parameters of households is well documented (Barnett & Whiteside, 2002; Negin, 2005) and helps in assessing the potential effects of existing policy.

This study is positioned within this dynamic and seeks to continue efforts to profile the economic impact of HIV on the welfare and productivity of individuals, households and the Ghanaian economy in general.

1.3 Objectives

The main objective of the study is to assess the economic burden of HIV on productivity and household welfare in Ghana.

The specific objectives of the study are:

- To estimate the effect of HIV and AIDS on Ghanaian Gross Domestic Product.
- To compute the welfare and productivity effects of HIV and AIDS on households in Ghana
- To calculate unit costs per capita for HIV and AIDS treatment and care in Ghana
- To examine the experiences and coping strategies of HIV affected households in Ghana

1.4 Research Questions

Several research questions among which the following would put the economic burden of HIV and AIDS at the centre of this research effort:

- What is the impact of HIV on the Ghanaian economy?
- How does HIV affect the economic conditions of Ghanaian households?
- What is the total societal cost for one person living with HIV in Ghana?
- How do affected household members experience and cope with HIV?

1.5 Relevance of the Study

A common characteristic is observable across most of the studies that have assessed the burden of HIV in Ghana. They are cross sectional in nature and do not incorporate the element of time, making it difficult to appraise the cumulative effect of the epidemic and relevant interventions on household welfare and economic growth or productivity in Ghana. Neither the food security assessments of

PLHIV households nor the out-of-pocket payment studies attempt to plot HIV magnitude onto the welfare-productivity nexus (Asante, 2018; Asante et al., 2014; NAP+, GAC, & UNAIDS, 2014; WFP & GAC, 2011, 2019) . Even when direct costs are detailed, indirect costs are often referred to in terms of estimated workdays lost to the disease only.

Previous OOP studies were carried out under a treatment regime which implemented an eligibility criterion for enrolment onto HAART. As a result, the studies were limited by differences in treatment coverage. In prior OOP studies, almost all study respondents were receiving ART care whereas national treatment coverage was about one third of all PLHIV at the time; below 30 percent in 2010 (Asante et al., 2014) and about 40 percent in 2017 (GAC, 2018) when Asante (2018) carried out data collection for his study. The current treatment protocol initiated in 2016 mandates all persons who test positive for HIV to be treated. This policy change would soon double ART coverage, making the respondents of any repeat out-of-pocket study potentially closer in terms of treatment coverage to the national reality than in previous studies (Lee, Naik, & Kenu, 2017; NACP, 2010, 2018b) . Data from recent studies by Asante (2018); (Asante et al., 2014); Rosen and Asante (2010) confirm suggestions by Albert, Williams, Legowski, and Remis (1998) that the natural history of HIV is changing over time and that with it, the expenditure burden would shift away from in-patient care to outpatient ARV supply. These shifts reinforce the need for recurrent inquiries to establish the profile of the cost of the HIV and AIDS epidemic.

Barnett and Whiteside (2002) recommend routine economic profiling of HIV affected households for purposes of policy monitoring particularly for ART adherence and economic mitigation. Their position is echoed by Rajaraman, Russell, and Heymann (2006) as well as Gillespie, Jere, Msuya, and Drimie (2009) who detailed how treatment adherence as well as school attendance are affected by declining SES. It is therefore apparent that without economic mitigation interventions, Ghana's

efforts to end AIDS by 2030 as part of the sustainable development goals on health (SDG 3) will come to nought. Four years after the initiation of the treat all policy an update of the economic profile of PLHIV affected households is necessary as it may be necessary to consider further economic mitigation interventions (GAC, 2017; WFP & GAC, 2011, 2019).

Literature on economic burden of HIV in Ghana does not sufficiently engage disease intensity. For example, the effect of multiple PLHIV in one household or the disease response over time. This dearth of knowledge about the intensity of the effect is compounded by the relative gap which exists in the knowledge of how the economic burden is felt and lived by the members of PLHIV households in Ghana. Even though several negative coping strategies such as withdrawal of children from school to support household expenditure in Ghana and other countries are documented (Gillespie, 2009; WFP & GAC, 2011) this phenomenon has not been sufficiently documented over time.

Owusu (2020) characterises most Women Living with HIV (WLHIV) as being housing insecure, living in abject poverty and compromising their treatment adherence due to food shortages in a study carried out in one of the high HIV prevalence areas of Ghana, the Manya Krobo municipality. It is however unclear if the situation is not merely a case of respondent self-selection as noted in certain South African surveys (Collins & Leibbrandt, 2007). This is because there is significant difference in the demographic profile of respondents in a nationwide survey such as the 2014 Ghana Demographic and Health Survey (GDHS) or the Stigma index study (NAP+ et al., 2014) and the respondents profiled in Owusu's (2020) study. Whereas GDHS reported 39.65 percent of all female PLHIV being single, never married, divorced, or widowed, Owusu (2020) reports that almost none of her respondents were in any consensual union. A situation which exacerbates the plight of female PLHIV since they are deprived of spousal support in a society which in many respects is male

dominated (Kutsoati & Morck, 2014). Additionally, the stigma index of 2014 reported only a third of PLHIV in Ghana earning income below or around the minimum wage while the profile of respondents in Owusu's 2020 study reported homelessness and excruciating poverty. Owusu's (2020) qualitative study also noted socio-cultural as well as gendered differentials in the intensity and scope of the HIV burden. This suggests the existence of significant intangible costs such as exclusion and anxiety which however were not quantified.

There is therefore a persistent need for continuing qualitative studies that put the voices of ordinary infected and affected persons at the centre of the discourse on mitigating the economic effects of HIV on the Ghanaian society. Such studies would uncover any themes emerging from changing socio-economic circumstances of PLHIV households and progress in epidemic control. Due to the gendered nature of HIV prevalence and the cultural practices which confine or restrict the rights of women in Ghana, particular emphasis on the gendered dynamics of the HIV response is desirable when such qualitative studies are implemented (Owusu, 2020) .

Finally, the preponderance of the cost of illness approach in studies involving the economic effects of HIV in Ghana obfuscates the potential impact of the epidemic on long term growth perspectives. Whereas studies involving the WHO Africa region suggest little or no impact of HIV on economic growth (Kirigia, Sambo, Okorosobo, & Mwabu, 2002) due to a large informal sector and high unemployment, others (Barnett & Whiteside, 2002; Duraisamy et al., 2006) suggest an inflection in growth. This ambiguity warrants an inquiry into the Ghanaian situation using other methods to validate the available information and bridge hitherto unaddressed gaps.

In addition to enriching the understanding of the economic effects of HIV on the Ghanaian society, the current study proposes to contribute to efforts at building a socio-economic profile of HIV

affected households. Such a mechanism would support the adaptation of existing policies such as the commitment to secure 3 percent of the NSP 2016-2020 resources for socio-economic mitigation interventions including ending short term poverty among PLHIV (GAC, 2016b) or the design of new approaches to confront the epidemic.

Additionally, the current study bridges the gap in knowledge about the output effects of HIV by contributing to the discourse broached by studies which focused on the effects of HIV on economic growth over time (Kirigia et al., 2002; Nketiah-Amponsah, Abubakari, & Baffour, 2019). The added advantage of this study is that it comes at a time when ART coverage in Ghana has risen from 47 percent in 2019 to 73 percent in 2021 and 64 percent in 2022 (GAC, 2020c, 2022b, 2023). The current study is therefore a better reflection of present times as it includes periods with ART coverage that are more reflective of the current treat all policy and also leverages the rebased annual GDP figures from the Ghana Statistical Service.

Finally, the current study complements the discourse on the economic burden of HIV and AIDS by integrating different methods to adduce corroborating evidence about the dire circumstances of PLHIV and their households. In giving voice to a diverse swathe of PLHIV, this study clarifies the interactions of age, gender, and other socio demographics on the economic burden of HIV, potentially addressing the issue of respondent self-selection as PLHIV respondents often display significantly higher rates of loss and penury.



1.6 Organisation of Thesis

Chapter one situates the subject within the broader discourse on health financing and disease burden studies, setting the background and identifying lacunae within the economic burden of disease literature with specific reference to HIV and AIDS in Ghana. The research questions guiding the objectives as well as the main and specific objectives are then presented prior to the significance of the study and finally the organisation of the dissertation.

Chapter two presents a review of the literature and some theoretical underpinnings. Conceptual and empirical works guiding how the study was conceptualised and an illustration of relationships between the ideas and theories and how they relate to the research study is then presented.

Chapter three is devoted to the methodological approach of the study and the characteristics of the study area as well as respondent selection and instrumentation details. Sampling, data sources, data collection and analytical approaches were also detailed in this section. The chapter ends with the provision of some ethical considerations and limitations.

Chapter four focuses on the growth effects of HIV on the Ghanaian economy with an emphasis on HIV prevalence and mortality as exogenous variables amongst others, in the production function. The chapter also escalates the marginal effects to the population level to illustrate the burden of HIV and create scenarios which may be useful for advocacy.

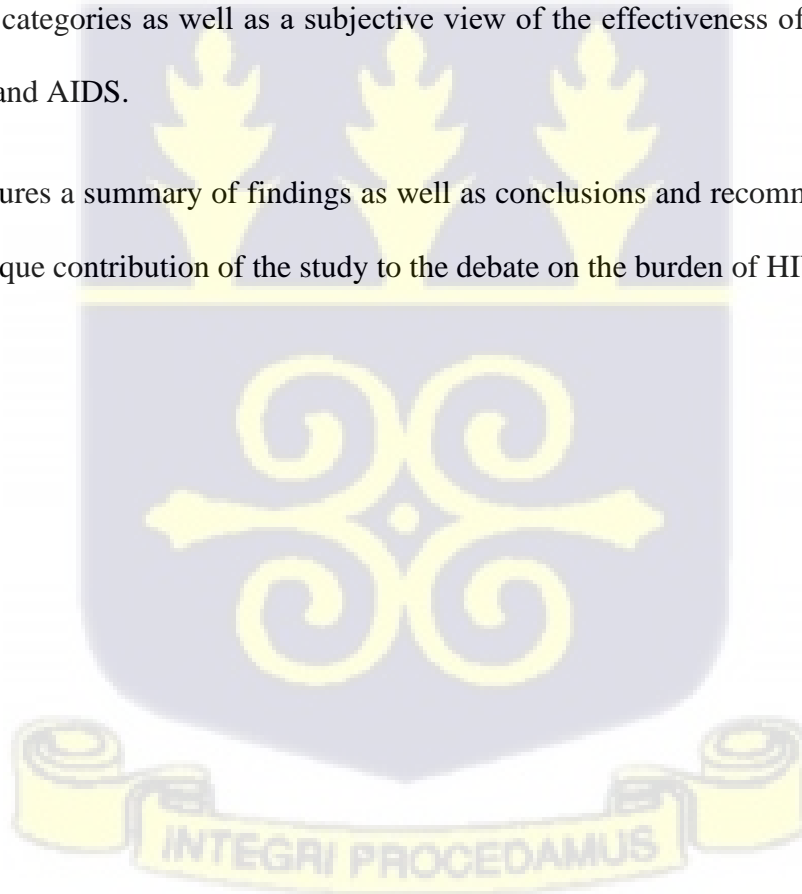
Chapter five features the welfare and productivity effects of HIV and AIDS on Ghanaian households. Direct, indirect, and intangible costs are layered to create a taxonomy of the economic burden of HIV on Ghanaian households. The chapter further explored interactions between several clinical and socio demographic variables and HIV related expenditure. The chapter also identified

trends in HIV related catastrophic health expenditure and summarised some household coping strategies gleaned from the household survey.

Chapter six aggregates institutional and household costs to compute a unit cost for HIV and AIDS in Ghana. The chapter relied heavily on secondary data including financial statements and annual reports of institutions within the health and social protection sectors to depict efficiency trends in the national response to HIV and AIDS in Ghana.

Chapter seven secured the results of the in-depth interviews. It captured PLHIV lived experience narratives. The chapter documented respondent biographical courses constructing a taxonomy of HIV expenditure categories as well as a subjective view of the effectiveness of Ghana's national response to HIV and AIDS.

Chapter eight secures a summary of findings as well as conclusions and recommendations. It also highlights the unique contribution of the study to the debate on the burden of HIV



CHAPTER TWO

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1 Introduction

The chapter provides the setting for constructing a conceptual framework for the study. Empirical and theoretical works are used to identify and explore historical and contemporary approaches to disease burden in Ghana. In the process, arguments for public investment beyond personal responsibility concerns and issues of moral hazard are discussed. An emphasis is also laid upon cost concepts and the different dimensions and scopes of health care costs which underpin the assessment of the economic burden of HIV in Ghana. The chapter further explores relationships between HIV and AIDS, productivity and welfare at varying levels of analysis; individual, household and national and how various demographic differentials are expressed at each of the levels of analysis.

2.2 Structural Functionalism

This study adopts the structural functionalist view of society as a system of interrelated parts functioning to ensure a cohesive and stable society as its main explanatory framework. According to structural functionalists, institutions of society perform specific roles to ensure stability. In this way, institutions, relationships, roles, and norms that together constitute a society serve a purpose, and each is indispensable for the continued existence of the others and of society as a whole (Durkheim, 1951). In structural functionalism, social change is regarded as an adaptive response to some tension within the social system. When some part of an integrated social system changes, a

tension between that part and other sections of the system is created, which will be resolved by the adaptive change of the other parts.

Although structural functionalism predicts adaptive change as a response to tension within the social system, it does not sufficiently illuminate the pathways of tension within households and the health system. Nonetheless structural functionalism initiates the task of illustrating how the cost components of HIV treatment and associated interventions as well as the decision to seek and access these services, including the avoidance and minimisation of risks are intricately linked with reinforcing connections. The nature and source of cost can potentially alter the treatment trajectory of persons living with HIV. Sources of cost for HIV treatment including direct, indirect and intangible cost are influenced by socio-economic status and behavioural patterns which are important drivers of HIV. The drivers therefore shape the intensity or magnitude of the infection which consequently informs the epidemic response. The forms of adaptations needed to maintain systemic balance in relation to the everyday negotiation of life for PLHIV are mediated by the various effects of the costs [different dimensions] on household welfare and productivity.

2.3 Grossman's Health Capital Theory

The tensions which are referenced in the structural functionalism theory above are a given and societies must invest in corrective action to ensure stability and therefore survival. One such investment is that which targets the people who make up society. Grossman (1972) argues that good health is a durable capital stock which produces healthy time, time which an individual can spend producing income and other commodities. Since a person's stock of knowledge affects their productivity, additional knowledge or education is likely to increase demand for health which in turn increases income through reduced sick time. Higher socio economic status (SES) has also been reported to increase the marginal value of a unit of health over a unit of income leading to a greater

demand for healthy time among persons of higher SES. Grossman (1972) therefore theorises that the initial stock of “good health” which people are born with can be invested in as a commodity to increase good health and that age conversely diminishes such good health through depreciation over time. Household SES holds “good health in gestation” releasing increasing value as individuals expand their income earning potential through education, increased social participation and social protection. As Schultz (1972) succinctly put it, the investments in people would result in good workers who will produce an increase in both hard (units of goods and services) and soft outputs which reflect in values such as trustworthiness and initiative. Conversely PLHIV with low SES and an ever-diminishing sphere of opportunities for social inclusion and engagement would experience poorer health outcomes including poorer clinical responses to ART regardless of Health Insurance coverage, a confirmation of the SES-health nexus which abounds in the literature (Case & Deaton, 2005; Deaton & Tortora, 2015; Titus J. Galama & Van Kippersluis, 2013). I argue in line with Twerefou, Akolmolga, and Barimah (2014) that time¹, as well as socio-economic and demographic determinants such as age, wealth, education and other social relationships classified under personal, geographic and environmental factors are associated with the gradients in health and quality of life among PLHIV in Ghana.

2.4 Biographical Disruption – Life course

Bury (1982) uses an emotional map to explore relationships between disruptive life experiences such as chronic illness and the process of identity creation and maintenance. In this discourse on the meaning of life “quality” and health endowments he is consistent with Grossman (1972) in highlighting the need for wellness and the effort people will muster to protect it. He sees illness as

¹ Time in this sense means duration of the disease or length of time since PLHIV was infected.

body failure and conceives biographical disruption as the inability of the body to perform those actions which crystallise our sense of self, compromising in the process the identities which we create for ourselves within our families, our communities and society at large.

He is supported in this impact assessment approach to illness by Carricaburu and Pierret (1995); Strauss and Corbin (1990) as well as Faircloth, Boylstein, Rittman, Young, and Gubrium (2004) amongst others, who have pursued socio economic analyses of disease outcomes by keenly observing the dynamics of the life courses of their research subjects pursuant to disruptive phenomena such as chronic illnesses. The biographical disruption model focuses on a discontinuity positing that inquiry proximate to the diagnosis of a disease or a disruptive event inevitably throws up theoretical and empirical questions which assist in understanding the daily circumstances of sufferers of disease as well as the wider structural and cultural framework within which their existence, knowledge and identities are created, maintained and disrupted (Bury, 1982). Patterns of access and consumption of resources, characteristics of relationships as well as normative rules of reciprocity and mutual support can be distilled as people transition through the stages of biographical disruption.

Bury (1982) believes that sudden illness will immutably cause biographical disruption through three phases including:

- (i) The problem onset phase characterised by recognition, disbelief, denial and anxiety issues often manifest by dread of immediate death and disclosure challenges,
- (ii) The emerging disability and uncertainty phase which is mediated by existing knowledge both biomedical and biographical. A stage often steeped in rationalisation and a distancing of the disease

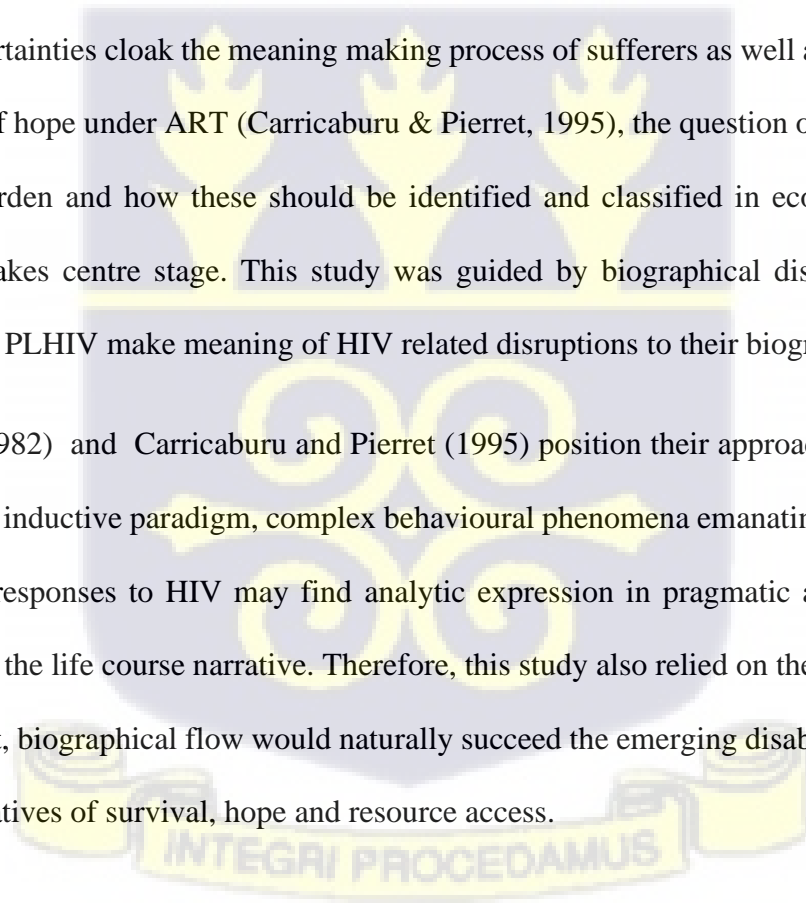
from the self in a bid to isolate causation. This stage is very responsive to experience and uncertainties in terms of treatment.

(iii) The chronic illness and mobilisation of resources phase is the final stage of the biographical disruption model wherein restriction in mobility whether physical or social, fatigue and embarrassment are not unusual.

Contrary to the presumed ubiquity of disruption, Carricaburu and Pierret (1995) as well as Faircloth et al. (2004) conceive other circumstances in which sufferers are able to demonstrate better isolation and dependency outcomes based on prior social network characteristics.

Seeing how uncertainties cloak the meaning making process of sufferers as well as the possibilities for the creation of hope under ART (Carricaburu & Pierret, 1995), the question of what constitutes the economic burden and how these should be identified and classified in economic burden of disease studies takes centre stage. This study was guided by biographical disruption theory in illuminating how PLHIV make meaning of HIV related disruptions to their biographical course.

Much as Bury (1982) and Carricaburu and Pierret (1995) position their approach to biographical inquiry within an inductive paradigm, complex behavioural phenomena emanating from individual and community responses to HIV may find analytic expression in pragmatic approaches which bring structure to the life course narrative. Therefore, this study also relied on the deductive notion that when present, biographical flow would naturally succeed the emerging disability phase and be replete with narratives of survival, hope and resource access.



2.5 Approaches to Economic Burden of Disease studies

Etymologically the word cost is rooted in Nordic languages and refers to, choice, selection, value and other notions of classification or primacy. In more recent times cost has come to be known as the monetary value of goods and services which consumers and producers exchange. Costing in a certain sense therefore underpins every psychosocial interaction and constitutes a fundamental consideration in every act or relationship as intimated by various rational action theories. It can therefore be seen as a first step towards the decision-making process and can be referred to as the socio-economic burden of an object, a place or a phenomenon; the price to pay. Flowing from these considerations, several approaches have been developed to attribute or allocate, compare and classify costs. These approaches constitute theories and principles which are often curated by guilds and professional bodies for purposes of decision support and standardisation.

2.5.1 Production Costing

Every productive activity is undergirded by a decision support mechanism which informs the choice to engage in the said activity or to commit productive resources to other applications. Accounting as a discipline has been defined as the language of business, business in this sense loosely referencing any productive endeavour. Production costing can therefore be seen as that branch of the accounting profession which is committed to accounting for the use of resources in any productive endeavour to inform subsequent decision making (Kennedy, 1997) .

Costing taxonomies are extremely varied depending on the nature and specific purpose of the productive behaviour. Quite often differences are driven by the quantity of production or the complexity and processes (quality) thereof; the former is the basis for classifying costs as fixed (FC), marginal (MC), average (AC) or variable (VC). The sum of the FC and VC make up the total cost (TC) that is the total amount of money spent in the production of goods and services. The FC

is an operating expense of a business that is independent of the volume or output of the business activity. It remains constant and does not change with the level of production. Examples of FC are rent payment, building and machinery, loan payment, etc. Within the context of disease costing, FC are most likely to occur at the level of health and policy institutions where testing and treatment interventions are crafted and delivered (Inc., 2020). This informed the approach which the current study took in prioritising institutional expenditure on treatment reported by the Ministry of Health and its agencies such as the National AIDS Control Program and the Ghana Health Service (GHS) who together are directly responsible for the delivery and monitoring of treatment and care services in the country.

Marginal cost is the addition to TC as a result of producing one more unit including all of the costs that vary with the level of production; it varies according to the volume of goods being produced. Contrary to the proponents of absorption costing who would allocate all period costs to some output or product, Spencer (1994) suggests that only raw materials or direct costs in a sense should be considered when computing MC as these are the only true variable costs. The MC of production is affected when there is a VC associated with production and although the MC measures the change in the TC with respect to a change in the level of production, a change in FC does not affect the MC. This suggests that focusing on MC may not always yield efficiency in the production process. Although computing the MC aids in tracking production efficiency through the relationship which suggests that whenever average cost (AC) is greater than MC it reflects a production process which is becoming more efficient and vice versa when MC exceeds average cost (Rajan & Reichelstein, 2009), the search for efficiency must include an effort to identify cost centres which account for FC and improve their performance or simply exclude them from the production run entirely (Kennedy, 1997; Spencer, 1994). Within the context of disease costing such a relationship could be utilised to

ascertain if treatment and care interventions are becoming more efficient or less so. It is important to note however that the distinction between FC, VC and MC is only valid in the short run since within this time frame it may be impracticable to vary the employment of fixed inputs making it necessary to employ more variable inputs if one wishes to improve output (Spencer, 1994). The cost of some components of the supply chain management systems as well as the equipment necessary for diagnostics and care could be viewed under such fixed cost rigidities.

Costs can also be classified by a measure of how well they can be attributed to the units of output being produced. In this case they can be direct or indirect. When costs are not directly consumed for the purpose of producing a service, they are indirect. The expenditure (indirect) is necessary to achieve a certain level of product or service quality but cannot be exclusively accounted for by specific goods or services being produced. Overheads are quite similar as they too provide services which may not be allocable to specific units produced but contribute in a more remote manner to the conditions under which production is achieved. Examples include expenditure such as management services and fees and security services. For purposes of economic evaluation and the matching principle in accounting theory, all such costs must be allocated to some cost centres and cost units for the purpose of aligning them with output and/or revenue (Spencer, 1994).

Indirect costs have also been likened to implicit costs by disease burden studies (WHO, 2009). These are costs which are perceived but cannot necessarily be recorded in financial statements because they do not represent an actual transfer of money. They constitute an economic burden though because they represent an opportunity cost, lost income, benefits or resources as a result of the disease or intervention.

Beyond economic costs which include both accounting (direct) and opportunity costs (indirect) social costs are said to be the only true costs because they represent a comprehensive assessment of the burden of a particular course of action to society. They include private costs which can be tangible or intangible as well as external or third party costs which include institutional and society wide costs and opportunity costs (UNAIDS, 2019). Rice (2004).

Invariably, costs are incurred for a purpose, generally aggregative on a production path, they are not losses and therefore care must be taken to ensure that any system dedicated to the metrics of efficiency is engineered to adequately distinguish production costs from the costs emanating from other policy objectives to separate fact from fiction and delineate forecast from true historical costs (Cole, 1936)

2.5.2 Disease Costing Guide

Several costing guides exist to support economic burden of disease studies. The guides have become necessary for purposes of standardisation across diseases and countries due to the extreme variability in the assumptions undergirding several studies and the heterogeneity of reported costs and methods used (McIntyre et al., 2006). Generally, much of the guidance which is relevant to HIV and AIDS recommends the identification of the entire health production path from funding sources to the final beneficiary communities of the investment. The National AIDS Spending Assessment (NASA) guidelines and the WHO's guide to the economic consequences of disease literature both entreat practitioners to consider the flow of resources through economic agents as they consume non health goods, leisure and health services themselves (UNAIDS, 2019; WHO, 2009). Guidance from both sources constitute the fulcrum of this study.

2.5.2.1 WHO Disease Costing Guide

2.5.2.1.1 Scope

WHO (2009) in line with several studies (Arndt & Lewis, 2000; R. D. Smith, Yago, Millar, & Coast, 2005) predicts economy wide impacts of HIV on the demand side (consumption, opportunity costs of therapeutic interventions) and on the supply side (labour and productivity losses). It posits that all economic agents would experience disruption. Individuals in terms of their inability to engage socially as they might have been accustomed to in much the same manner as described by Bury (1982). This decline in social interaction is applicable to firms in terms of absenteeism and morbidity related productivity declines, households in terms of present and future income, savings and investment declines as well as government in terms of morbidity and mortality related transfer payments and declines in tax revenue (Arndt & Lewis, 2000). The WHO (2009) however admonishes practitioners to be wary of using economic burden of disease studies as exclusive resource allocation devices as these are often imprecise in nature and the models used are often unstable based on the variability of the perspective, the unit of analysis and the cost items incorporated into the analytic framework. That notwithstanding, economic burden of disease studies by targeting the transmission channels of distribution of economic costs hold significant value for informing the development of strategies to placate or attenuate the economic effects of disease on various economic agents.

2.5.2.1.2 Philosophical and conceptual underpinnings

The conceptual framework recommended by WHO (2009) is premised on utilitarian theory and endogenous growth models and explores the economic impact of ill health through channels at the macroeconomic as well as the microeconomic levels. It suggests that growth and ultimately improvements in economic welfare are accounted for by investments primarily in human capital, a position supported by Barro (1991) which places education, health and wellness at the centre of

economic growth . The initial stock of human capital with the right level of investment, known to be inversely related to fertility, then provides traction for subsequent growth through complementary investments such as education, infrastructure, research and development (R&D). This happens since a group of people that is more educated and healthier would better be able to drive the above investments as both participants in R&D as well as consumers of the final products and infrastructure.

As individuals maximise their utility through the consumption of market and non-market goods and services and through social participation and leisure activities, the burden of any disease including HIV can be estimated as a proxy of the declines in the consumption of these activities (WHO, 2009).

Individual utility is affected in three (3) ways. As people prefer health for the sake of health itself, i.e. healthier than less so, good health contributes directly to utility. The second pathway through which ill health including HIV and AIDS affects individual utility is through the marginal effects of direct expenditure incurred on account of the disease. These disease-related expenses diminish resources which would otherwise have been used by individuals for normal household/personal consumption activities or to produce public goods in the case of publicly financed health expenditure. The final route through which utility is impinged is indirect. It is reflected in the diminished ability to produce income. This can be felt both in the present in terms of immediate productivity losses or in the future as households and individuals delay or diminish investments and saving to reallocate the resources to health restoration efforts, thereby depleting their ability to produce income in the future.

WHO (2009) recommends the use of models which estimate forfeited GDP growth in a bid to proxy lost market consumption opportunities while keeping in mind the calibrations and tests necessary

to contextualise the estimates, consider sensitivity analyses and appropriately address endogeneity. Although a society wide approach may be difficult to calibrate since such approaches require significant investments in data and know-how, they demonstrate significant benefits in that in seeking equilibrium, the sum of income from all economic agents (households, firms and government) is taken into account while the injections and leakages to/from income and labour are addressed with movements in aggregate expenditure, private debts and assets and changes in the supply of public goods.

Hendriks et al. (2014) similarly identify the challenge of data and technical capacity in costing efforts in low- and middle-income countries and recommend a balance between accuracy and data availability. Their recommendation suggests that all studies settle on six main concerns prior to study implementation: (1) study perspective, (2) unit of analysis, (3) identification of cost items, (4) measurement of cost items, (5) valuation of cost items and (6) uncertainty analyses.

It has been noted that the majority of low- and middle-income countries generally implement health care provider or institution-based perspectives which results in estimates which insufficiently assess the cost of disease. Study perspectives provide the objectives of the study and the scope of interest and should be as comprehensive as possible (Hendriks et al., 2014). The current study attempts to address this insufficiency by integrating household and institutional or health care provider perspectives.

The disease costing unit of analysis is reflective of the study perspective. It reflects the relationship being studied and is often observable within the clinical pathways of the disease; it generally defines the location of the metrics for the study. The cost items in disease costing studies reflect the level of detail desired by the study. This area of the data is heavily impacted by data paucity. Cost items

can be identified through ‘gross costing’ in which case the approach is one which allocates costs to a cost centre/item indirectly, using an apportioning mechanism. In such cases the cost of joint facilities could be attributed on the bases of specific disease case-loads treated at a particular health facility. This approach has been typical of health sector institutional costs in all NASA exercises in Ghana. Micro costing approaches which are generally more precise would prioritise a bottom-up approach that would seek to allocate cost items in a more granular manner which costs resource use on the basis of a step-wise compilation of expenses related to compliance with identifiable intervention protocols (Hendriks et al., 2014).

The WHO (2009) guidance further suggests that all other areas of concern related to disease costing studies i.e. Measurement (4), valuation (5) and uncertainty analyses (6) of cost items are to be addressed on a case by case basis in line with the study perspective or decision problem. Ideally this should be done with a focus on micro costing/bottom-up approach as this tends to be more accurate. A mixed approach which restricts gross costing or mark-up methods such as for indirect costs and overheads while espousing a bottom-up micro costing approach for all other expenses on the clinical path of disease is recommended as it provides an acceptable median between accuracy, cost and effectiveness. This integrative stance was preferred for the current study since direct household costs were typically micro costed while institutional and indirect costs were exposed to some level of gross costing such as is applicable under the human capital approach.

Uncertainty analysis reflects the range of data accuracy concerns of a study as it deals with the cohort of assumptions around the costing estimates produced. It addresses questions about the variables which are either held constant or redefined to affect the cost at various levels of production of the unit of health being studied (Hendriks et al., 2014).

Uncertainty analysis was applicable within the context of the current study to the extent that conservative estimates for the cost of time and capital were preferred in the costing of the indirect costs.



2.6 Funding Landscape of HIV and AIDS in Ghana

2.6.1 Epidemiology and financing of HIV and AIDS interventions in Ghana.

2.6.1.1 Epidemiology

In Ghana, although there is anecdotal² evidence of AIDS-like symptoms prior to death in the late 1970s and early 1980s, the first 42 cases of the human immunodeficiency virus (HIV) infection were recorded in 1986 mainly among women who had travelled outside the country (Amoa, 2005). Since then, the state has responded with the creation in 1987 of the National AIDS/STI Control Programme (NACP) and the Ghana AIDS Commission (GAC) in September 2000, to lead the response against this virus which causes the acquired immunodeficiency syndrome (AIDS). The effervescence observed in the provision of policy direction³ (GAC, 2016b) has however not been accompanied by the right level of local investments. Consistently, public funding for HIV and AIDS interventions has hovered around 10 percent of total HIV and AIDS funding (GAC, 2017). Several reasons have been advanced to explain the low levels of financial commitment to declared policy. Some of the reasons include information asymmetry, exchange rate volatilities, restricted fiscal space, out-dated restrictions and unwillingness to provide health insurance cover for the full range of services required by PLHIV (Agaba, 2009; Amofah, 1992; GAC, 2014c, 2016a, 2017).

In the meantime, HIV infection in absolute terms is rising in Ghana. It is estimated that with a prevalence of 1.69 percent in 2018, almost three hundred and thirty-five thousand (334,713) people

² Author's discussions with relatives of suspected PLHIV who passed on in the late 1970s and early 1980s

³ Specific reference is made here to the relatively quick succession of executive actions and Acts of parliament of the Republic of Ghana geared towards eradicating the disease. See Act 613 (2002) and later Act 938 (2016).

live with HIV in the country, 9 per cent of whom are children aged 14 and below. Although median prevalence has declined on average by 0.04 percent per year since the year 2000, PLHIV numbers are up 23.64 percent from 270,704 people in the year 2000.

Estimates for 2019 and 2020 do not vary much from the 2018 situation. Adult HIV incidence was estimated at 0.11 percent for both years whilst 2019 HIV prevalence was estimated at 1.7 percent (a slight increase [0.5%] from 2018). Maintaining a downward trend, prevalence estimates for 2020 declined by a steeper magnitude than the change in the previous year. It declined 1.2 percent from 1.7 percent in 2019 to 1.68 percent in 2020 (GAC, 2021a). In 2019 PLHIV estimates reached 342,307 persons in absolute terms, 7.6 percent of whom were children aged 0-14 years of age (GAC, 2019, 2020c). This incline represents a growth of 2.3 percent from 2018, approximating the inter-censal annual population growth rate (2.5 percent) of Ghana and suggests that in line with the 2012 predictions of the Ghana Statistical Service (GSS), the PLHIV population might double, within the next 3 decades if appropriate interventions, beyond extant approaches, are not deployed to curb the spread.

Similarly, the absolute number of PLHIV in Ghana rose slightly below 2 percent (1.1 percent) to total 346,120 persons in the year 2020 with 66 percent females and 20 percent of all PLHIV cases being paediatric in nature. Deaths totalled 12,758 almost evenly spread among male (49 percent) and female while ART coverage averaged 63 percent with viral suppression at only 73 percent of those on treatment (GAC, 2021a). These numbers indicate that a lot of work remains undone, and that progress may constitute an uphill task particularly in the context of competing health and fiscal concerns.

New HIV infections in 2019 accounted for 20,068 cases, an increase in absolute terms of 137 cases compared to the year 2018. The year-on-year change in incidence appears insignificant except for the age distribution which declined for children aged 0-14 years from 16.6 percent in 2018 to 14.81 percent in 2019. AIDS deaths also declined 4 percent from 14,181 in 2018 to 13,616 in 2019 (GAC, 2019, 2020c).

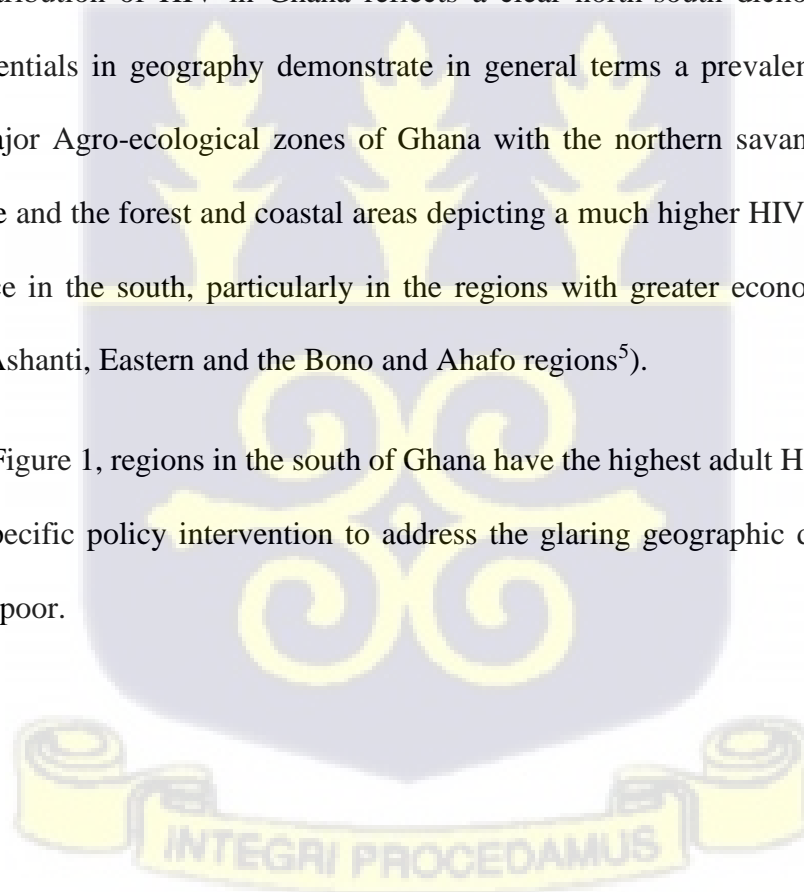
Childhood HIV poses an increasing challenge as the age disaggregated incidence data forebodes an adolescent AIDS crisis. The five years to 2018 witnessed a 5.41 percent increase in prevalence for the age group 15-24, culminating in a total of 34,219 PLHIV (GAC, 2018) in this group of young people with dire consequences for the sustainability of treatment interventions. Some therapeutic sustainability risks for this group of PLHIV could be ascribed to their relative youthfulness [15-24] which suggests that potentially, they could be on HAART for much longer, since the therapy is life long, with uncertain outcomes for long term viral suppression on first line regimens. This is because it is expected that as length of stay on the first line regimen increases, adherence may become difficult for some clients due to treatment fatigue and other economic and psychosocial issues leading to treatment failure (NACP, 2010; Tenkorang, Owusu, Laar, & Yeboah, 2017).

The transition onto even more expensive second and third line or newer generation therapeutics (de Necker, de Beer, Stander, Connell, & Mwai, 2019) would therefore potentially include a greater number of PLHIV as the adolescent cohort transitions into adulthood while exploring their nascent sexual needs within the context of HIV prevention. The nexus of prevention and treatment of HIV within this group of PLHIV therefore presents some interesting perspectives for funding the epidemic in the long term as the 2014 Ghana demographic and health survey showed lower knowledge and adoption of safe sexual practices among adolescents than for the general population (GSS et al., 2015). An example of the sustainability risk to the HIV treatment program is seen with

the uptake in the use of more expensive⁴ second line drugs in the national anti- retroviral therapy (ART) program in Ghana from 1 percent in 2016 to 3 percent in 2019 (Atun, Chang, et al., 2016; GAC, 2019; NACP, 2018b; Rosen & Asante, 2010). There is therefore a risk of an escalating economic impact at the macroeconomic and microeconomic levels given the need to reallocate scarce foreign exchange resources to the importation of both first line and second line anti-retroviral medication which are not manufactured locally. Thankfully 2019 estimates project a decline in prevalence within the adolescent age group from 38,090 in 2019 to 29,516 by the year 2025 (GAC, 2020c).

The regional distribution of HIV in Ghana reflects a clear north-south dichotomy (The aforementioned differentials in geography demonstrate in general terms a prevalence pattern that is related to the major Agro-ecological zones of Ghana with the northern savanna displaying the lowest prevalence and the forest and coastal areas depicting a much higher HIV prevalence.) with greater prevalence in the south, particularly in the regions with greater economic opportunities (Greater Accra, Ashanti, Eastern and the Bono and Ahafo regions⁵).

As illustrated in Figure 1, regions in the south of Ghana have the highest adult HIV prevalence and should elicit a specific policy intervention to address the glaring geographic divide particularly among the urban poor.

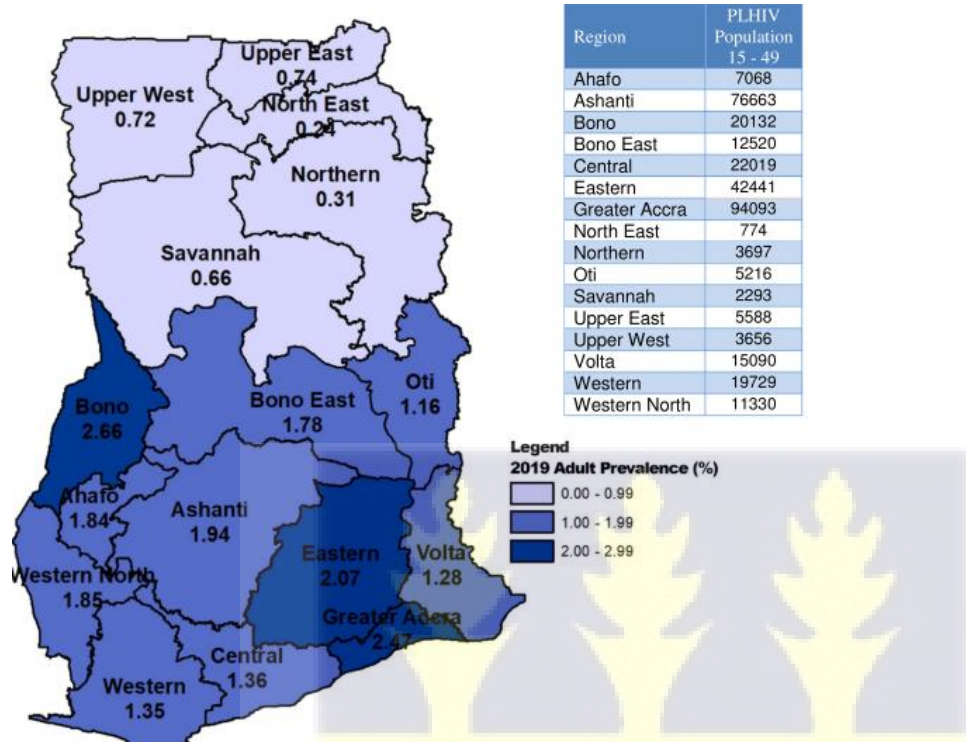


4 Price differential could escalate as high as eight-fold

⁵ GSS (2018). Ghana Living Standards Survey, Round 7 (GLSS7): Poverty Trends in Ghana, 2005-2017, Ghana Statistical Service.

Figure 1

2019 Regional Adult (15-49 years) HIV Prevalence



Source: GAC, 2020 : National and Sub-National HIV and AIDS Estimates and Projections, 2019

A further link between the dynamics of Ghana’s HIV and AIDS epidemic and an ever-increasing economic burden can be perceived through the nature of the predominant viral strain of HIV in Ghana. Two strains of HIV are prevalent in Africa (HIV-1 and HIV2). HIV-2 has been predominantly observed in West Africa including Ghana and is reported to be less perinatally and sexually transmissible and to have a milder impact on the development of immunodeficiency (Barnes, 2008; Ishikawa et al., 2001). However, over the past several decades Ghana’s dominant HIV type is HIV-1, accounting for 65 percent of cases in 1990, 92.8 percent in 1999 and 99 percent of HIV cases in 2017 while HIV-2 and dual cases are estimated at 0.8 percent and 0.2 percent respectively in 2017 (Ishikawa et al., 2001; NACP, 2018a). The viral typology and relative success

of the ART program for enrolled PLHIV in Ghana has significant cost implications for the national response to HIV in Ghana. Since the predominant HIV type in Ghana is the most infectious type and the type most likely to lead to immunodeficiency if left untreated, it presents potentially, a more potent health and economic impact.

2.6.1.2 Financing Health including HIV and AIDS Interventions

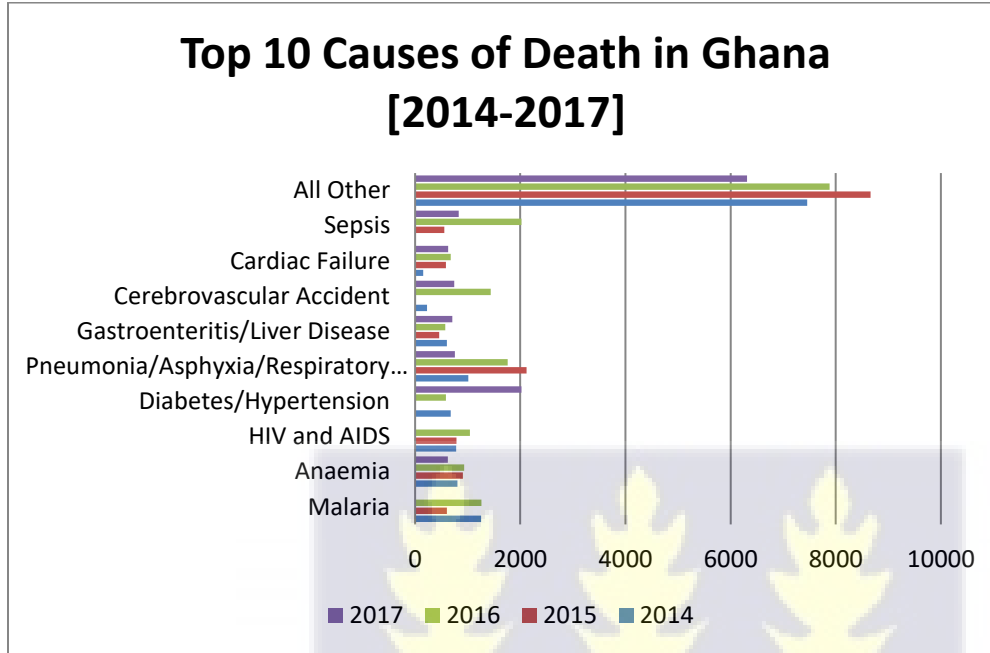
The most significant dimension of the economic burden of HIV is related to the direct cost of treatment and its ability to delay the onset of disease related mortality. Prior to the deployment of ART in Ghana, HIV was a death sentence. The introduction of publicly funded ART and therapeutics for opportunistic infections has had an ablative effect on mortality: “I am strong since I started this medicine, I don’t fall sick ...” (C⁶, personal communication, December 01, 2019). This glimmer of hope however is not sufficiently impactful because although HIV does not feature among the top 10 causes of admission into Ghana’s health facilities, it continues to feature among the top five causes of mortality among admitted patients. HIV was the third and fourth leading cause of death among admitted patients in 2015 and 2016 respectively. Additionally, Indirect causes of maternal mortality including HIV account for almost a third (26 percent) of all maternal deaths in Ghana (GHS, 2017). This perspective may provide preliminary pointers for policy interventions to address issues of early diagnosis and access to therapeutic interventions designed to halt and reverse the clinical and socio-economic impact of HIV and AIDS.

The burden of HIV expressed in mortality for the year 2014 to 2017 is illustrated in **Figure 2**. The graphical representation of mortality from year 2014 to year 2017 shows a rise in AIDS deaths in terms of overall contribution to mortality in Ghana.

⁶ C is a PLHIV who was formerly within the leadership of the Network of Persons Living with HIV in Ghana – NAP+

Figure 2

Top 10 Sources of Mortality in Ghana – 2014-2017



Source: GHS, 2016, 2017, 2018

When HIV is compounded with other diseases, its impact in terms of Disability Adjusted Life Years (DALY) or even mortality can become compelling, given the high incidence of co-morbid tuberculosis (25 percent) (Ansa, Walley, Siddiqi, & Wei, 2012) and malaria (Owusu, 2020) among PLHIV in Ghana.

Compared with a group of seven other lower middle-income countries (LMIC) depicted in **Figure 3**, Ghana was the worst performing country in the group with respect to disease related DALYs for Malaria and HIV. For a selection of other diseases and conditions Ghana’s peers performed below the LMIC group mean on average for about 2 diseases while Ghana underperformed the LMIC group mean for five (5) conditions. These conditions included neo-natal and congenital disorders,

non-communicable diseases such as ischemic heart disease and stroke as well as diarrheal diseases and lower respiratory tract infections.

Figure 3

Disease DALYs per Country – Lower Middle Income (LMIC)



Source: Adapted from <http://www.healthdata.org/ghana>

The burden of HIV has been expressed in terms of its fiscal impact on related institutions. For example the impact on the health sector expenditure is estimated at about 20 % (MoH, 2015). This figure emulates the 19.4 % reported for sub Saharan Africa (SSA) by Amico, Aran, and Avila (2010). The same study however found Ghana’s HIV expenditure to be 6.9% of all health expenditure. The National AIDS Spending Assessment (NASA) estimated that out of all HIV expenditure, more than 10 % was being financed through out of pocket payments by affected

families (GAC, 2017). These households and families are already socio economically vulnerable as found by several studies in Botswana and Ghana and should not have to bear such a significant portion of the financial burden of HIV (Owusu, 2019; Weiser et al., 2003; WFP & GAC, 2011, 2019).

There is an undeniable relationship between HIV and economic conditions of households. In Ghana several studies have shown low and middle income quintile households to be more affected by HIV with about a third earning barely the minimum daily wage (Asante, 2018; NAP+ et al., 2014). In Botswana and Swaziland for example, high risk sexual behaviour has been associated with food insufficiency (Weiser et al., 2007). Even when People Living with HIV (PLHIV) are put on treatment, socio economic status (SES) characteristics such as food insufficiency and household financial challenges pose a threat to adherence with downstream complications such as drug resistance (Gari et al., 2013). A personal correspondence with a former member of the leadership (2008-2012) of the network of people living with HIV (NAP+ Ghana) aptly depicts the daunting challenges faced by many PLHIV in Ghana:

“... [With the medicine, I need] 6 [balls of] banku⁷, I am now going to my 21st year on HIV drugs. If they don't give us transport⁸, some people will not go home. Poverty is now killing the people not the drugs. We can work, but where is the work? I am a labourer at Amasaman⁹, can this drug sustain us for another 5 years?” (C., personal communication, December 01, 2019)¹⁰. This lament raises several themes including the ambient poverty

7 Banku is a maize based local staple food

8 Cash allowances for transport may be given to some PLHIV when they visit ART centres to refill their anti-retroviral medicines under some in-country grants

9 A nascent suburb of Accra, Ghana's capital city.

¹⁰ C is a PLHIV who was formerly within the leadership of the Network of Persons Living with HIV in Ghana – NAP+

which appears to have become a constant feature in many studies involving PLHIV. The cyclical relationship between poverty and HIV is thus well documented (De Neve, Fink, Subramanian, Moyo, & Bor, 2015) and the abiding concern about long term economic and epidemiologic impacts of HIV.

2.6.1.2.1 Philosophical underpinnings for public health financing in Ghana

A robust dialectic over human consumption and investment, population versus capital has been a fixture in the development literature for most of the 20th century and continues to be topical to this day. The debate has hinged over why society in general should be unduly concerned about the health and wellness of any individual endowed with sufficient agency to decide for themselves whether they want a healthy lifestyle or not. In other words, why should the lament of PLHIV matter?

Meadows, Meadows, Randers, and Behrens (1972) provide plausible reasons why people matter. They opine that there is evidence of confluence over the suggestions that healthy and educated human beings escalate economic growth through more efficient access to goods and services such as consumer goods, science, social interaction, music and the arts. This growth is usually heavily reliant on production surpluses after food and shelter as well as on leisure time. The ‘human’ therefore occupies the centre of the development enterprise and as a result should attract significant investment in terms of their health and education from the household, through the community and on to the society in general (Meadows et al., 1972). These views constitute normative ethics which guide Ghana’s health funding landscape and are driven by deontology and utilitarianism as approaches to moral philosophy. This is so because contrary to virtue ethics which proposes virtue or goodness simply because it is good to do so, the former approaches can be said to be a guide for

decision making because they focus on policy action and outcomes (Hursthouse & Pettigrove, 2016).

Framed by deontology and utilitarianism, the authority for public financing of health in general and HIV and AIDS in particular in Ghana emanates from the 1992 constitution which aptly captures the nation's view of development as one in which the powers of state are exercised for the ultimate achievement of the potential of the greatest number of citizens, subject to the respect of individual rights and freedoms (Republic of Ghana, 1992).

In the directive principles of state policy, the Ghanaian constitution mandates all powers and efforts of the state to be directed towards the provision of conditions which enable citizens to fulfil their rights to health, work and productivity. The constitution also prescribes welfare in general with specific reference to various disadvantaged communities such as geographies, the aged, women and children. Consequently, the requirement to report on demographic differentials places a duty on all related disease burden studies to reflect the relevant disease related gradients. Article 34 and 35 are specific about reasonable access to good healthcare for all within the confines of what is feasible and just (Republic of Ghana, 1992, p. 31). This provision suggests that access to public services such as health should be equitable and therefore affordable. It is indicative of popular support for public financing of health in Ghana. It is also indicative of the public's willingness to support private financing of healthcare in a progressive manner, such that those who can pay effectively do so. Consequently, any comprehensive assessment of the scope of disease costs in Ghana should include both public and private (comprehensive) costs. Article 34 further requires the president to report on the achievements of all these development goals annually in a report to parliament. This accountability mechanism presupposes that duty bearers would implement systems which produce

the evidence to inform the constitutional report to parliament. Efforts such as the current study contribute to that accountability function.

Criticisms of utilitarianism abound among which the view that aggregative utility could open the possibility of causing harm to a few if that would escalate the wellbeing of many more (Shaw, 2006). Such a case would arise for example, if it was possible, to consider the repulsive idea of institutionalising and/or euthanizing as many PLHIV as possible in a bid to reduce and eventually eradicate the HIV virus by eliminating the host (PLHIV) for the greater good. Milder variants of such an approach which use contact tracing and medically driven isolation with tenuous ethical implications were used in Cuba to great effect and to the everlasting angst of human rights advocates worldwide (Hoffman, 2004). Interestingly Cuba is the country with the greatest success in stemming the tide of the HIV virus worldwide. Cuba reports prevalence rates which are only a tenth (0.05 percent) of the rates in the United States and a disease burden which is several hundred times the rates within its Caribbean neighbours and other African countries. The intuitive rejection of forced residence in sanatoriums (8 weeks) and mandatory disclosure of sexual histories can be understood in countries where individual rights and liberties are held in high esteem, undoubtedly demanding the introduction of a more reasonable model for a country like Ghana.

2.6.1.2.2 Health Financing

Since its creation in 2003, the National Health Insurance (NHIS) has become the main vehicle by which access to health facilities is assured in Ghana (H. Wang, Otoo, & Dsane-Selby, 2017). The rise in demand for health care is illustrated by health service use data and fluctuates with the fortunes of the NHIS. After declining in 2012, Out Patient Department (OPD) use per capita reached and exceeded 1 in 2018, suggesting that on average every Ghanaian visited a health facility at least once in that year (MoH, 2019). NHIS subscription numbers rise and fall with changing bottlenecks

to access, many of which are economic. Wang et al (2017) for example note a health funding skew in Ghana, sourcing data from the national health accounts in 2005, 2010 and 2012 to decry a tripling of out-of-pocket payments for households between 2010 and 2012.

Revenue and expenditure of the NHIS continue to demonstrate Ghana's quest for a more egalitarian society as coverage equity improved between 2008 and 2014 by 37.5 percent among female subscribers within the highest and lowest wealth quintiles. Revenue wise, NHIS levies, through the Value Added Tax (VAT) scheme, which attracts 2.5 percent of applicable sales transactions and social security allocations which attract 2.5 percent of all monthly contributions accounted for 74 percent and 20 percent respectively, of all revenue to the health insurance scheme. In 2014, about two thirds of all enrollees were exempt from direct premiums by virtue of age or indigence, resulting in only 3 percent of funding emanating from health insurance premiums. As at 2021, the situation of active enrollees is not significantly different as about 57 percent of NHIS enrolments consist of age or indigence exempt subscribers with only 36.4% paying direct premiums¹¹ (MOH, 2022a). Efficiency and sustainability concerns also abound because only 77 percent of expenditure is dedicated to claims payments while service providers frequently raise concerns over delays in processing claims particularly those in the private sector who do not receive subventions from the state (GHS, 2017, p. 27; MoH, 2019; Wang et al., 2017, p. 18). That notwithstanding, almost all revenues (80 percent) for direct health service delivery costs are borne by the NHIS (MoH, 2019), a situation which aptly demonstrates the direction of the state in terms of UHC.

¹¹ According to MoH the change in those paying direct premiums has been minimal [6% increase over a 5-year period]. Additionally, with a mean per capita monthly income in Accra (the wealthiest city, see GLSS 7) below GHS2000 and contributions expected to be 2.5% of 18.5% of the reported monthly incomes for SSNIT enrollees, the negligible share of premiums within the NHIS's revenue structure is not unexpected.

Although 95 percent of diagnosed conditions in Ghana are covered, the NHIS benefits package covers only opportunistic infections which arise from HIV. HIV treatment services as well as medicines and laboratories defined as part of the ART protocol are not covered (NHIS, 2020). Currently, funding for HAART is primarily funded through donor contributions and caters for only 61 percent of the 74 percent of PLHIV who know their HIV status as at 2018 (Ghana CCM, 2020). This suggests that about 169,000 PLHIV are either oblivious of their HIV status or have been tested but are not yet on treatment and therefore bear the burden of the disease unknowingly or without much assistance from the health system.

The level of coverage is compromised even further as the 2019 national HIV estimates report puts ART coverage at only 39 percent, a 36 percent decline from 2018 due to improvements in the data management processes of the treatment program and the methods for preparing the national estimates report (GAC, 2020c, p. 49). In 2021 ART coverage estimates have improved by about 85 percent to cover 72 percent of all PLHIV (GAC, 2022b).

Thankfully GAC (2020c) reports that only about 3 percent (3,464 out of 147,270) of all those aged 15 years and above who are on ART will experience an AIDS related death. Notwithstanding second line therapy, this figure may be understated because viral suppression which is a measure of ART success has been reported at less than 50 percent (2019) and 73 percent (2020) of all those on treatment (GAC, 2020b, 2021a).

The situational analysis illustrates a dire condition of health and HIV financing in Ghana. Usage is escalating and funding sources, although consumption-tax linked are unable to keep pace with the cost of health service delivery. There is no local ownership of the HIV response as ART protocols have been excluded from NHIS coverage while up to 23 percent of NHIS revenue is dedicated to

overheads sparking significant concerns over inefficiency and sustainability (premiums are negligible). Under such conditions, the limited ART coverage and therapeutic success may conceal a much greater investment need.

2.6.2 HIV and AIDS Policy Landscape

There is clearly a disparity between Ghana's level of investment in health conditions such as HIV and AIDS and the needs depicted in Table 1. There is cause for worry that the window of opportunity to eliminate the disease in Ghana could be compromised. Particularly due to its relatively low prevalence (1.69 percent) (GAC, 2019) within the context of neighbours who display rates of HIV infection which are triple and at times tenfold that of Ghana within the West African sub region and across the continent respectively (Fobil & Soyiri, 2006; UNAIDS, 2022).

McRobie et al. (2018) have raised concerns about Ghana's ability to meet its declared 90-90-90 fast track targets due to resource constraints and the fact that in the view of many key stakeholders, the targets are merely an advocacy 'slogan' to obtain more resources to bridge the funding gap for the five-year period to 2020 which stood at about a quarter of all resources required.

In Table 1: HIV Landscape and Policy Vignette, Fobil and Soyiri (2006) provided some perspectives on the policy shifts that would be required to optimise Ghana's HIV response. The themes raised included unclear institutional relationships and ambiguity in the direction of the national response as expressed in the tensions between the GAC and the National AIDS Control Program (NACP). They also included the difficulty in transitioning awareness of HIV and AIDS in the general population to behaviour change particularly for the young and those with lower socio-economic status (SES). Policy action through in-school focused institutions such as the Ghana Education Service was found wanting as the investments did not attract the desired behaviour change. These implementation gaps were compounded by research gaps which typically entailed

an over-emphasis on bio medical domains to the exclusion of socio-economic research. Program data (prevalence) was typically Ante natal clinic (ANC) based and was therefore over estimated.

Table 1 also reports that more than a decade later, many of the challenges documented in 2006 have been addressed even though it remains doubtful if the political will to address all outstanding issues is available as several NASA reports have decried. The leadership of the national response for example has been affirmed and sits unambiguously within the ambit of the Ghana AIDS Commission while awareness and risky behaviour have declined (20 percent) and increased (100 percent and more) respectively. The biomedical bias in implementation and research remains while there appears to be an entrenchment of the rights-based approach to HIV and AIDS programming without the commensurate funding to support this course of action (McRobie et al., 2018).

As expected, the gap between policy and action may be accountable for the rise in the number of young women and girls who are sexually active before or by age 15. Table 1 depicts that this number has risen from about 7% in 2006 to about 57% in 2018. This precocious exposure to sexual activity would predictably trigger a spike in infection among young women. Recent spikes in HIV incidence for the year 2021 have confirmed this sombre prediction, with young girls accounting for most new infections (91.6%, 82.7% for 10-19 & 15-24 age groups respectively) (GAC, 2023). Similarly, Table 1 illustrates that condom use among males in their most recent risky sexual encounter had declined from about 50% in 2006 to below 35% in 2018 with predictable outcomes in terms of HIV incidence. Unfortunately, sufficient action was not taken to prevent what research had predicted.

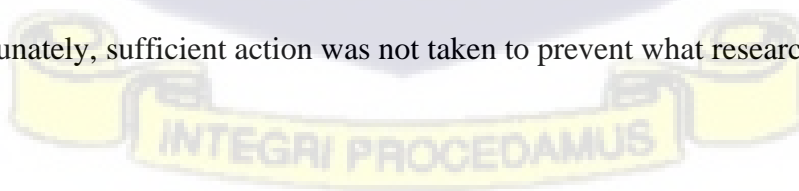


Table 1: HIV Landscape and Policy Vignette - 2006 & 2018

2006				2018			
Fobil, J., & Soyiri, I. (2006)		Study Type: Desk Review		McRobie, E., Matovu, F., Nanyiti, A., Nonvignon, J., Abankwah, D. N. Y., Case, K. K., . . . Conteh, L. (2018)		Study Type: Case Studies, semi-structured Interviews	
Prevalence	3.1%	# Of PLHIV: 380,000	Paediatric representation: 1%	Prevalence ¹²	1.68%	# Of PLHIV: 346,120	Paediatric representation: 8.2%
Situational Analysis ¹³	<p>Awareness V. High [>98%]; Knowledge: High [<1/2 F, 3/5 M]; Behaviour change: Low [28%F; 45%M]</p> <p>Sexual debut @15: 7%F & 4%M; Condom use (15-24) <30% F & <50% M</p> <p>Clarity of Roles (GAC – Coordination /NACP - Treatment) “Tangled web” of Multi sectoral Health Promotion & Prevention Campaigns,</p> <p>Implementation gap: Political will without Political Commitment, Donor Driven, School Health Education Program (SHEP) of the Ghana Education Service defective. Research gap: Universities – R&D Biomedical bias. Anecdotal evidence of socio-economic drivers of disease & social exclusion consequences. Direct versus Indirect causes and effects. Projections Ante natal clinic (ANC) based.</p> <p>Recommendation: Close surveillance & monitoring of PLHIV and their movement particularly on Eastern Corridor (high prevalence geographies)</p>			Situational Analysis ¹⁴	<p>Awareness: High [79%]; Knowledge: High [70%F, 81%M]; Behaviour change: Low [11%F, 17%M] (Alhassan, Abdulai, & Alhassan, 2021)Sexual debut <15: 57%F; Condom use (15-24) <15% F & <35% M</p> <p>Clarity of Roles (GAC – Coordination /NACP - Treatment) – Clarified. Promotion & Prevention Campaigns still donor driven, ineffective.</p> <p>Implementation gap: Political will without Political Commitment, Sloganism. Research gap: Universities – R&D Biomedical bias. Evidence of socio-economic drivers of disease & social exclusion consequences. Emphasis on Direct versus Indirect costs. Projections improved beyond ANC basis; service data improved.</p> <p>Recommendation: Continued Rights based approach & Monitoring of financial commitments</p>		
<p>HIV spending to GDP ratio: Uganda in comparison to Ghana (0.21%) spends about 19 times more. With similar epidemiology (case load) and a tenth of the population, Namibia performs 3 to 5 times better than Ghana in ART coverage, MTCT, PMTCT as well as public and overall financing.</p>							

Source: Fobil, J., & Soyiri, I. (2006), McRobie, et al. (2018) and Halasa-Rappel et al. (2021)

¹² Additional Data Source: GAC. (2021). *National and Sub-National HIV and AIDS Estimates and Projections, 2020 Report*

¹³ Additional Data Source: GSS, NMIMR, & ORCM. (2004). *Ghana demographic and health survey, 2003*: Ghana Statistical Service.

¹⁴ Additional Data Source: GSS, GHS, & DHSP-ICFI. (2015). *Ghana demographic and health survey, 2014 - Key Indicators*. Accra: Ghana Statistical Service.

The integrative approach echoed under the structural functionalism theory however has significant value for policy action in Ghana and encourages the deployment of conscious accommodations for HIV infected and affected persons including emotional and economic support to improve therapeutic outcomes for HAART in Ghana as recommended in Owusu and Laar (2018). The concept of interconnectedness between profits, corporate interests, social protection and/or safety nets as well as supportive accommodations for ill and affected employees is also upheld by Lwanda (2006) who found that many South African multinational companies present in SSA could save about US\$800,000 per year by introducing ART and other HIV prevention, treatment and support interventions in the workplace.

The HIV and AIDS response landscape in Ghana continues to be traumatic for PLHIV. Stigma within public institutions by government officials and health personnel who should provide protection has attained worrisome proportions. Vulnerability to stigma with attendant deprivation of economic rights has been shown to be associated with SES requiring further studies into the economic impact of the epidemic on households (Epeh, 2019; NAP+ et al., 2014).

HIV impacts lives at different levels. Health, social and economic costs are typically referenced in HIV impact studies (Asenso-Okyere et al., 2011; Gari et al., 2013; NAP+ et al., 2014; Orem, Kirigia, Azairwe, Kasirye, & Walker, 2012). Health costs often refer to productive life years lost to morbidity and mortality (Asante, 2018). Estimates have put HIV related DALYs at an average of 9.5 million over the five years to 2019 (GAC, 2019). Impediments to social participation resulting in exclusion, poverty and other welfare degrading conditions as well as the attendant coping strategies constitute the social costs that are routinely investigated (Asante, 2018).

2.6.3 Socio economic Impact of HIV and AIDS

There is debate as to the extent of the impact of poor health including HIV on economic performance of households and nations. Lee et al. (2019) as well as de Lagasnerie, Agué, Denis, Fagot-Campagna, and Gastaldi-Menager (2018) posit that the economic effect of poor health, usually negative, can vary from double to as much as tenfold, as a result of the varied assumptions used in costing diseases. Kirigia et al. (2002) on the other hand had found no growth effects of HIV morbidity on the economy. In their study of selected countries in the WHO Africa region, they contend that high unemployment may have dampened whatever effects might have been attributable to the disease. This apparent dissonance belies the concurrence that appears to exist in the literature about the justification of economic burden of disease studies, the approaches and perspectives in general. There is agreement in general that disease metrics should transcend clinical measures of morbidity and mortality to gauge the economic consequences of impaired health because better health leads to longer and more productive lives with implications for savings and investments (WHO, 2009, n.d.). Disease burden studies cater to microeconomic level questions such as income and outcome effects of disease for households, firms, and governments. They also consider macroeconomic concerns pertaining to disease induced growth variations for example (WHO, 2009) . Such an understanding may quickly overwhelm attempts to assess or estimate the cost of disease because of the diversity of disease related activities that may qualify to be analysed for costing purposes. In doing so, it may be useful to consider whether the individual or society pays or should pay for the cost of healthcare as well as the nature of those costs, their scope, intensity, and trends.

Concerns relate to the philosophy of value and whether appropriate mechanisms exist to fully apprehend all costs engaged in the provision of good health (WHO, 2009). In Africa, cost recovery

attempts for health and other social services through the imposition of user fees were driven by the World Bank and its associated institutions (McIntyre et al., 2006). The idea was to secure scarce resources which were the outcome of unfavourable trade conditions for African commodities on the international market amongst others. In 1983, Ghana complied with “advice” from its development partners and implemented fees (Agyepong & Adjei, 2008). The results are now known to have been less than satisfactory (Mills et al., 2012) suggesting that in the Ghanaian context there is demand for public and private funding for health financing. To mitigate the economic burden of disease which has been noted for being severe particularly for the less economically endowed (Arenliu Qosaj, Froeschl, Berisha, Bellaqa, & Holle, 2018), the government of Ghana introduced risk pooling through the national health insurance scheme (NHIS) to complement direct taxation and out of pocket (OOP) payments as funding sources for health expenditure in Ghana (Ashigbie, Azameti, & Wirtz, 2016).

Christmals and Aidam (2020) corroborate Wang et al. (2017) in noting that although the NHIS has seen a significant uptake of subscribers from about one third in 2008 to about 40 percent from 2013 to 2017, a majority of all facility visits are financed by the NHIS (GHS, 2017) exposing the scheme to sustainability challenges.

Wang et al. (2017) have raised the issue of moral hazard which describes a situation where subscribers and service providers abuse the system precisely because there is no direct monetary charge to their consumption behaviour. Ghana’s NHIS is exposed to such risks because in-patient and outpatient visits virtually exploded following the implementation of the NHIS from 0.5 visits per capita per year in 2005 to over 3 visits per capita per year in 2014 (Wang et al., 2017). Proponents of personal responsibility for health care have premised a core thrust of their arguments against socialised healthcare provision in any form on such risks of abuse and the inefficiencies

created by such systems. An example of such failures leading to existential threats for the entire health system has been profusely documented and denounced in countries like France where persons who are exempt from co-payments¹⁵ utilised about 60 percent of all health care spending in 2006 (Chiappori, Durand, & Geoffard, 1998; Kerleau, Fretel, & Hirtzlin, 2009). In the United Kingdom, Smith (2018), concurs with Cullis and Jones (1986) in to suggest that the failures have been addressed through rationing, manifested in the extensive wait lists for medical procedures

Proponents of differentiated socialisation interventions for health on the other hand point to similar distortions in the health care service market with minimal public intervention as occurs in the US. Critics of such wholesale privatisation bemoan an escalation of prices which essentially denies access to health for several millions of citizens and residents¹⁶ (Donelan et al., 1996; Khatana & Groeneveld, 2020).

The success of the Ghanaian health insurance landscape which prioritises direct tax funded payments as well as premium driven interventions for both private and public health insurance schemes is an indication that for low-income settings a mixed approach may hold the keys to improved effectiveness and efficiency of health service delivery. According to Wang et al. (2017), this doesn't eliminate the funding challenges of the health system in Ghana since for the decade ending in 2018, less than 5 percent of NHIS revenue has been sourced from premiums. The scheme therefore continues to rely heavily on direct taxation for its sustenance. The ad valorem tax (VAT) is the main source of tax funding for the NHIS (about three quarters) and suggests that significant

15 Co-payments were introduced to curtail and control costs which have been spiralling out of control since the 1970s

16 Almost 30 million people lack access to health insurance and therefore health care as at 2018

inroads are being made to inject equity into the provision of health care in Ghana. With a progressive tax-based system which ensures that the more endowed, as in the case of the Ghanaian VAT system, pay more even if it means that the less endowed enjoy greater usage (Nguyen, Rajkotia, & Wang, 2011). Such risk pooling systems so far hold the greatest promise to achieve universal health access for Ghana (H. Wang et al., 2017)

2.6.4 Burden of HIV and AIDS on economic growth

The burden of HIV and AIDS is operationalized as the extent to which national output may be affected by HIV incidence and prevalence. This macroeconomic view per neo-classical economic theory suggests that economic growth relies upon three factors: capital stock, health, labour stock and efficiencies within firms and society in general. In listing HIV morbidity and mortality as explanatory variables alongside the other factors of production one can specify a model to aid in estimating the burden of disease on growth. Production efficiencies are related to scientific diffusion; together with ease of trade they represent enabling factors which prime labour to generate more output if all other conditions are held constant. Several studies use net international trade as proxy for a country's openness and its ability to innovate and therefore create wealth (Orem et al., 2012; Kirigia et al., 2002).

This study will use the production function approach to estimate the burden of disease focusing on the output derived from the use of factors of production. It targets large economic costs, government expenditures and reduced private earnings (Orem et al., 2012; Kirigia et al., 2002).

The production function approach has been critiqued for providing a false sense of security to governments in Africa because some studies which used the approach reported statistically

insignificant effects of HIV on economic growth with others even predicting GDP escalations as a result (Negin, 2005).

2.6.5 Economic Burden of HIV and AIDS on household welfare

At the household level, Donni (2006) posits that welfare can be defined as any distribution of demand. A position which equates welfare to consumption decisions in general. Traditionally at household levels the burden of HIV and AIDS is computed as the percentage of total household income required to defray direct and indirect costs of treatment and care (Asante, 2018). The agreed view amongst researchers in the area of burden of disease studies has been to partition the health burden between economic and social costs as well as direct, indirect and intangible costs (McIntyre et al., 2006). These are often further classified into food and non-food items in a bid to assess whether the costs are catastrophic or not.

2.6.5.1 Direct costs

Some economic burden of disease studies present direct costs as exclusively related to actual treatment costs i.e., medicines and ancillary services at the health facility (Adamba & Owusu, 2011), whereas other approaches expand direct costs to include overhead costs such as transportation to and from the health facility or present direct costs as including residential, semi-residential and non-residential costs (Marcellusi et al., 2018). Some definitions have included diet adaptations necessitated by the disease (Russell, 2004). This study takes the comprehensive approach including transportation, diet and other related medical costs.

2.6.5.2 Indirect costs

Indirect costs are productivity losses due to illness or premature death. Productive time is lost due to care needs of the sick family member for example and this care function is often provided by female family/community members further skewing labour force participation of women

(Abimanyi-Ochom, Inder, Hollingsworth, & Lorgelly, 2017). In a Tanzanian study, women were found to lose 30 percent more work time than men (Rugalema, 1998) while family incomes in a Thai study were reported to have reduced by as much as 48 percent as a result of HIV and AIDS (Pitayanon, Kongsin, & Janjareon, 1997). Disease related absenteeism and debility as well as mortality therefore act to compound the economic burden of HIV.

It is worth noting that the representation of burden of disease results in terms of share of household income alone may not adequately reflect concerns of health access and equity as they do not capture costs borne by health insurance programmes and other publicly funded programmes (McRobie et al., 2018). A significant contribution of this study therefore would be to include institutional care and treatment costs to the household costs in an attempt to achieve a more comprehensive estimate of the burden of HIV and AIDS in Ghana.

The study will use the human capital approach to estimate indirect costs.

2.6.5.3 Intangible costs of HIV and AIDS

The intangible costs of HIV include pain and social exclusion. Due to the complexity of concepts such as pain, suffering and exclusion some authors have found it difficult to include this critical cost item into their estimations of disease burden, purporting that only longitudinal studies could effectively capture the long-term production and consumption effects of the modified socio-economic decisions taken as a result of the disease (Asante & Asenso-Okyere, 2003). Others have applied cross sectional surveys to compute intangible costs of disease using Quality Adjusted Life Years (QALY). In their 2010 study involving paediatric cases of the common variable immunodeficiency registry in Tehran, Sadeghi, Abolhassani, Naseri, Rezaei, and Aghamohammadi (2015) found that early diagnosis and equitable access to care services reduced estimated cost of the disease attributable to forfeited quality of life by about 11 percent (US\$29,500).

Some more recent studies have applied the Willingness to Pay (WTP) approach to quantifying intangible costs (Goodchild, Nargis, & d'Espaignet, 2018). Such applications of the WTP method to costing intangibles have significant value for cost effectiveness studies and planning purposes (Choi, Brandeau, & Bendavid, 2017) but will not be used in this study.

Several studies in less advanced economies have noted that households which experience illness also experience declines in welfare. The situation in Ghana is similar as evidence from studies covering Buruli ulcer (Adamba & Owusu, 2011), HIV (Asante, Poku, et al., 2014; NAP+ et al., 2014; WFP & GAC, 2011, 2019), Malaria (Asante & Asenso-Okyere, 2003) and Injury (Mock, Gloyd, Adjei, Acheampong, & Gish, 2003) have noted. Food production and nutritional intake have been reported to decline (WFP & GAC, 2019; Mock et al., 2003; Mock, Abantanga, Cummings, & Koepsell, 1999). Severe depletion of savings and asset loss for illness response has also been documented (Asenso-Okyere et al., 2011; Adedigba et al., 2009). Little appears to mitigate the impact of HIV morbidity and mortality in many less developed countries. In la Cote d'Ivoire for example, health insurance, regardless of the scheme did not spare PLHIV households catastrophic expenditure (Beauliere et al., 2010). Similar tenuous socio-economic conditions are illustrated in the findings of the PLHIV Stigma Index in Ghana which reported extreme poverty, defined as the inability to meet basic food needs, at 15 percent among PLHIV (NAP+ et al., 2014) at a time when the national average was 8.4 percent (Ghana Statistical Service [GSS], (2018). Extreme poverty is therefore 79 percent higher among PLHIV households. The persistence of a welfare differential between the general population and PLHIV households and communities is all the more perturbing given the visibility of government action over the past three decades.

The phenomenal impact of HIV on Ghanaian society cannot be overstated. HIV quite simply deactivates all structural portals for enhancing participatory development. Affected populations are

thus literally “squeezed” out of society’s productive framework (Lithur, Williamson, Chen, & MacInnis, 2014). Exclusion having become the norm; existing legal instruments are disembowelled exposing PLHIV and their families to stigma and discrimination particularly in communities which are not accepting of PLHIV. The Ghana Demographic and Health Survey (GDHS) in 2003 and 2008 record an alarming spate of rejection of PLHIV within Ghanaian society, about 10 percent (women) and 14 percent (men) acceptance by all measures of accepting attitudes in 2003 and 11 percent (women) and 19 percent (men) for 2014 (GSS, GHS, & DHSP-ICFI, 2015; GSS, NMIMR, & ORCM, 2004). This rejection often comes from health personnel as well as family members and even other members of the affected communities who see themselves as being higher up the scale in the hierarchy of vulnerability (Epeh, 2019; NAP+ et al., 2014).

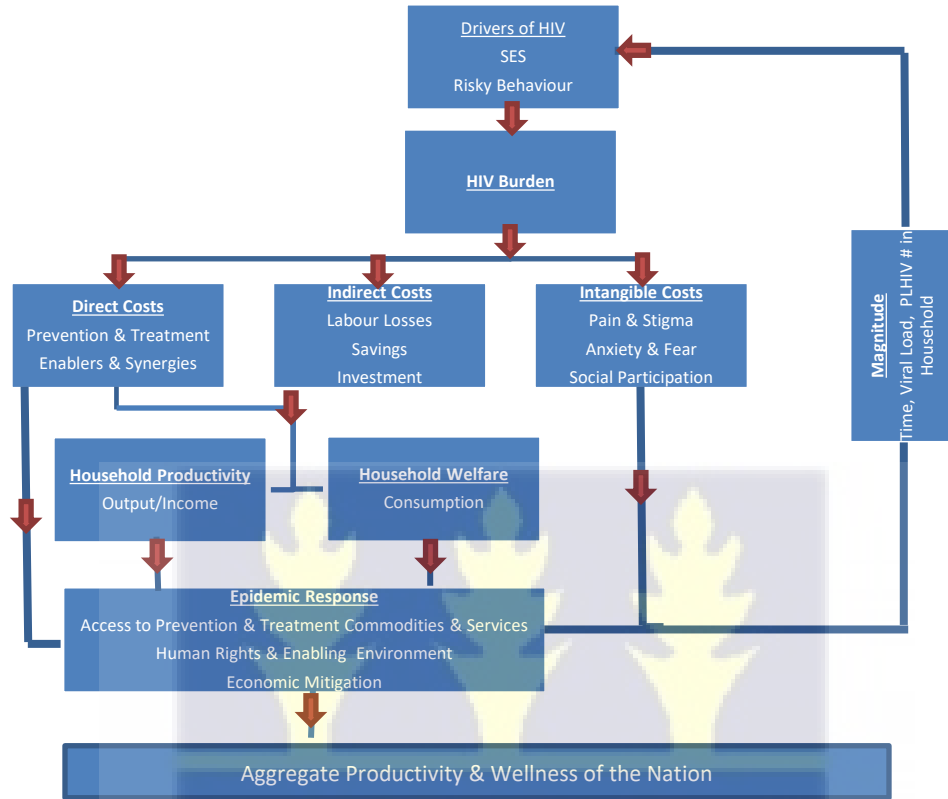
2.7 Conceptual Framework

Schematically the relationships between the cost drivers, service providers and recipients as well as the costing process are documented in **Figure 4**. The figure adapted from Asante and Asenso-Okyere (2003) merges mortality, disability and morbidity into one concept (HIV burden) and introduces the concept of disease magnitude, suggesting that as treatment coverage and economic mitigation interventions adjust the impact of costs on households and PLHIV, the magnitude of the disease will be altered, triggering a change in the behavioural responses of PLHIV with a domino effect on treatment adherence, morbidity and mortality.

The interconnectedness of disease outcomes and the socio economic drivers of disease constitute the main points of departure from the framework used for malaria by Asante and Asenso-Okyere (2003). Given the chronicity of HIV and AIDS in comparison to Malaria, these changes are not unusual.

Figure 4

Illustration of Conceptual Framework



Source: Adapted from Asante and Asenso-Okyere (2003)

2.8 Definition of key terms

2.8.1 Welfare

Social policy is not a self-contained discipline. Its scope including welfare strategies are hinged on multiple academic disciplines, politics, sociology, economics and philosophy. They undergird society’s attempts to ensure that the physical and material requirements which constitute well-being or what is good for citizens are met. This view is well aligned with the concept of human capital which economists broadly define to include: “education, health, training, migration, and other

investments that enhance an individual's productivity" (Gyimah-Brempong & Wilson, 2004, p. 3). Welfare can thus be seen as any improvement in the condition of this key factor of production: human capital. Unavoidably, contributions to human capital should include protection from undue fear and anxiety as well as the provision of a minimum amount of assets. Welfare so construed then focuses on consumption practices including basic needs such as food, clothing and shelter. These necessities are expected to diminish the exposure to risk of the citizenry and to reinforce their resilience with respect to unemployment, exclusion, sickness, disability and old age (Feinberg, 1973; Spicker, 2017).

Circumstances vary from country to country therefore obtaining estimates of welfare conditions for households affected by disease often requires that the settings of affected households be compared to unaffected households to identify disease impacts for intervention (McAuley, 1977). An approach which compares households with PLHIV newly enrolled into care and those with longer term enrollees or one which align pre and post diagnosis conditions may offer a similar glimpse into disease related welfare changes.

2.8.2 Household

Households are the building blocks of society and are often the measurement unit of socio economic survey because they represent a pool of income and revenue often dedicated to a common use or purpose, particularly for the essentials of living and constitute a group of people with biological, family and/or emotional ties (Arenliu Qosaj et al., 2018). In Ghana, the 2008 Demographic and Health Survey includes certain rituals such as living in the same house or compound, sharing housekeeping arrangements and eating together as a unit regardless of whether the group of persons are related in defining a household (GSS et al., 2009). The current study will use the latter definition as it is more appropriate within the Ghanaian cultural context.

2.8.3 Productivity

This is the quantity of output that can be achieved with a given level of technology. As labour (human capital) is a key input to productivity one can assume that an increase in the quality and/or quantity of labour would result in an increase in productivity (Asante & Asenso-Okyere, 2003). The productivity cost of disease is the work or leisure time lost to morbidity. Several approaches used to quantify productivity losses use the unit cost of similar services on the market or the estimated value of the care giver's time (Hilhorst, van Liere, Ode, & de Koning, 2006; L. S. Wilson et al., 2005).

2.8.4 Economic output

Definitions of Economic growth allude to the consistent procedure by which the productive capacity of the economy is expanded after some time to obtain rising levels of national income and output, a measure of which is total national output (GDP) in real terms (Todaro & Smith, 2015). These rising levels of income and output may be observed through increased consumption of goods and services (welfare) at the household level. Economic output is secured and improved (growth) if the factors of production including human capital are expanded and invested in while depletion, as in the case of HIV infection and ill health in general and disinvestments are deleterious to economic output.

2.8.5 Catastrophic Health Expenditure

Catastrophic expenditure is any great and sudden expenditure incurred by sufferers of disease or their households for the purpose of treatment which compromises their ability to cater for other wellness and living expenses. It has been defined as thresholds, 10 percent or 20 percent of income, or expenditure in lieu of income (Sadr-Azodi, 2019) or 40 percent of non-food expenditure (WHO,

2009). Globally Asia and Africa account for the greatest share of catastrophic health expenditure which is 12 percent using the 10 percent threshold and only 3 percent using the 25 percent threshold (Sadr-Azodi, 2019) .

2.9 Conclusion

This chapter explored Ghana's approach to health financing relying on desk reviews of theoretical and empirical works. In the chapter, efforts were made to document Ghana's humanist values and its efforts at delivering universal health care to its citizens.

A marked chasm between policy and practice was noted with a prominent and abiding unwillingness to bring local funding of HIV and AIDS interventions to the scale required for local ownership. Empirical literature was accessed to inventory the diverse attempts and methods which have been construed to relieve and document, the socio-economic burden of HIV, the relationships between HIV morbidity differentials and welfare and productivity outcomes in Ghana.

Using structural functionalism, the chapter situated the systems approach as a general framework guiding this study. The health capital theory and, biographical disruption theory were then introduced as additional guidance to explain health investment choices, resilience under disease affliction, meaning making and coping mechanisms respectively among HIV infected and affected persons.

The chapter finally sketched a cost aggregative path linking PLHIV socio economic status (SES) and sexual and reproductive health (SRH) behaviour to welfare and productivity at the household and national level.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the specific methodological approaches used in the study. It provides details on study design and approaches used while offering justifications for their use. It further provides details on the selection of study sites and unit of analyses for the study. The profiles of the study sites selected for the study is also presented in the chapter highlighting their suitability for the study. The presentation of this chapter is divided into different sections spelling out specific details under each section. The study design and approaches are presented with empirical and theoretical rationale for the options used. A mixed method approach was used based on a pragmatic philosophical orientation. Profiles of study areas, sampling procedures, sampling techniques, sample size and target populations are discussed. Instrument design and process of data collection and analysis are also discussed.

3.2 Study Area

The study focuses on the major agro-ecological zones of Ghana (Coastal, Forest/Transitional and Savannah) since a majority of Ghanaians are gainfully employed in agricultural activities which occur throughout the country (GSS, 2014n). The study utilised data from secondary sources for national level aggregates to explore the growth effects of HIV and relied on primary data in terms

of the household costs of HIV. For the household data, a purposeful sample which considered maximum representation in terms of epidemiology and geography, as is typical of many HIV economic impact studies carried out in Ghana thus far, was used (Asante, 2018; WFP & GAC, 2019).

As the HIV epidemic has disproportionately affected the economically active segment of the population aged 24-39 years (Bollinger & Stover, 1999; Fobil & Soyiri, 2006; GAC, 2021a) the study focused on adult members of households in estimating the socio-economic impact of HIV on households.

The National and Sub-National HIV and AIDS Estimates and Projections, 2019 report published by the Ghana AIDS Commission lists the regions with the highest, median and lowest HIV prevalence for the year 2020 within the 0-80 age group as Bono (1.8%), Bono East (1.2%) and North East (0.16%) (GAC, 2020c). The same source similarly details the regions with the highest median and lowest anti-retroviral therapy (ART) coverage as Upper East (80.29%) Greater Accra (36.53%) and Ahafo (14.12%). The above epidemic conditions make for a representative selection of regions as respondents from within these regions are expected to reflect high, median and low HIV prevalence as well as ART coverage characteristics. These two epidemic characteristics reflect the clinical burden of disease as well as the level of access to treatment and care services, both attributes taken together, make a good proxy for the state of play of HIV, i.e., the progress of the disease and the clinical response to the disease in Ghana.

Much of the transitional zone reflects intermediate HIV prevalence while the coastal and Sudan savanna experience high and low HIV prevalence respectively.

Urban areas (2.1 percent) were also found to have higher prevalence than rural areas (1 percent) (GAC, 2019). Representation within the sample was cognisant of this and sought to equally represent rural and urban sites. In regions in which there was no HSS sentinel site to be prioritised for recruiting respondents whether under the rural or urban category (NACP, 2018a) the antiretroviral therapy centre within the rural or urban category nearest to the said urban or rural centre was selected. This list is derived from the updated list of ART service centres (NACP, 2019a).

Table 2: HIV estimates for Ages 0-80 and 15-49 for selected regions - 2019

#	Region	HIV Prevalence		ART Coverage		AEZ ¹²	PLHIV# # [0-80]	Remarks
		0-80	15-49	0-80	15-49			
	<i>National</i>	<i>1.15%</i>	<i>1.7%</i>	<i>38.99%</i>	<i>35.4%</i>		<i>342,307</i>	
1	Bono	1.8%	2.63%	41.25%	37.21%	SDF & TZ	20,132 [15%]	High
2	Bono East	1.2%	1.76%	47.93%	43.61%	TZ & GS	12,520 [9%]	Median
3	North East	0.16%	0.23%	75.28%	66.39%	Sudan Savanna	774 [<1%]	Low
4	Upper East	0.50%	0.74%	80.29%	71.76%	Sudan Savanna	5,588 [4%]	High
5	Greater Accra	1.67%	2.45%	36.53%	33.18%	Coastal Savanna	94,093 [67%]	Median
6	Ahafo	1.24%	1.82%	14.12%	12.97%	Semi-deciduous forest	7,068 [5%]	Low
Total for selected Regions							140,175 [100%]	41% of PLHIV [342.3K]

¹⁷Source: GAC, 2020

The selection which comprised six (6) regions also reflected significant agro-ecological diversity as it encompasses all the major ecological zones of the country. The agro-ecological zones represented are: The forest zone (Ahafo and Bono), the transitional zone (Bono and Bono East) and

¹⁷ AEZ = Agro Ecological Zone; SDF = Semi-deciduous Forest; TZ = Transitional Zone; GS = Guinea Savanna

the savanna zone (Coastal - Greater Accra, Guinea – Bono East, Sudan – North East and Upper East).

The selected regions represent 41% of all PLHIV living in Ghana as depicted in Table 2.

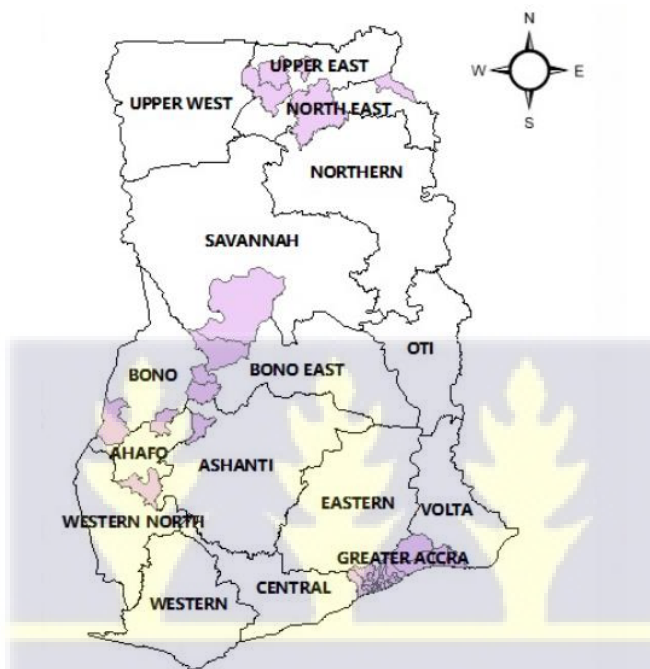
The inclusion criteria for study sites further relied on the 2019 HIV sentinel survey report to identify urban and rural ART sites located in the regions selected for the study. Sites located in regional/administrative capitals were prioritised because it was expected that they would have greater PLHIV client loads. In cases where the targeted number of respondents were not attained within a particular ART site and its immediate catchment area (proximate health facilities), enumerators expanded the catchment area to include nearby HSS sites (NACP, 2020) .

In the Ahafo region, Bechem (Urban ART site) & Asunafo (Rural ART site) were selected from the Tano South Municipality and the Asunafo South District Assembly, respectively. The ART sites selected in the Bono region were Sunyani (Urban) in the Sunyani Municipal Assembly & Dormaa (Rural) in the Dormaa Central Municipal Assembly. In the Bono East region, Techiman (Urban) and Kintampo (Rural) were selected from the Techiman municipal assembly and the Kintampo municipal assembly respectively as ART centres from which to collect data. In the Greater Accra region, due to the heavy client load expected from the region, any urban ART Centre identified with the assistance of the Network of People Living with HIV (NAP+) was targeted while the Ada East District Assembly was targeted for rural respondents. In the North East region, Walewale (Urban) in the West Mamprusi Municipal Assembly and Bunkpurugu-Nakpanduri (Rural) in the Bunkpurugu Nyakpanduri District were selected as focus ART centres. In the Upper East region, Bolgantanga (Urban) from the Bolgatanga Municipal Assembly and Builsa (Rural) from the Builsa North and Builsa South District Assemblies were selected as focus ART centres (NACP, 2020).

The locations of the communities are shown in **Figure 5**

Figure 5

Selected districts and regions included in the study - 2021



Source: Author's depiction, 2021

3.2.1 Profile of Study Areas

Driven by the mixed method approach, the study considers growth effects of HIV on Ghana as a country as well as the burden of HIV illness from the perspective of households in selected districts of Ghana. Consequently, the macroeconomic context of Ghana is presented following which the profiles of the selected districts for the household interviews would be presented.

3.2.1.1 Macroeconomic context of Ghana 2020-2021

Ghana has experienced some forceful growth within the past decade. GDP growth was 14.0 percent in 2011, largely because of the oil industry. The country's economic growth slowed to 3.4 percent

in 2016 largely due to commodity price slumps amid global economic turmoil including sluggish growth from China (African Development Bank [AfDB], 2017) . In 2019, growth had returned to 6.9 percent driven by significant FDI flows in oil, financial services and construction, only to decline to 1.7 percent in 2020 (estimates) and 4 percent in 2021 and 2022 (projected) as a result of the impact of the COVID-19 pandemic (AfDB, 2021).

Table 3: Real GDP growth in Africa (2016-2022)

	2016	2019	2020	2021	2022
Ghana	3.4	6.5	1.7	4.0	4.1
West Africa	0.4	3.6	-1.5	2.8	3.9
Africa	2.2	3.3	-2.1	3.4	4.6

Source: African Development Bank, 2017, 2021

Prior to the COVID-19 pandemic, the Government of Ghana was pursuing a fiscal consolidation strategy complexified by the free high school education policy. This strategy has been muted by the unforeseen health expenditure triggered by the response to the COVID-19 pandemic. Additionally, the fulfilment of many of the social protection and development promises made during the 2020 elections is expected to put significant pressure on budget deficits which were reported at 4.8 percent of GDP in 2019 and are expected to rise to 10.5 percent of GDP in 2020, an amount more than double the threshold of 5 percent established by Ghana's 2018 fiscal responsibility law. The 5% fiscal deficit ceiling is not expected to be attained before the year 2024 (AfDB, 2021).

The growth outlook for 2020 and 2021 is lacklustre. Whereas health and social protection expenditure must be sustained and even scaled up because of the COVID-19 pandemic, Ghanaian remittances which constituted 5 percent of GDP and averaged two (2.15) billion USD in 2016 have declined in line with other countries in Africa by about 9 percent in 2020. At the same time tourist

visits have almost ceased altogether pending progress on COVID-19 vaccines and supply chain rigidities. During the partial lockdown, 770,000 Ghanaians experienced reduced wages while about 42,000 lost their jobs entirely (AfDB, 2021).

Post COVID-19 recovery Growth is expected to be led by construction and manufacturing as well as gold and cocoa exports. In line with these projections the World Bank estimates increases in the contribution of manufacturing to GDP from 32 percent in 2019 to 35 percent in 2020 while the agriculture and fishing sector's contribution averages 18 percent in 2019 and 2020 (World Bank, 2020).

The Ghana cedi experienced relative stability due to the pandemic related slump in imports. Its depreciation held steady at about 3.1 percent in 2020 from a 10 percent decline in 2019. This trend is likely to be reversed if the country experiences success in avoiding subsequent waves of the COVID-19 pandemic leading to a resurgence of imports. At the same time, debt distress lurks as the debt portfolio has ballooned to 71 percent in September of 2020 from 63 percent a year earlier. Additionally, the debt portfolio displays several unfavourable characteristics. About 90 percent of domestic debt has short-to-medium term maturities and foreign debt is largely non concessionary i.e., commercial (50 percent) and US dollar denominated (70 percent) which exposes the country to significant foreign exchange risk (AfDB, 2021) .

The health sector context within which these macroeconomic developments are set is lacklustre. The 2021 sector holistic assessment report scored 2.9 out of a maximum of 5, a noticeable decline from the 3.1 performance of the year 2020 (MOH, 2022a), In 2021 health sector employees experienced a 25% growth, escalating to 183,033 health personnel in 2022. This scale up in personnel drove an increase in 4th Ante Natal Clinic (ANC) visits for expectant mothers from 75

percent in 2020 to 84 percent in 2021. Prevention of Mother to Child Transmission did not change significantly as it remained around 80 percent in 2022. Maternal deaths increased by about 9 percent from 2020 to 2021 while outpatient attendance increased in the same period by 14 percent from 13.9 million to 15.8 million persons (MOH, 2022b, 2023).

Whereas noted improvements in revenue generation for the NHIS were noted with the use of e-receipting and mobile technology driven member renewals, rapid urbanization continued to pose a threat to health care delivery. A dearth of facilities particularly in the peri-urban locations pose a challenge for the equitable distribution of health care workers, especially given the high rate of health worker emigration. These challenges are compounded by the continued presence of bad actors with clinical audits retrieving GHS28.4 million in 2022 as a result of over billed claims (MOH, 2022b, 2023).

The medium-term health sector outlook appears dim as Ghana Government funding is earmarked almost entirely for emoluments. The weight of health worker compensation has escalated from about 70 percent in 2020 and 2021 to 98 percent in 2022. These constrained conditions within the sector are further corroborated by the per capita health expenditure which can be gleaned from the annual financial statements. The amounts decline nominally from US\$46 per capita in 2020 to US\$36 per capita in 2022. A 2021 spike of US\$57 was noted (MOH, 2022b, 2023).

3.2.1.2 Profile of selected districts

The current study included a field survey and interviews which obtained cross-sectional primary data collected to address the second, third and fourth objectives i.e. enabled the computation of the household cost of illness and the unit cost of HIV in Ghana as well as the documentation of the quality of life of affected persons. Field survey data were collected between July and December of

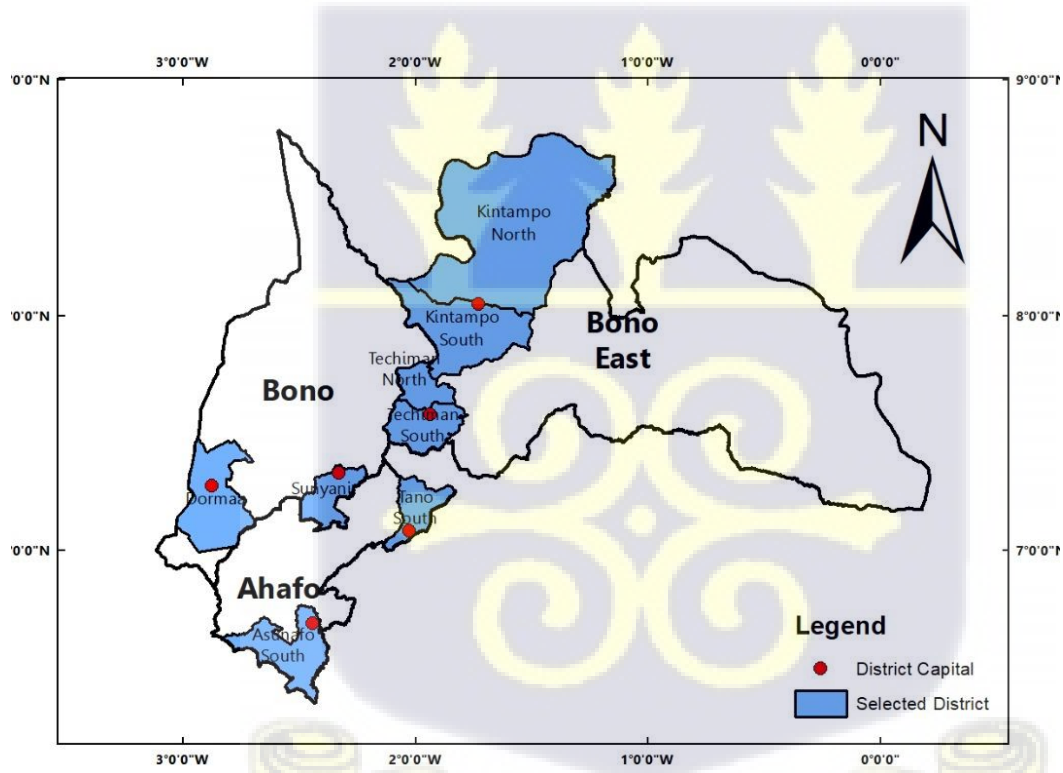
2021. To provide a detailed perspective of the study areas, each ecological zone is presented separately. Districts are presented within their administrative regions.

Ahafo, Bono and Bono East Regions

These three regions which result from the breakup of the erstwhile Brong-Ahafo region are suitable for agriculture and had a 2019 average HIV prevalence of 1.4 percent for the 0-80 age range (range: 1.2 percent in Ahafo and Bono East and 1.8 percent in Bono) and an ART coverage of 34.4 percent (range: 14.2 percent in Ahafo and 48 percent in Bono East).

Figure 6

Selected districts in the Ahafo Region - 2021



Source: Author’s depiction, 2021

This depicts that the regions have a median HIV prevalence with low ART coverage (GAC, 2020c).

Flanked to the west by la Cote d'Ivoire, a neighbouring country with national prevalence rates which are 41 percent higher than Ghana's HIV prevalence (UNAIDS, 2021). The regions are part of the forest and transitional zone of Ghana and are comprised of twenty-nine (29) districts amongst which six have been selected for inclusion in the study because they reflect the prevalence (median) and ART coverage (low) required for inclusion in the study.

Tano South, Asunafo South, Sunyani, Dormaa, Kintampo North and Techiman Municipalities

The selected districts reflect rural and urban settlements in the western half of the three regions. They lie within latitudes 06°00'N and 09°00'N and longitudes 03°00'W and 1°00'W. Rainfall in the selected regions is bimodal. The second quarter (April to July) often witnesses the major rainy season while the minor seasons has been known to stretch from November to March. The regions are drained by several rivers including the Atobiaso, Moku, Kwasu, Subri-Sui for the Ahafo region, the Tano, Amoma, Kankam, Benu, Yaya, Bisi-Bia, Nkasapim and Pamu for the Bono region. The Bono East region which is proximate to the Volta Lake exhibits greater fluvial density and includes the Fra, Urukwin, and Nyamba rivers. Other rivers include the Oyoko, Pumpum and Tanfi-Tano (south), the Subin and the Kar (north) as well as other minor rivers (Brewa, Traifi, Kyini and Fia). Relief in the selected areas ranges from 60 meters above sea level (Kintampo) to 1000 meters above sea level (Asunafo South). Temperatures range from 20°C to 26°C (average 24°C) in the cooler months from April to August and in the dry months can average 31°C (range: 30°C to 33°C). The surface area of selected districts is about 2,000 square kilometres and ranges from 489 square kilometres (Tano South) to 5108 square kilometres (Kintampo North). Except for the Sunyani municipality where household sizes are 3.9, all other districts have household sizes that are at least 4.6 which is the average for all selected districts (GSS, 2014b, 2014f, 2014g, 2014h, 2014i, 2014j; MoFA, 2021b, 2021c, 2021d, 2021e) .

The household population of the district, according to the 2010 population and housing census ranged from 77,185 (Tano South) to 145,309 (Techiman). The Total population size for the municipalities in the year 2021 given the 2.6 percent average growth rate was 878,284. Children constitute 43 percent of households. About 73 percent of the population aged 15 and above is economically active out of which 96 percent are employed and 4 percent unemployed. The economically inactive segment of the population (27 percent) is comprised largely of students (53 percent). About 5.3 percent of the population in the selected municipalities are either too sick to work or are disabled. As infirmity is estimated at a prevalence of 2 percent of persons in the districts, it can be inferred that the majority of those who are unable to work suffer mainly as a result of illness.

The economy of the selected districts is largely agricultural (56 percent of households) and primary as farmers mainly operate at the subsistence level except for cocoa which is cultivated for export. A burgeoning industrial, commercial, and service sector is noticeable in the district and accounts for about 34 percent of occupations. The industrial sector is largely driven by Agro-processing facilities for oil palm and cassava. The commercial and service sector deal in household goods such as detergents and provision of services, trade in Agro-chemicals and farming implements such as cutlasses. The agriculture sector is dominated by cash crops with cocoa contributing about 80 percent of the sector's activities among other cash crops like oil palm. An overwhelming majority of agricultural households (about 97 percent) are involved in crop farming. Food crop production which is done at subsistence level is also vital to the crop sector in the selected districts. Livestock and other cash crops are produced for export. These include cocoa, cashew, mango, oranges, cowpea, and groundnut. The Techiman municipality hosts an international market which attracts

traders from the sub region (Mali, Burkina Faso, Nigeria and Niger)(GSS, 2014b, 2014f, 2014g, 2014h, 2014i, 2014j; MoFA, 2021b, 2021c, 2021d, 2021e) .

North East and Upper East Regions

The Upper East region is bordered by the republic of Burkina Faso and the republic of Togo. The former has a lower prevalence than Ghana while the latter has a higher prevalence of HIV (UNAIDS, 2021). The North East region is one of the three regions which result from the breakup of the erstwhile Northern region. Even though the Upper East region is known for its rocky outcrops, both regions are agriculturally potentiated due to the significant part of their territory being flat grasslands within the Savanna (Guinea and Sudan Savanna) zone of the country and therefore ideal for mechanised agriculture.

The regions are noted for high temperatures ranging between 40 ° C - 45 ° C (high average 43 ° C) with limited (unimodal) rainfall between April and October. The cooler months of the year have temperatures ranging between 12 ° C - 30 ° C (low average 21 ° C) (GSS, 2014c, 2014d, 2014e, 2014k; MoFA, 2021a).

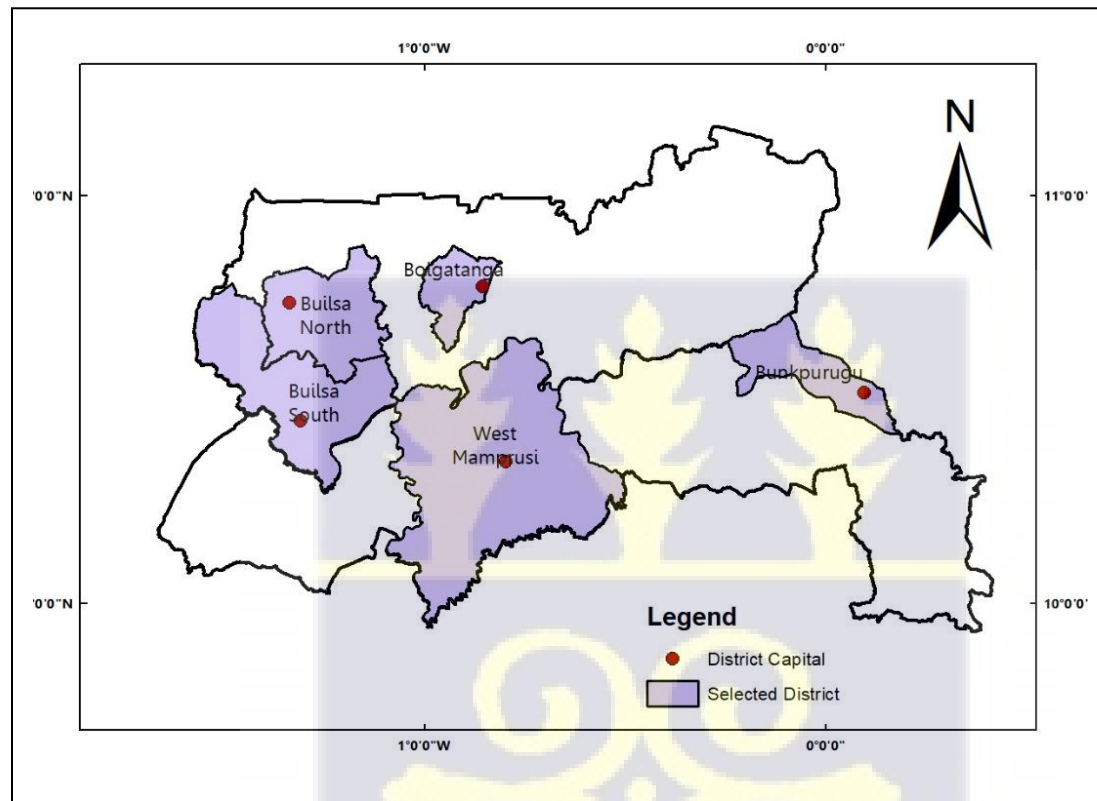
Bolgatanga Municipality, Builsa North, West Mamprusi and Bunkpurugu-Nyakpanduri

Four districts out of the 21 which make up both regions were selected for the study due to their relatively low HIV prevalence and high ART coverage in an approach which sought to represent urban and rural settlements. In 2019, the regions presented an average HIV prevalence for ages 0-80 of 0.16 percent for the North East region and an average HIV prevalence for ages 0-80 of 0.5 percent for the Upper East region. ART coverage at about 78 percent in 2019 was quite high for both regions given the national ART coverage of 39 percent at the time (GAC, 2020c). Both regions

share boundaries with the Republic of Togo where adult HIV prevalence is about 30 percent higher than what pertains in Ghana (UNAIDS, 2021).

Figure 7

Selected districts in the North East and Upper East Regions - 2021



Source: Author’s depiction, 2021

The selected districts lie within latitudes 10°00’N and 11°00’N and longitudes 0.15°00’E and 1.64°00’W. The Bolgatanga municipality and the West Mamprusi district are situated almost centrally within the Upper East and the North East regions respectively while the Builsa North and Builsa South districts make up the south westerly flank of the Upper East region. Bunkpurugu-

Nyakpanduri is bounded to the north by the Upper East region and to the east by the Republic of Togo while Burkina Faso constitutes the northerly bound for the Upper East Region.

The selected districts are within the Guinea and the Sudan Savanna ecological zones and experience a unimodal rainfall pattern lasting between April and October. The weather is coolest between December and January when dry winds blow south from the Sahara Desert. The districts rely on the white Volta, the red Volta, the Nawonga and Moba rivers as well as the Sissili, Kulpawn, Besibeli, Tono, Asibelika and the Azimzim rivers and their tributaries including several wells and dams for household use and for farming. The selected districts cover about 4,751 square kilometres or 2 percent of Ghana's surface area (GSS, 2014c, 2014d, 2014e, 2014k; MoFA, 2021a)

The household population of the selected districts, according to the 2010 population and housing census ranged from 56,477 (Builsa North) to 131,550 (Bolgatanga Municipal) and averaged 92,610 persons per district. Population growth was 1.1 percent for all selected districts except West Mamprusi which grew by 2.8 percent annually since 2010. Population estimates for 2021 for all selected districts are thus 424,883, an increase from 370,440 in 2010 (a cumulative growth of about 15 percent over the period).

Within the 2 regions, the selected districts recorded an average household size of 6.8 persons per household (7.8 and 5.8 percent for North East and Upper East regions respectively). Adults aged 15 years and above constituted about 58.45 percent of the population (53.9 and 63 percent for North East and Upper East respectively). About 72.6 percent of the population is economically active (67.7 and 76.7 percent for West Mamprusi and Bunkpurugu-Nyakpanduri respectively, both in the North East region). Out of the number deemed economically active, about 1.9 percent are unemployed on average, with a range spanning 0.9 percent for Bunkpurugu-Nyakpanduri and 3.2

for Builsa North. About half of the economically inactive segment of the population (27 percent) is comprised largely of students (49 percent) and those who perform household duties. On average, the 98 percent of employed persons is structured as follows; 9.7 percent are engaged in services and sales work, 10.4 percent in craft and other trade activities and 69 percent are involved in skilled agriculture, forestry and fisheries. A smaller percentage (5.9 percent) are engaged as managers, technicians and professionals. About 5.4 percent of the population in the selected districts are either too sick to work or are disabled. As disability is estimated at an average prevalence of 3.4 percent of persons in the selected districts, it can be inferred that the majority of those who are unable to work suffer as a result of disability (GSS, 2014c, 2014d, 2014e, 2014k).

The economy of the selected district is largely agricultural (engaging 79 percent of households with a range from 59.8 percent in Bolgatanga municipal to 86.3 percent in Bunkpurugu-Nyakpanduri). Farmers mainly operate at the subsistence level. Crop farming engages almost all farmers (95 percent) while three quarters (77 percent) of all farmers are engaged in livestock farming. Manufacturing, wholesale, and retail as well as repair of motor vehicles provides employment to about 16 percent of the employed population on average. Accommodation, transportation and food services provide a further 3 percent of the employed persons in the municipality with employment (GSS, 2014c, 2014d, 2014e, 2014k).

Greater Accra Region

The Greater Accra region is the most urbanised region in Ghana. It shares boundaries with the Eastern Region (North), The Volta Region (East), the Central Region (West) and the Gulf of Guinea (South). The region is drained by the Volta and the Densu rivers principally. Seasonal streams from the Akwapim range which drain into lagoons and are often polluted are also noted within the region.

With a surface area of 3,245 square kilometres, the region is characterised by high temperatures all year round which range between 20 ° C and 30 ° C. A bimodal rainfall pattern which should enable the plains around Shai Osudoku, Ningo Prampam, the Ga and Ada districts to escalate agricultural production is noted in June and October (GARCC, 2021)

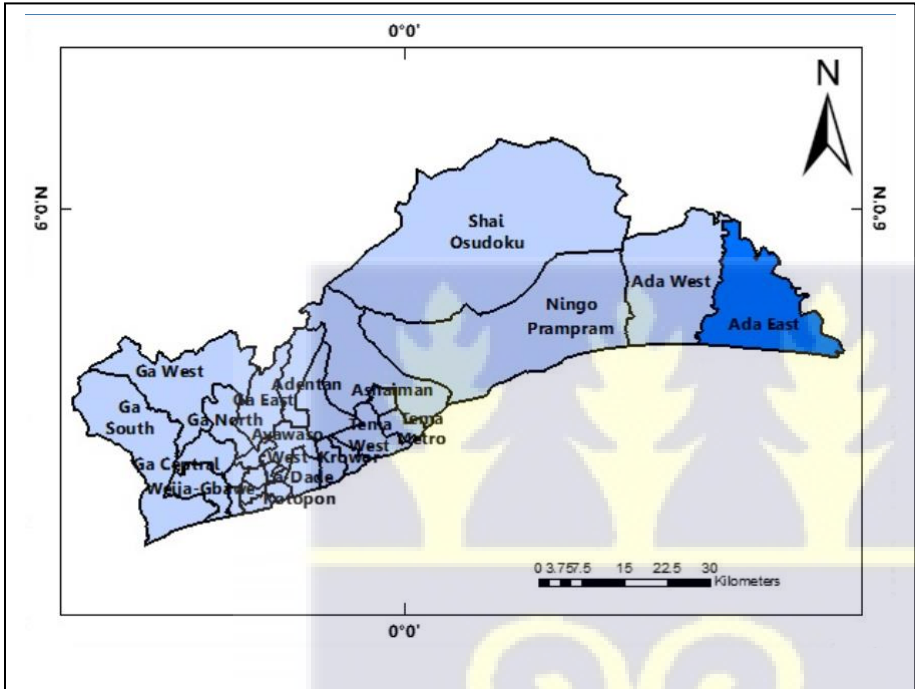
The region has an HIV prevalence of 1.67 percent for the 0-80 age range and 2.45 percent for the 15-49 age range with an ART coverage of 36.53 percent and 33.18 percent for the 0-80 and the 15-49 age range, respectively. This depicts that the region has a high HIV prevalence and a low ART coverage. The region is part of the Coastal Savanna and is comprised of twenty-nine (29) districts amongst which one has been selected to represent rural communities within the region (Ada East). All other ART centres in towns and cities across the region were targeted in a bid to achieve regional representation as the region's estimated number of PLHIV represents about two-thirds of all PLHIV living in all the regions selected for the study and at least a third of all PLHIV in Ghana (GAC, 2020c). The decision to target all districts in the Greater Accra region is also driven by the preponderance of HIV related stigma in Ghana. Thus if saturation or representation is not achieved within a district because PLHIV are unwilling to expose themselves in any district, the nearest district may be relied upon for respondents (NAP+ et al., 2014).

The household population of the region, according to the 2010 population and housing census is 3,888,237. With a population size of 4,010,054 and growth rate of 3.1 percent per year, Greater Accra is expected to have 5,441,729 inhabitants by the year 2021. The region has a household size of 3.8 persons per household and about 68.58 percent of its population is aged 15 years and above. Of this age segment 55.9 percent is economically active out of which 92.2 percent are employed and 7.8 percent unemployed. The economically inactive segment of the population (44.1 percent) is comprised principally of students (two thirds) and persons performing unpaid household work.

Among the employed persons, 35.6 percent are engaged in services and sales work, 21 percent in craft and other trade activities and 4.6 percent are involved in skilled agriculture, forestry and fisheries.

Figure 8

Selected districts in the Greater Accra Region - 2021



Source: Author’s depiction, 2021

Managers, technicians, and associate professionals constitute 17.2 percent. The region reports disability at 2.6 percent of the population (GSS, 2014m).

Ada East

Ada East district with capital at Ada Foah was a natural candidate for a rural site in the Greater Accra region being the most rural district in the region (68.3 percent rural, percentage of farming as occupation – 37.1 percent and the greatest household size - 4.7 against a regional size of 3.8 (GSS, 2014m)). As with rural sites in other regions, respondents were culled from neighbouring

districts in this case the Ada West District (with capital at Sege) which was coterminous with the Dangme East district until 2012 when the districts when both Ada districts were carved out of the erstwhile Dangme East district which had its capital at Ada Foah (NACP, 2020)

Ada East district assembly is situated in the eastern octile of the Greater Accra region. It is bordered to the west by the Ada West District and to the East and North by the Volta Region. Spanning an area of 290 square kilometres. The district lies within Ghana's coastal Savanna ecological zone and has a bimodal rainfall pattern lasting from March to September with high temperatures ranging from 23°C and 28°C with possibilities of attaining 33°C during the hot seasons. The Volta River and its tributaries constitute the main waterway and with the gulf of guinea provides for significant fluvial and maritime fishing activities (GSS, 2014a).

The household population of the district, according to the 2010 population and housing census is 70,470. The Total population size for the district in the year 2010 was 71,671 with a regional population growth rate estimated at 3.1 per year. This suggests that by 2021 the population is expected to have risen to 97,259 people (GSS, 2014m). The district recorded a household size of 4.6 persons per household. Children (ages below 15 years) constitute 40.1 percent of the population. 70 percent of the population aged 15 and above is economically active out of which 95 percent are employed and 5 percent unemployed. The economically inactive segment of the population (30 percent) is comprised largely of students (50.2 percent) and those who perform household duties (15.8 percent). Of the 95 percent of employed persons, 39.3 percent are engaged in services and sales work, 23.3 percent in craft and other trade activities and 20.2 percent are involved in skilled agriculture, forestry and fisheries. A smaller percentage (8.7 percent) are engaged as managers, technicians and professionals. 5.8 percent of the population in the district are either too sick to work

or are disabled. As infirmity is estimated at a prevalence of 4.3 percent of persons in the district, it can be inferred that those who are unable to work suffer mainly as a result of disability.

The economy of the district is largely agricultural (33.3 percent of households) and primary as farmers mainly operate at the subsistence level relying principally on rain-fed agriculture. 77 percent of farmers are engaged in crop farming. Livestock farming accounts for 59.5 percent of farmer households.

Manufacturing, wholesale, and retail as well as repair of motor vehicles provides employment to 38.2 percent of the employed population. Accommodation, transportation, food and storage services provide a further 10.9 percent of the employed persons in the municipality with employment (GSS, 2014a).

3.3 Study Design and Data Collection Methods

3.3.1 Philosophical Basis for the Design and Sampling Procedure

Disease experiences are as plural as there are illnesses and sufferers of these conditions in the world. This complexity naturally suggests a mixed approach to explore as many dimensions of disease costs as possible. The popularity of pragmatism (mixed methods) is attributable to its ability to offset the limitations of both the positivist and the interpretivist research paradigms (Creswell, 2013). As the objective of this study is to engage with the complexity of the cost of HIV and related health protective or destructive behaviour by vulnerable populations, the study used a mixed design (O'Cathain, 2009). Quantitative and qualitative therefore influenced the inclusion and exclusion criteria of respondents, instrumentation, data collection, analysis and reporting.

A multistage explanatory sequential design was applied which first deployed quantitative methods to elicit the nature and extent of the economic burden on the nation and households following which a qualitative approach was used to explore why and how the burden becomes manifest at the individual level, through social networks and finally within the host communities of PLHIV and society in general.

The first stage of the sequential approach therefore considered the effect of HIV at the national level, the growth reinforcing or mitigating effects of HIV and AIDS morbidity in Ghana. The second stage included a household survey which targeted the direct and indirect costs which are imposed on affected households by HIV and AIDS in selected regions of Ghana. The final stage of the multistage mixed sequential design pursued some clarity from purposefully selected respondents via in-depth interviews on coping strategies adopted in response to the economic impact which might have been documented during prior stages of the sequential approach.

The multistage approach detailed above encompasses two out of the three methods which have been used routinely to estimate disease costs across the world: the cost of illness approach (COI) and the production function approach (PF). The willingness to pay approach (WTP) will not be used in this study (Orem et al., 2012). The COI and WTP approaches focus on micro level costs (Albert et al., 1998) while PF approach tends to address costs at a more aggregate level.

While the COI approach may also include costs borne by health institutions, other social protection stakeholders and society at large, the WTP approach focuses on an institution or an individual's risk perception, how much they are willing to pay to avert morbidity or mortality (Kirigia et al., 2002).

The constructivist dimension of the study is the lived experience of sufferers of the condition. This is because PLHIV have highlighted their exclusion from the decision making process in relation to prevention, treatment and care decisions which concern them (NAP+ et al., 2014). An attempt was made to “hear” their “voices” through this approach, describing their own reality in a manner unshackled by the prejudices and beliefs of the managers of the national response to HIV and AIDS (Groenewald, 2004). Under this approach, in-depth interviews attempted to elicit the varying areas of vulnerability and different dimensions of the pain of PLHIV as well as the exclusion which they feel although these costs, seen as intangible, were not costed in this study.

Pragmatist philosophical foundations of scientific inquiry such as that which is adopted here typically betray dissatisfaction with the dearth of detail or insufficient focus on specific cases. In extant economic burden of HIV inquiries in Ghana for example it has been difficult to identify the economic impact of the disease over time while at the same time documenting the details of individual and household burden such that duty bearers could craft economic mitigation interventions to address the “pressure points” of household HIV and AIDS related expenditure. In several instances PLHIV report that government’s main social protection programmes do not sufficiently cover their needs because they may be just shy of the qualifying criteria in the case of the Livelihood Empowerment Against poverty (LEAP) or because National Health Insurance (NHIS) premiums which are paid on their behalf to facilitate access to health care do not cover ancillary investigation payments (GAC, 2016b, 2020a). The best-suited approach to address some of these questions is pragmatism, a combination of all the paradigms which “work”, allowing the different methods to complement one another without disregarding acceptable scientific rigour. Rules pertaining to each paradigm were respected thereby maintaining the validity of results. A mixed method approach typically plugs the limitations of quantitative methods by deploying

qualitative methods and vice versa. In the current study, this approach was used sequentially and iteratively until answers to the research questions were either broached or achieved (Morgan, 2007). Mixed methods are said to be the natural or human way to arrive at truth because humans are said to question phenomena in several practical ways until they arrive at answers which are satisfactory to them (Tashakkori & Teddlie, 2010).

3.3.2 Target Population

This study explores productivity and economic welfare losses in Ghana. These concepts can be apprehended from a society wide perspective or from a household perspective (WHO, 2009). The former targets annual growth and related economic data from the onset of the disease or the time when “patient zero” might have triggered the first transmission in Ghana (1970s)¹⁸ until the 2019 version of the National HIV estimates report (GAC, 2020c), a total of 49 years. However, since the main viral strain of HIV in country (HIV-1) became predominant circa 1990, economic output was regressed with the disease condition over the revised 30-year period instead (Ishikawa et al., 2001) with the unit of analysis being a calendar year in line with the cadence of epidemic and national economic output reporting.

Productivity and welfare losses from the Ghanaian household perspective are derived from the condition or frame within which PLHIV live and are supported for their daily treatment and care needs. The households targeted are situated in localities which display the highest, median, and lowest HIV prevalence (3 regions) and ART coverage (a further 3 regions) for a total of 6 regions.

18 Patient Alpha is estimated to have occurred anywhere prior to 1971 as UNAIDS through the Spectrum software has reported estimates of PLHIV from 1971. A total of 128 persons. This can be compared to 1986 when the first few cases of HIV were officially recorded in Ghana and the 1970s when anecdotal reports of death of relatives by a wasting disease have been noted.

Care was also taken to ensure that rural and urban anti-retroviral treatment sites were targeted such that households normally resident within that catchment area are selected (NACP, 2020). Populations in Ghanaian households are typically engaged in the service sector (43.5 percent) and agricultural production (38.3 percent)(GSS, 2019a). The unit of analysis for the household survey is therefore the household. Ghana Statistical Service (2019a) defines a household as one or more persons who may or may not be related but live in the same housing unit under the same housekeeping and cooking arrangements and who acknowledge the same individual as their household head.

3.3.3 Exclusion and Inclusion Criteria

Due to the sociology of HIV and AIDS as well as the level of stigma in Ghana, a multistage sampling approach was used. First, all 16 regions of Ghana were listed according to HIV prevalence and ART coverage estimates. The lowest, highest, and median regions were selected for both prevalence and ART coverage. From each of the six (6) selected regions, the rural (1) and urban (1) sentinel sites with the greatest ART client loads were chosen. These sentinel sites are typically district level health facilities (GAC 2020). Community entry was facilitated by community experts or key informants such as employees of the Ghana AIDS Commission resident within the region of interest and the leadership of the Network of Persons Living with HIV and AIDS (NAP+). At this point a snowball sampling approach was used to enrol respondents (Creswell 2013). Respondents were included only if they were (1) PLHIV, (2) resident or receive their medicines from a health facility located in the selected district, (3) are the household head¹⁹ or designated representative of a household that has one or more PLHIV as members. If the ART facilities and the Network of People Living with HIV (NAP+) key informants were unable to provide the required number of

¹⁹ The survey targeted household expenditure for PLHIV households as well as PLHIV experiences.

respondents, a similar snowball approach was used to access PLHIV in and around the nearest ART facility within the same or proximate administrative districts. This was the case with Builsa North and South for example. Efforts were also made to engage male and female PLHIV in equal numbers. Beyond the afore mentioned geographic exclusion criteria (residency and ARV refill location) there were no notable exclusion conditions.

Wherever possible, a sampling frame (list of PLHIV) was obtained from the key informants from which survey participants were selected systematically (walk through) until the respondent allocation for the district was attained. Alternatively, “walk-in” ART clinic participants were approached and offered participation in the study until numerical saturation was achieved. These respondents were approached in person or via phone to explore their willingness to participate in the study. Once participation was agreed, a fact to face meeting was organised at a convenient location where confidentiality and privacy were assured.

A tenth of the questionnaire respondents (survey participants) were given the opportunity to participate in the in-depth interviews. Selection for the in-depth interview was random²⁰, with replacement.

Three FGD were held across the country to reflect the diverse Agro-ecological zones. Greater Accra for the coastal Savanna, Ahafo for the forest and transitional zones and the upper East Region for the Guinea and Sudan Savanna.

3.3.4 Sample Size Determination

This study samples data available for all key objectives. The estimation of the growth effects of HIV on the Ghanaian economy was done using data from 1990 to 2019. The time series data

²⁰ The list of survey respondents was used to randomly select candidates for interview sessions until saturation.

available for this exercise is limited by the number of years for which UNAIDS was able to provide HIV prevalence estimates i.e. 1971 to 2019 using its spectrum software (GAC, 2020c). The sample was also restricted to 1990 as a starting point because of the predominance, since that year, of the dominant viral strain HIV-1 in Ghana (Ishikawa, Janssens, Banor, Shinno, Piedade, Sata, Ampofo, Brandful, Koyanagi, & Yamamoto, 2001; NACP, 2020).

The second and third objectives which sought to compute the welfare and productivity effects of HIV and AIDS on households in Ghana and to calculate unit costs per capita for HIV and AIDS treatment and care in Ghana respectively were also implemented using sampling methods. For this purpose, Yamane's method for estimating samples was used for the household survey (Yamane, 1967).

The following estimation formula was used:

$$n = N / (1 + [N(e)]^2)$$

Where, n = the sample size

N = the estimated number of PLHIV in the country

e = the error of 5 percentage points.

Power calculations for 342,307 estimated PLHIV as of 2019 with confidence level of 95% and 5% error is 400. It should be noted that the sample size obtained required adjustments to reflect the extent of typical response rates within the community.

Although response rates involving beneficiaries of government programs in Ghana are generally quite high; often 90 percent and above (Akazili et al., 2017) some studies have noted significant inadequacies in responses to specific questions relating particularly to HIV related welfare (Asante,

2018). Out of the 600 respondents in the 2010 study for example Asante et al. (2014) obtained only 66 respondents (n=66) with enough detail to support the construction of a direct cost of illness table per month by region, settlement type and income level. Similarly, the average response rate for urban HIV Testing Services (HTS), hospitalisation & nutrition in a study by Asante et al. (2014) was approximately 50 percent. Asante (2018) indicates that response rates for similar questions did not change significantly when another study was done more recently.

Thus, provision was made to account for non-response and incomplete responses. The sample size obtained when substituting national PLHIV estimates into Yamane's formula was thus adjusted upwards by 50 percent to account for the typically low response rates in such studies.

The sample size obtained was therefore $400 \times 1.5 = 600$.

This national sample size of 600 was then distributed across the selected regions using weights obtained from the national estimates report and as documented in Table 2. The total estimated number of PLHIV living in the selected regions is 140,175 which represents about 41 percent of all people living with HIV in Ghana as at 2019 (GAC, 2020c). Table 2 illustrates the district weights. The district allocations are illustrated in Table 4.

Sixty (60) in-depth interviews, representing a tenth of all survey respondents ($600 \times 10\% = 60$), were targeted to be complemented by three focus group discussions (FGD) to build consensus on the pattern of challenges and household coping strategies. Table 4 indicated that due to low prevalence in some regions, the estimated sample sizes might be too low to accommodate a focus group discussion which targeted six (6) participants at a minimum to assure representativity across the following variables: locality (rural versus urban), gender (male versus female) and occupation (agriculture versus service and related activities). This purposive approach provided for at least

eighteen FGD participants in all ecological zones since FGD targeted a minimum of 6 participants ($6 \times 3 = 18$) each. Per Table 4, only the Sudan and Guinea Savanna Agro ecological zones (Upper East and Northeast Regions) initially fell short of the minimum number for the FGD²¹. For these regions, the original sample size for the questionnaire was 30 for all four districts combined and declined to 10 percent thereof for the in-depth interviews, i.e. 3 respondents, a number significantly below the 6 participants required for each FGD. Since the sample size 600 was already sufficiently large, it was not increased any further to address the challenge with the FGD slated for the Upper East and Northeast regions. The Greater Accra region, which was already sufficiently represented, since it hosted 67 percent of all PLHIV in the selected regions was adjusted downwards to accommodate an increase of 30 respondents each for the Upper East region and the Northeast region. The redistributed number of respondents was allocated based on the weights of localities (rural versus urban) for a total sample size which remained 600. The Greater Accra sample size thus declined from 358 to 298 respondents while the Northeast region (Rural sites - Bunkpurugu Nyakpanduri) increased from 4 to 26 and West Mamprusi, the urban site increased from 2 to 10 respondents. Builsa North, the rural site of the Upper East region increased from 19 to 43 respondents while its urban counterpart (Bolgatanga Municipal) rose from 5 to 11 respondents. After these adjustments, the Northeast and Upper East regions had a joint sample size of 90 from which 10 percent of respondents were drawn for in-depth interviews thus providing a group of 9 respondents from which a minimum of 6 participants could be drawn for the FGD.

²¹ See initial observations per district in brackets “[]” on Table 4. Sample sizes were later adjusted under the sample size column for Greater Accra, Northeast and Upper East Regions.

Table 4: Survey Sample Size Estimation for Selected Districts - 2020

Region	2019 PLHIV # ²²	Rural/Urban ²³	District	Sample Size
Ahafo	5 %	R = 52 %	Asunafo South	16
		U = 48%	Tano South	14
Bono	15%	R = 52 %	Dormaa	47
		U = 48%	Sunyani	43
Bono East	9%	R = 52 %	Kintampo North	28
		U = 48%	Techiman	26
Greater Accra	67%	R = 9.5%	Ada East	38
		U = 90.5%	All Urban [358]	298
North East	1%	R = 72%	Bunkpurugu Nyakpanduri [4]	26
		U = 28%	West Mamprusi [2]	10
Upper East	4%	R = 80%	Builsa North [19]	43
		U = 20%	Bolgatanga [5]	11
Total				600

Source: Author (2021)

3.3.5 Sources of Data

The study relied on two main sources of data, primary data which was obtained from the Household Survey, Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) and secondary data which was culled from corporate reports and aggregate country level economic data.

Primary Data

Primary data were sourced and used in three ways. The household survey questionnaires provided demographic, stigma and discrimination, income and expenditure as well as employment and coping information related to the household. The second source of primary data emanates from the Interviews which focused on individual perceptions of their identity and the meanings which they make of their status as PLHIV. Data from the interviews were validated through focus group

²² Expressed as percentage of selected districts

²³ Population distribution by locality is derived from the Regional Analytical Reports of the 2010 Population and Housing Census. All regions created after 2010 are classified under their most proximate (culture/geography) region (GSS, 2013, 2014, 2014m)

discussions to obtain a community perspective on the challenges which PLHIV are compelled to bear as a result of HIV.

Secondary Data

Secondary data were sourced and used in two ways. The World Development Indicator Series of the World Bank (World Bank, 2020) and the Penn World Tables, version 10.0 (Feenstra, Inklaar, & Timmer, 2015) which are databases providing data on levels of output, input, income and productivity for most of the countries in the world for several decades including the period of interest to the study, i.e. 1970 to 2019.

Secondary data were also culled from desk reviews of corporate reports particularly treatment expenditure data as detailed in the financial statements and annual reports of the Ministry of Health (MoH) and the National AIDS Control Program (NACP). The National AIDS Spending Assessment (NASA) reports were also perused for funding sources of the national response to HIV and AIDS. Data were also fetched from statutory reports prepared or hosted by aggregators such as the Ministry of Finance, the US Government and the Global Fund to fight AIDS, Tuberculosis and Malaria (GFATM). These data sources contained most costs borne by government and other funding partners and were used to calculate unit costs per capita for HIV and AIDS treatment and care in Ghana (GAC, 2020b).

Ancillary prevention and mitigation data were also collected from the West Africa Program to Combat AIDS and STI (WAPCAS, a principal recipient of funding from the Global Fund in Ghana), the Ghana AIDS Commission, the Ministry of Education (through the School ALERT prevention program) and the Ministry of Gender, Children and Social Protection (The Livelihood Empowerment Against Poverty – LEAP). The multiplicity of secondary data sources was useful as it supported data verification and validation.

3.3.6 Data Collection Tools

A pragmatic perspective informed the instruments which were designed to collect data for this study.

Desk review

A desk review of reports and articles constituted the main data collection mechanism for costs borne by institutions on behalf of the PLHIV and or their households. This facilitated the computation of unit costs per capita for HIV treatment and care in Ghana.

Questionnaires

Constructed in seven sections, the questionnaire was designed for the exclusive use of households and was administered by enumerators using the cost of illness approach to explore welfare and productivity effects of HIV on households. The data were used to compute household out-of-pocket (OOP) payments as well as the per capita cost of HIV treatment and care. The costs collated from the administration of this questionnaire were added to the costs borne by corporate parties and government to enable the computation of per capita unit costs for HIV treatment in Ghana. The questionnaire also enabled the identification of various cost centres for household HIV expenditure. Additionally, by disclosing household income and HIV related expenditure, the questionnaire facilitated the computation of the “burden” of HIV for Ghanaian households.

The seven sections of the questionnaire were rendered in eleven (11) parts (see appendix 1). Section 1 is preceded by informed consent and administrative data after which the household characteristics including assets, the number of PLHIV within the household and any relocations since diagnosis are shown. Section 2 and 3 highlight the demographic characteristics of household members and the household’s income and expenditure respectively.

Section 4 of the questionnaire considers post diagnosis relationships as well as stigma and discrimination. Section 5 and 6 pertain to the impact of HIV on employment and on the health status, respectively. Finally, section 7 prioritises coping mechanisms, social insurance and social protection as well as caregiver data.

Interviews

An interview guide (see Appendix 2) was designed to support proposals made in earlier studies which recommend investing in nutrition and ART access costs as well as interventions geared towards addressing stigma and discrimination which are deleterious to PLHIV efforts at economic enterprise (Asante, 2018; Asante et al., 2014; Poku et al., 2020; WFP & GAC, 2011, 2019). Some of these proposals have however been evasive about the nature and approach that such mitigating action might take given the low resource setting in which such policies would be implemented. The interview guide is designed to give voice within the policy space to PLHIV to identify cost centres of concern and possibly suggest areas in which policy might improve as well as how this might be done (Hampton, Buggy, Graves, McCann, & Irwin, 2017; NAP+ et al., 2014; Poku et al., 2020).

Focus Group Discussions

The Focus Group Discussion guide is framed along the structure of the interview guide as it is designed to validate the disparate views of interview respondents. It is focused on household income and expenditure trends as well as the dynamics of the HIV policy space and how improvements in these areas might be achieved. Participation in the FGD is restricted to the key informants themselves with an emphasis on rural urban, gender and occupational representation (top two occupational sectors in the agro-ecological zone).

3.4 Data Processing and Analysis

3.4.1 Method of Analysis

3.4.1.1 Quantitative Analysis

Quantitative analysis in this study was bifurcated. First, the growth effects of HIV on the Ghanaian economy were explored using a production regression function. Secondly, the economic outlay of households incurred for the purpose of responding to HIV related health shocks was computed.

A multivariate time series regression was used to consider the effect of HIV on aggregate output. Challenges occasioned by data gaps in some of the key variables of the production function were addressed by linear interpolation using 5-year averages.

The total value of goods and services produced in an economy is its GDP. It is a measure of an economy's aggregate output; it encompasses expressions of factors of production such as land, labour and capital in their varying forms (human capital, entrepreneurial abilities and institutional qualities amongst others). It is also designed to reflect personal consumption, private and public investment, other government expenditure, savings and trade openness reflected by imports and exports (Kirigia et al., 2002; Orem et al., 2012).

As there is consensus that poor health negatively influences output and socio economic status (SES) (Halla & Zweimüller, 2013; Kirigia, Sambo, Anikpo, Karisa, & Mwabu, 2005a), this study utilised the traditional PF approach with a measure of gross domestic product (GDP) as the dependent variable of the regression function.

There is clarity on how HIV morbidity might inflect productivity, savings and therefore investments. Savings are the surplus of output returns which is not consumed. When HIV related health costs outstrip regular operating expenses, savings are first consumed to parry the demands

of ill health and then productive assets are sold to meet health spending needs (Asenso-Okyere et al., 2011; Tebandeke & Premkumar, 2011). Labour and human capital are also impacted by HIV and AIDS morbidity since absenteeism by infected and affected workers leads to loss of knowledge and to diminished working hours which are spent tending to the sick (Adato & Bassett, 2008; Asante & Asenso-Okyere, 2003). Undoubtedly, further investments in replacing workers lost to AIDS further reallocates resources away from other productive purposes. The impact of health on present and future marginal productivity of labour is thus well documented (Cardoso, 1998; Hunter, Bulirwa, & Kisseka, 1993; Kirigia, Sambo, Anikpo, Karisa, & Mwabu, 2005b; Kirigia et al., 2002).

3.4.1.1.1 Production Function Model Specification

As extensively documented by Asante and Asenso-Okyere (2003); Kirigia et al. (2002) and Orem et al. (2012) it is expected that HIV and AIDS morbidity would erode physical and mental wellbeing, inhibiting self-care and investment in the self as well as social participation, all of which are key performance indicators which contribute to economic growth. In other words, the marginal productivity of labour (change in economic growth attributable to changes in labour) is a function of physical and human capital.

The Cobb-Douglas function specified for estimating the effect of HIV and AIDS morbidity and mortality on the Ghanaian economy is a double log function. The Cobb-Douglas function is an equation which describes the relationship between economic inputs, namely capital and labour and economic output. It is a practical and powerful tool for macroeconomic analysis and the evaluation of government policies (Gujarati & Porter, 2009; Hájková & Hurník, 2007) .

The effect of HIV and AIDS on economic growth can be expressed as follows:

$$GDP = f(F, HK, E, X, H, A) \quad (1)$$

The arguments of the function are detailed under (3). Assuming that the standard linearity assumption between explanatory variables is violated, the equation could acquire a Cobb Douglas production function form as below:

$$GDP = F^{\beta_1}HK^{\beta_2}E^{\beta_3}X^{\beta_4}H^{\beta_5}A^{\beta_6}\epsilon^i \quad (2)$$

Equation (2) is simplified as denoted in (3) using the double log model by applying the natural logarithms (ln) to both sides of the equation denoted in (2) i.e. log to the base ‘e’ with ‘e’ being equal to 2.718 (Kirigia et al., 2002)

$$\ln GDP = \beta_0 + \beta_1 \ln F + \beta_2 \ln HK + \beta_3 \ln E + \beta_4 \ln X + \beta_5 \ln H + \beta_6 \ln A + \epsilon \quad (3)$$

Where: Dependent variable and regressors are defined below.

3.4.1.1.1.1 Dependent Variable

GDP is the nation’s gross domestic product. In (3), it is the dependent variable. It is constructed by computing the total of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. The computations exclude deductions for depreciation of fabricated assets or for depletion and degradation of natural resources (World Bank, 2020). The value obtained in purchaser’s value and at current market prices (in millions of Ghana Cedis) was sourced from the Ghana Statistical Service (GSS, 2021).

3.4.1.1.1.2 Explanatory Variables

F is the nation’s stock of fixed capital. Capital stock includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. It is reported as national prices in millions of 2017-US\$ and sourced from the World Penn Tables (Feenstra et al., 2015). An alternate proxy used for this

variable similarly measures fixed capital in current US\$ and was sourced from the World Bank Development Indicator Series (The World Bank Group, 2019). In theory fixed capital should add to aggregate output.

HIV morbidity depletes savings as households try to cope with the burden of treatment and care, this would have a negative effect on disposable income and therefore private investments and capital accumulation. The regression coefficient is expected to be significant and negative.

HK is human capital rendered as Human capital index, based on years of schooling and returns to education. This ratio reflects the investments in human capital undertaken by the nation and is sourced from the World Penn Tables.

The Human Development Index (HDI) is another proxy for investments in human capital which reflects health, education, income or welfare and general enhancement in the quality of life of the citizenry. HDI is a composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living (UNDP, 2020). The data were sourced from the data centre of the United Nations Development Program (UNDP) and unsuccessful attempts (data paucity and model fitness) were made to use it as an alternate proxy for human capital. Nonetheless human capital proxied by secondary education demonstrated sufficient fitness for purpose and was used instead.

Improvements in human capital, combined with investments in physical infrastructure are expected to improve economic growth. The coefficient of this variable is therefore expected to be significant and positive.

E is the number of persons economically engaged in the country. It is reported as time series data and rendered in millions of persons. This variable reflects social participation which tends to decline

when PLHIV are stigmatised and denied basic rights for example. Tsai (2015) in a study of 4,314 sub-Saharan PLHIV noted the high levels of internalised stigma and the regressive effect which it had on PLHIV with lower SES. It was also noted that a significant correlation exists between the stigmatising attitudes of the general population and the extent to which PLHIV self-stigmatised or internalised stigma with obvious implications for investments in themselves as well as social and economic participation. It is expected to increase economic growth and therefore its coefficient should be significant and positive. Data for this variable was culled from the World Penn Tables (Feenstra et al., 2015)

X is a measure of the volume of goods and services traded or trade openness. It is a ratio comprised of the sum of all imports divided by the sum of all exports in current US dollars. Imports and exports are good proxies for trade openness. In this study, the quotient of trade volumes in current US dollars expresses the nature of local economic output and preferences in terms of international trade. The quotient could be used to broach the subject of whether local production is sufficient to satisfy local demand and therefore attenuate imports and conversely if there is enough productivity in-country to enable exports. The quotient is used as a proxy for trade openness and is computed as follows:

$$X = Imports/Exports \quad (4)$$

Trade openness can also reflect the extent to which a country accepts new ideas. Such scientific diffusion typically helps in optimising the effectiveness and efficiency of local production systems. Imports and exports typically require compliance with international standards and markets, it presupposes that the local business ecosystem would have adapted to meet the said import and export requirements in terms of infrastructure, networks and business practices. They could also be

used as a good measure of international competitiveness and attractiveness of a country as trade partners do have the option of looking elsewhere for trading partners if a country is deemed inefficient or is performing sub optimally in terms of ease of doing business, price or product quality amongst other concerns.

Data for this variable is sourced from the World Development Indicator Data series of the World Bank Group (The World Bank Group, 2019). It is expected that increased trade openness would improve economic growth. The coefficient of this variable is also expected to be significant and positive.

H is HIV morbidity recorded as the growth in total number of people estimated to be living with HIV in Ghana. HIV and AIDS morbidity and eventually mortality is deleterious to economic growth in that PLHIV are unable to fully contribute to social and economic activities because of the bio physical drain occasioned by the disease and the abiding stigma which precludes many from social participation. Productivity declines stemming from the physiological strain of living with HIV combined with diminishing social participation resulting from stigma and discrimination will diminish the extent to which PLHIV and their families can either invest in themselves or increase their earning power.

HIV morbidity can be expressed as prevalence which is the number of PLHIV at any point in time or as incidence which is the number newly infected persons (GAC, 2018). Incidence is the ratio of new infections; new infections may be measured as the frequency of observations per 1,000 inhabitants or more. Although it is often recommended to consider incidence which better reflects the evolution of the epidemic, incidence data is less readily available than prevalence data (Albert et al., 1998; Cohen et al., 2008). This may account for why the prevalence of HIV for the 15-24 age

group is used as a proxy for incidence in Ghana (Asamoah-Odei, Calleja, & Boerma, 2004). Conversely, WHO posits that whereas future disease impact may be suited to the use of incidence data, prevalence data is more comprehensive in that it integrates the total economic burden of disease by merging the costs related to existing cases as well as new cases (WHO, 2018). For this study, the total number of people afflicted by the chronic disease²⁴ was deemed to be more reflective of total economic burden than incidence data. The economic cost of lifelong anti-retroviral therapy, as well as the physiological and stigma related social exclusion effects of HIV infection amongst other drivers of the economic burden influence the decision to use prevalence data.

Increases in the epidemic burden are therefore expected to negate economic growth, thus the coefficient of this variable is expected to be significant and negative.

The variable “A” refers to land. Agricultural activities constitute a significant occupation of Ghanaian households with nearly half (44 percent) of all households owning or operating a farm with a significant rural (74 percent) urban (20 percent) schism (GSS, 2019a). It is represented by arable land per capita in hectares sourced from the World Bank Development Indicator Series (The World Bank Group, 2019)

The coefficients β_i ($i = 0, 1, 2, 3, 4, 5, 6$) are the partial elasticities of the respective variables with ε being the error term. They represent the percentage change (β_i) in the dependent variable (in this case per capita GDP) for every one-percent change in an explanatory variable x_i , given that all other explanatory variables are held constant.

²⁴ CDC defines a chronic disease as one which last for 1 year or more and requires ongoing medical attention or limits daily living activities or both.

Source: <https://www.cdc.gov/chronicdisease/about/index.htm>

3.4.1.1.2 Cost of Illness (COI)

The Total Cost of Illness [COI] is expressed mathematically as follows:

$$C = \alpha + \beta + \iota \quad (5)$$

Where C = Household Cost of HIV and AIDS illness.

α = direct cost of care at household level, and

β = indirect costs related to HIV and AIDS illness (productivity cost) at household level

ι = intangible costs at household level.

Direct costs of care at household level include cost of drugs, fees paid to access health facilities (registration, consultation, outpatient, and in-patient care), laboratory tests for diagnostics and disease monitoring, transportation and feeding costs for PLHIV and any caregivers as well as the cost of enhanced nutrition which is recommended as part of the therapeutic protocol.

Mathematically α can be expressed as follows:

$$\alpha = \sum_{(i=1)}^n x_i \quad (6)$$

Where x_i is a vector of the direct cost items listed above.

The indirect cost of HIV and AIDS illness (β) at household level is the forfeited productivity arising from partial or permanent HIV related morbidity and premature mortality. In line with Asante and Asenso-Okyere (2003) and (Adedigba et al., 2009), the value of time lost as well as the forfeited interest lost as a result of HIV triggered dissaving (β) can be expressed mathematically as follows:

$$\beta = \mu_1 \left(\sum_{(i=1)}^n y_i \right) + \mu_2 \sigma \quad (7)$$

where y_i is a vector of forfeited productive time in hours or other period measure such that $y_1 =$ shuttle time to health facility, $y_2 =$ waiting time for treatment at the facility, $y_3 =$ time spent caring for the sick, $y_4 =$ time lost due to incapacitation (i.e. duration of illness and convalescence).

y_5 to $y_n =$ other time and fringe benefit coefficient lost to HIV and AIDS treatment and care activities.

$\mu_1 =$ household income²⁵ is premised upon regional market labour rates (expressed in cost per hour or in periods coherent with y_i . Wherever the household income per time unit was unavailable, average per unit cost of labour within the region was used.)

$\mu_2 =$ cost of capital²⁶

$\sigma =$ forfeited savings (draw down on savings)

Intangible costs τ are costs which are typically not costed in cost of illness studies because of how challenging it is to assign costs to the inconvenience of having to adapt to the pain and trauma caused by the illness as well as the stigma and discrimination which are often incidental to the disclosure of the status of PLHIV (Adedigba et al., 2009). Intangible costs were not computed mathematically in this study although a non-exhaustive inventory was broached in chapter seven.

In ascertaining the unit cost of HIV treatment per capita, the institutional costs of treatment from government facilities such as the free ARV delivered to PLHIV periodically, the operating costs of health facilities as well as the costs of clinical research, monitoring and evaluation were compiled

²⁵ In this study, Households were assumed to be single source income for purposes of indirect and unit cost computation. This is because more than 80 percent of all respondents indicated that their live-in spouses were unemployed.

Self-care and other personal services are estimated at 24 hours/day maximum for 52 weeks a year. Work entailing third parties is restricted to 8 hours a day for 52 weeks a year or 365 days a year.

²⁶ Bank of Ghana APR estimates (21%).

and added to the household costs. The private sector has had a very minimal role in the national response to HIV and several levels of the treatment cascade are exclusively public sector driven (GAC, 2021b). Consequently, the public sector treatment expenditure data detailed in the financial statements and annual reports of the Ministry of Health (MoH) and the National AIDS Control Program (NACP) were added to household costs of illness such that the unit cost per capita for HIV and AIDS treatment in Ghana can be expressed mathematically as follows:

$$D = ((\alpha + \beta)/\varphi) + (v/\varphi') \quad (8)$$

Where α = Direct Household Cost of HIV and AIDS illness culled from

β = Indirect Household Cost of HIV and AIDS illness as depicted in (7)

v = Institutional treatment costs including clinical research, monitoring and evaluation as well as sector level overhead costs.

φ = Number of PLHIV living in the household and

φ' = Number of PLHIV enrolled in the national ART program

Additionally, ancillary economic mitigation, policy and prevention costs incurred by key HIV service delivery institutions were compiled and added to the institutional costs of treatment as depicted in (8). This additional data was obtained through interactions with officials and reports from stakeholder institutions to arrive at a comprehensive unit cost of HIV and AIDS in Ghana at the societal level.

The comprehensive HIV costs per capita include all non-clinical expenditure namely mass and key population prevention, operating, administration and overhead costs as well as other research

monitoring and evaluation costs which would not have been incurred by society if the counterfactual scenario of “no HIV” prevailed in the country.

Mathematically, the comprehensive per capita HIV and AIDS costs at societal level may be scripted as follows:

$$Z = D + (\lambda/\varphi^{\prime}) \quad (9)$$

Where:

Z = Societal Cost of HIV per capita

D = Unit Cost of HIV Illness at Societal Level as depicted in(8).

λ = All non-treatment institutional costs which were not compounded under (8).

φ^{\prime} = Number of estimated PLHIV in Ghana regardless of ART enrolment status

The comprehensive societal cost of HIV per year would then be computed mathematically as follows:

$$S = P(Z) \quad (10)$$

Where:

S is the annual cost of illness to the Ghanaian society.

Z is the societal cost of HIV per capita culled from (9) and reflects direct and indirect unit costs of treatment as well as unit costs of non-clinical interventions occasioned by the presence of HIV in Ghana.

P is the total number of PLHIV, which may be used subject to sensitivity analyses, to compound the total cost of illness to society. P may be considered as the total number of PLHIV enrolled in the ART program if the objective is to compute the current expenditure floor. Conversely it is interpreted as the total estimated number of PLHIV in Ghana when the objective is to compute the opportunity cost, in that case S becomes the maximum expenditure which may arise from Ghana's response to the current epidemic under a business-as-usual scenario.

The total cost of illness as expressed in (10) has focussed on the cost of HIV morbidity. Using the human capital approach, the impact of AIDS mortality may also be computed as follows:

$$M=X(LYL)(\text{Average Annual Household Income}) \quad (11)$$

Where:

Life Years Lost (LYL) is the time lost when AIDS related premature death occurs. It's computation is inspired by WHO (2009) and Kirigia et al. (2002). It is computed as follows: $LYL^{27} = \text{Retirement Age (60) - Average Age of PLHIV at AIDS death (45.46)}$.

X is the number of AIDS deaths in the year.

M is the stream of lost household income because of AIDS mortality, it may or may not be discounted subject to the purpose of the analysis. The lifetime loss is computed in Appendix 6.

²⁷ Poorolajal et al. (2016) estimated life expectancy on ART at 10 years. Average length of time since diagnosis in household survey was 7.3. With Average age of PLHIV in the household survey being 42.78, average age at infection is $(42.78 - 7.3 = 35.46)$ years. This means that the average age at death is $(35.46+10 = 45.46)$ years. Life Years Lost may be construed as Labour Years lost in this case since PLHIV tend to expire before retirement.

3.4.1.1.3 Welfare and Disease Indices

Indices are mechanisms for dimensionality reduction. They allow often disparate characteristics of a phenomenon to be compressed into a single relative measure for purposes of evaluation or assessment (WFP, 2017). This study deployed two such indices to explore disease progression and welfare dynamics.

In a sense, the score of a household on a properly constructed asset index is its financial position, a measure of the household's net natural, physical and financial assets after taking into consideration its liabilities. Measurements of household wealth are useful in that they reflect the access which households might have, to resources or factors of production, their socio-economic status (SES) or living standards. Typically, this is measured by income, expenditure and consumption. Since expectation and/or desirability bias among other biases and challenges are known to influence measures of income and expenditure, consumption or asset ownership and household characteristics can be combined into an asset index to measure relative wealth or living standards (WHO, 2009).

3.4.1.1.3.1 Asset/Welfare index

A wealth index measures the longer-term economic welfare of households and is therefore less responsive to short term shocks. This characteristic is well suited to any study which seeks to explore the burden of disease over time (WFP, 2017).

The Principal Component Analysis (PCA) is one of the statistical methods used to identify asset combinations which account for the greatest variance in a dataset or hold the most information (WFP, 2017). A PCA approach can therefore be useful in synthesising a wealth index (a linear combination of variables) from an array of assets. Some criticisms which have targeted this approach to the creation of wealth indices include the fact that it encourages the uses of varied and extensive data points, its complexity in other words.

Another criticism directed at the PCA approach has been the challenge of variable selection bias, which often favours urban settings to the detriment of rural households by deprioritising assets such as productive assets and livestock. Some approaches to address this problem include re-classifying some productive assets wherever possible such as motorised/mechanised farm vehicles based on relative engine capacity. For example, a hand mill might be associated to a motorbike while a tractor or a motorised plough of sorts is associated to a vehicle. Other approaches include using only variables which are normally distributed across urban and rural households or any other grouping of interest. Another solution may lie in presenting separate indices which aptly reflect the classes or groupings of interest (WFP, 2017). On the strength of the considerations listed above, the PCA approach which was used in the current study provisioned for both agricultural/rural and urban sensitive assets, keeping in mind that about 58 percent of all localities in the districts which were selected for the study are rural and that 60 percent of employed persons in the communities of residence of respondents are involved in agriculture (GSS, 2019a). The mix of assets selected in the current study presented assets which are considered popular within urban settings such as electronics and other entertainment and household equipment as well as more rural devices and equipment including wells, generators, sprayers, tractors, cutlasses and other agricultural equipment and implements. The asset listing also included household characteristics such as energy and water usage, housing type, furniture, fixtures and fittings.

Notwithstanding the disparaged complexity of the PCA model, some rapid wealth assessments requiring only four (4) research questions for example have been proven to be as accurate in categorising households and predicting mortality as more elaborate survey approaches (Psaki et al., 2014). Given the criticism of the PCA model, this study relied on a register consisting of thirty-nine (39) variables such that the diversity of urban and rural settings could be reflected in the asset

index even though for the sake of simplicity, only one dimension (consumption of goods and asset ownership) was taken into account. The thirty-nine variables covered four housing characteristics namely, housing type, source of water for drinking, fuel for cooking and toilet type as well as eleven associated dummies. In addition, twenty-four (24) other distinct asset items were relied upon to classify household wealth in a one-dimensional (asset) index. The 24 different types of assets ranged from electronic appliances such as radios and mobile phones to agricultural and household equipment and more expensive assets such as vehicles, plots of land, and houses. The comprehensive basket of assets used for the index was designed to accommodate rural and urban living conditions. Narratives of loss or sale of domestic animals due to disease, natural disasters or illness abounded, making it unlikely that respondents could be differentiated in any meaningful way using this asset type (domestic animals). Consequently, domestic animal ownership was dropped from the asset index. An increase in the number of asset types owned by households reflects greater welfare.

The weights λ detailed in (12) for the household index are given by the standardised first principal component of the variance-covariance matrix of the observed household assets (Filmer & Pritchett, 2001). In this way the data itself accounts for weighting or the importance of each component as opposed to a situation wherein researcher preferences would hold sway in weight accounting (Sahn & Stifel, 2000).

Data cleaning including recoding of asset fields into binary variables was done, the PCA executed, and the wealth quintiles created for the period prior and post HIV diagnosis. A summative variable reflecting the pre and post diagnosis change in wealth scores was created to track declines (positive sum) and inclines (negative sum) in household welfare. The metric was further transformed into a binary outcome variable reflecting code 1 for household wealth which increased or stabilised

(desirable outcomes) and all others coded zero (0). This was done to explore the extent to which various risk factors were able to predict net welfare outcomes. The asset index reflecting weights takes the following form:

$$\text{Household Asset Index } (A_i) = \lambda_1 a_{i1} + \dots + \lambda_k a_{ik} \quad (12)$$

Where the asset index A_i for each household i is determined by the ownership of k assets each weighted by λ_k .

Table 5 illustrates the dimensions, components, indicators and cut-offs used in building the asset index. The index is restricted to one dimension (household consumption or ownership of assets) which may be broken down into two components. The first component of the consumption dimension includes household characteristics such as building type, drinking water and cooking fuel source as well as sanitary or toilet facility type. The second component of the consumption dimension reflects consumer durables and agricultural implements.

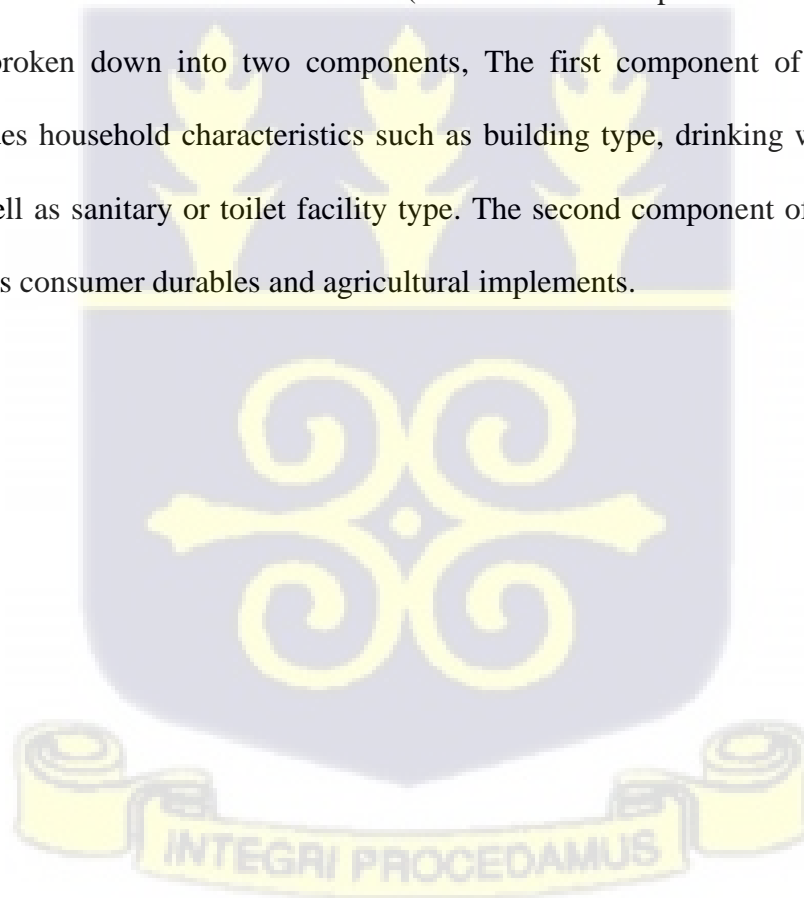


Table 5: Dimension, Components, Indicators and cut-offs

	Components	Indicators	Cut-Off/ Binary ownership scale
1	<p>Household Characteristics (4 Asset types including 11 dummies: 3 x 3 except for sanitation which had 2 dummies instead of 3)</p>	<p>Building type Drinking water source Cooking fuel Toilet facility</p>	<p>Building Type: Uncompleted buildings, homelessness & makeshift shelters considered unimproved & 3 additional dummies created to score improved housing in: different compound, compound housing and single-family unit/apartment. Drinking Water Source: Rivers, lakes, springs, ponds and rainwater considered unimproved & 3 additional dummies scoring improved water source in: Wells, pipe borne and water vending services. Cooking Fuel Source: Cow dung, charcoal & wood considered unimproved & 3 additional dummies scoring the following improved energy sources: Kerosene, LPG gas and Electricity/Biogas Toilet Facility: Open defecation & others considered unimproved & 2 additional dummies scoring improved sanitation with: KVIP and flush toilet systems</p>
2	<p>Consumer & Agricultural Durables (24 Asset types)</p>	<p>Electronics, furniture, fixtures and fittings Fan, Bicycle, Radio/Transistor, Tape recorder, Television B/W, Television colour, Refrigerator/Freezer, Telephone, Washing Machine, Mobile Phone, Computer, Pressure Cooker/blender, Sewing Machine, Mattress, Furniture (Bed, Chairs, Tables)</p> <p>Vehicles, motorised and non-motorised farm equipment Moped/Motor. cycle/Scooter, House/Flat/Plot of land, Car/Jeep/Van, Bullock cart, Tractor, Thresher, Tube Well, Cutlass/Hoe, Spraying machine/generator</p>	<p>Simple binary ownership scale for all assets</p>

Source: Author (2021)

3.4.1.1.3.2 Disease progression/intensity

Two disease variables were combined to create a metric for disease progression. This enabled an evaluation of the levels of welfare sensitivity and response to disease progression since all respondents were already diagnosed PLHIV. Disease magnitude was compiled using the disparate measures of disease progression as reported by respondents. The dimensions included two measures of disease progression, the persistence of symptoms and the viral load (VL) score from the most recent VL test.

The combined disease metric was designed to score remission or viral suppression as well as the absence of clinical symptoms scored as zero and one being otherwise. Remission was defined for the purpose, as having VL scores of less than 50 copies of the HIV virus per mL of plasma (Lokpo et al., 2020; Mugavero et al., 2012; World Health Organization, 2016) per their most recent viral load test results. The 50 copies per mL of plasma standard was preferred to the 1,000 copies per mL measure because while the former defines non detectable thresholds with ramifications for prevention of mother to child transmission (PMTCT) and drug resistance, the latter defines only therapeutic success (World Health Organization, 2016). Asymptomatic PLHIV or PLHIV with VL score below 50 copies per mL of plasma were rated zero “0” and “1” otherwise to create the dichotomous disease progression variable.

Other characterisations of disease intensity were used such as length of time lived with HIV and number of HIV cases in households (single or multiple).

3.4.1.1.4 Logistic Model Specification

A binary logistic regression model was used to explore the effect of PLHIV household characteristics and disease intensity, using the disease metrics computed earlier as well as the epidemiology of the study areas (ART coverage and HIV prevalence), on dichotomous welfare

outcomes or group membership with the bottom three wealth quintiles designated as deprecated welfare. The same exogeneous variables as with welfare were analysed for their effects on productivity, disease progression and catastrophic health expenditure (CHE). Except for the net change in welfare and the disease progression metric, all other dependent variables were dichotomised using the bottom three quintiles as non-occurring (zero). For the net welfare change, the metric was created as a binary compilation of the difference in wealth scores between the period preceding HIV diagnosis and the post diagnosis period with negative values signalling that households had grown wealthier over the period. For disease progression, the metric reflected a binary which marked asymptomaticity and viral suppression as non-occurring (zero).

The ubiquity of the binary logistic regression model in epidemiology can be attributed to the ease with which its odds ratio feature may be understood, making it an “excellent candidate” in the analysis of relationships between risk factors such as respondent household characteristics and disease progression (Wilson & Lorenz, 2015 p. 22). The logistic regression model in the current study sheds light on the binary outcomes of welfare and productivity among PLHIV in Ghana. The model deployed explanatory variables including the time since diagnosis, post and pre-diagnosis welfare, stigma exposure, HIV expenditure as well as other epidemic and household characteristics. As denoted in earlier studies by Niu (2020) as well as Wilson and Lorenz (2015), the logistic regression model takes the following form:

$$\text{Log}\left[\frac{P_i}{1-P_i}\right] = \alpha + \beta_1 x_1 + \dots + \beta_n x_n \quad (13)$$

Where:

i denotes individual alternatives or combinations of the explanatory variable set x_i , ($i=1, \dots, n$; coefficients and explanatory variables here are denoted from 1 to any given number “*n*”), while P_i

represents the probability of the event occurring, and $1 - \pi$ represents the probability of the event not occurring.

The odds of the event occurring are denoted by the ratio of the two probabilities²⁸ while the left-hand side of the expression represents the log-odds, or the logit. On the righthand side of the equation, α represents the intercept while β represents the regression coefficients.

In line with the mixed method approach, the survey findings were supported by the results of focus group discussions (FGD).

3.4.1.2 Qualitative Analysis

Qualitative data were culled from audio recorded interviews, transcribed verbatim and coded line by line. A research assistant was recruited and trained to assist with in-depth interviews, transcription and coding. The author read and reviewed interview records and transcripts iteratively before coding commenced. Coding was also performed iteratively until no new codes could be extricated.

Reliability was pursued using intra-coder and inter coder reliability controls. The research assistant was part of the reliability controls as her coding choices were confronted with the author's own descriptions of the phenomena to ensure the use of low inference descriptors. The research assistant was further involved in auditing the coding process in a bid to increase objectivity (Anyidoho, 2017).

The themes which were generated following the verbatim transcription of interviews and interview notes were reviewed iteratively first by the research assistant and the author to firm up the draft

²⁸ As noted in the arguments of the log function on the left side of (13)

thematic register. The results of focus group discussions (FGD) were subsequently used to augment the explicative power of the themes (Onah & Govender, 2014).

Thematic maps were built through content analysis using Taguette ® and Microsoft Excel® spread sheets and Microsoft Word®. The analytic approach was driven by several iterations of reading, coding, sorting, classifying and organising for the purpose of reconciling observations arrived at independently by each member of the coding team and building connections, patterns and themes with an eye for competing explanations. This approach was designed to improve trustworthiness (Patton, 2002).

As part of the qualitative analysis, the daily circumstances of respondents as well as the wider structural and cultural framework within which their existence, knowledge and identities are created, maintained, and disrupted were analysed. This analysis emphasised the patterns of access and consumption of resources over time, the characteristics of relationships as well as the normative rules of reciprocity and mutual support as PLHIV transition through the stages of biographical disruption, from disruption to flow and biographical reinforcement (Bury, 1982; Carricaburu & Pierret, 1995). Respondent realities were kept front and centre of the inquiry and analytic process through member checking as selected PLHIV were given the opportunity to validate findings.

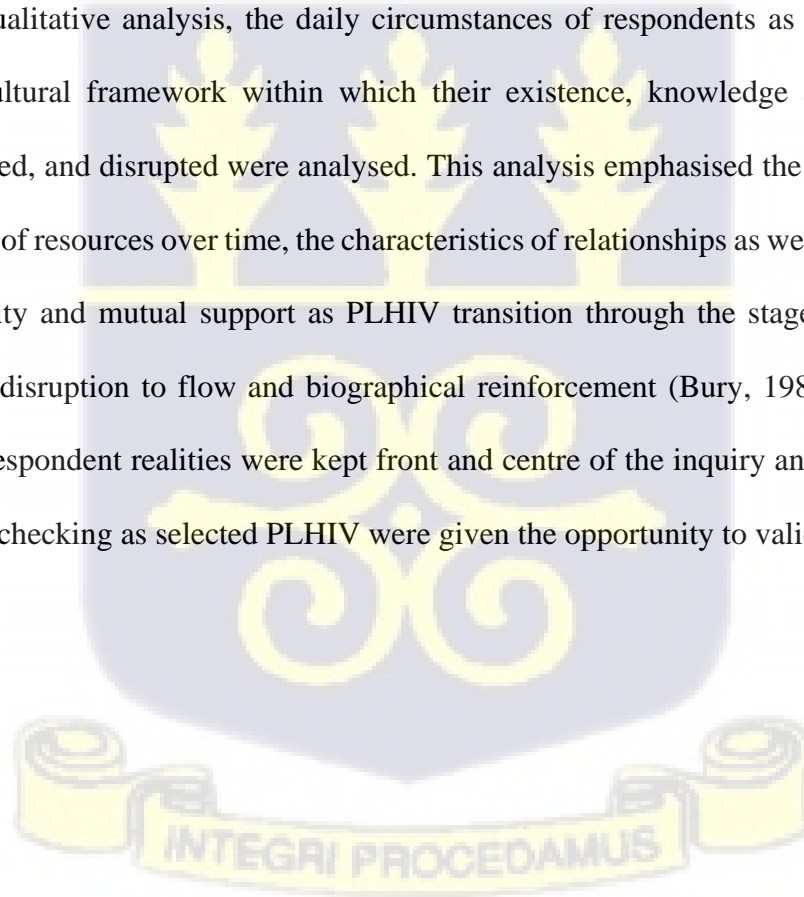


Table 6: Summary of Methods and Approaches of Data Collection and Analysis

Objective	Methodological Approach	Data/Source & Collection Technique	Data Analysis Method/Approach
To estimate the effect of HIV and AIDS on Ghanaian GDP growth	Quantitative Analysis	Penn World Tables and World Development Indicator Series (World Bank) HIV estimates reports (Ghana AIDS Commission)	Double log production function (OLS Regression)
To compute the welfare and productivity effects of HIV and AIDS on households in Ghana	Quantitative Analysis	Cost of Illness data from household survey	Descriptive and Inferential Statistics; logistic regression
To calculate unit costs per capita for HIV and AIDS treatment and care in Ghana	Quantitative Analysis	Financial Statements and institutional reports from sector ministries and agencies	Descriptive Statistics
To examine the experiences and coping strategies of HIV affected households in Ghana	Qualitative Analysis	Key Informant Interviews, Focus Group Discussions and Observations	Graphs and Charts, Coding and thematic analysis

Source: Author (2021)

3.5 Ethical Consideration

In line with ethical standards, participants were notified of the aim of the study which is to assess the socio-economic burden of HIV and AIDS on households and individuals. Every effort was made to ensure that participants were spoken to in a language which they understand including the use of interpreters. Participants were notified that their participation would improve understanding of the economic burden of HIV and AIDS and might inform policy. Before any written or audio recordings were done, permission was sought.

Ethical clearance was obtained from the Ethics Committee for the Humanities of the University of Ghana on May 26th, 2021 (ECH 154/ 20-21)), the ethical clearance had a validity of one year with a requirement to report all adverse findings in a timely manner amongst other ethical and regulatory standards.

3.5.1 Informed Consent

As a control measure to ensure that participants understood the purpose of the study, they were requested to explain the purpose of the study. At this time, their express approval was sought for participation in the study, based on their understanding of the study aims. They were also told that they could quit the study at their convenience and that there was no compulsion to answer questions which they might be uncomfortable with. To protect the identity and rights of respondents, interviews were held on telephone, at safe spaces recommended by NAP+ or other Key informants and at the health facilities exclusively (not in homes) such that no unauthorised access to the health status of a respondent was likely. In addition, all survey data were subject to anonymisation. No names or anything that could be used to tie responses to persons was used.

3.5.2 Confidentiality Anonymity and Privacy

In the presentation of results, pseudonyms were used. Similarly, privacy concerns drove the enrolment strategy which ensured that key informants and community experts approached potential respondents to confirm their willingness to participate and their preferred platform (in-person or via telephone, at health facility or at another safe location, not in their homes) before commencement of the questionnaire administration and in-depth interviews. This ensured that respondents who had not yet disclosed their status beyond their care giver could remain in control of the dynamics of their disclosure.

3.5.3 COVID-19 Protocols

The study was carried out at a time when several waves and variants of the corona virus had been noted in the country. It was therefore imperative that all COVID-19 protocols were followed. In the case where participants preferred to have remote meetings, arrangements were made to accommodate those needs. Where face to face meetings were inevitable, hand sanitisers and nose

masks were provided for all enumerators and respondents. Enumerators were required to change nose masks at least every four (4) hours. Social distancing was required during all engagements from the questionnaire administration through the in-depth interviews to the FGD.

3.6 Limitation of Thesis

There are a few limitations to this study therefore generalisation and causation claims should be avoided or at the very least interpreted contextually (Y. Wang, Wang, Ji, & Huang, 2021).

- 1- There is potential for bias in the study sample. The period selected for the production function approach (1990-2019) may influence the magnitude of the effects of HIV because of the underlying epidemiology and structure of the economy during this period. Also, the study areas selected for the household survey comprised all major Agro-ecological zones in Ghana (Coastal savanna, Transition zone and, Guinea and Sudan savanna) however, the sampling process restricted data to the six regions selected because of their geography and epidemiology. Snowballing, community entry²⁹ and HIV caseloads significantly influenced participation in the study and therefore introduced some level of bias, prominent among which are courtesy and social expectation bias. Mitigation efforts in this regard comprised measurement and analytic diversity. Also worthy of note is the possibility that estimates of the effects of HIV on economic output, given Ghana's recent attainment of middle-income status and its increasing urbanisation would be more significant should the time frame of the estimation be adjusted to reflect more current economic and epidemiological conditions. The dynamic models illustrated in APPENDIX 5: ACCOUNTING FOR STATIONARITY³⁰ may be cursorily suggestive of this as they account for initial wealth. Additionally.

²⁹ Using employees of the Ghana AIDS Commission and members of NAP+

³⁰ Model 9 & 10 are dynamic models which fit the data better and report morbidity and mortality impacts that are about 30% higher. These models were however not used due to conservatism and epidemiologic concerns.

Although Ghana's rapid urbanisation puts the majority of PLHIV in urban areas as captured in the survey, the current study pursued both rural and urban representation to inject some temperance into the cost estimates since income and expenditure levels are expected to be higher in urban areas than in rural areas. The results of this study may thus be seen as conservative and remain pertinent.

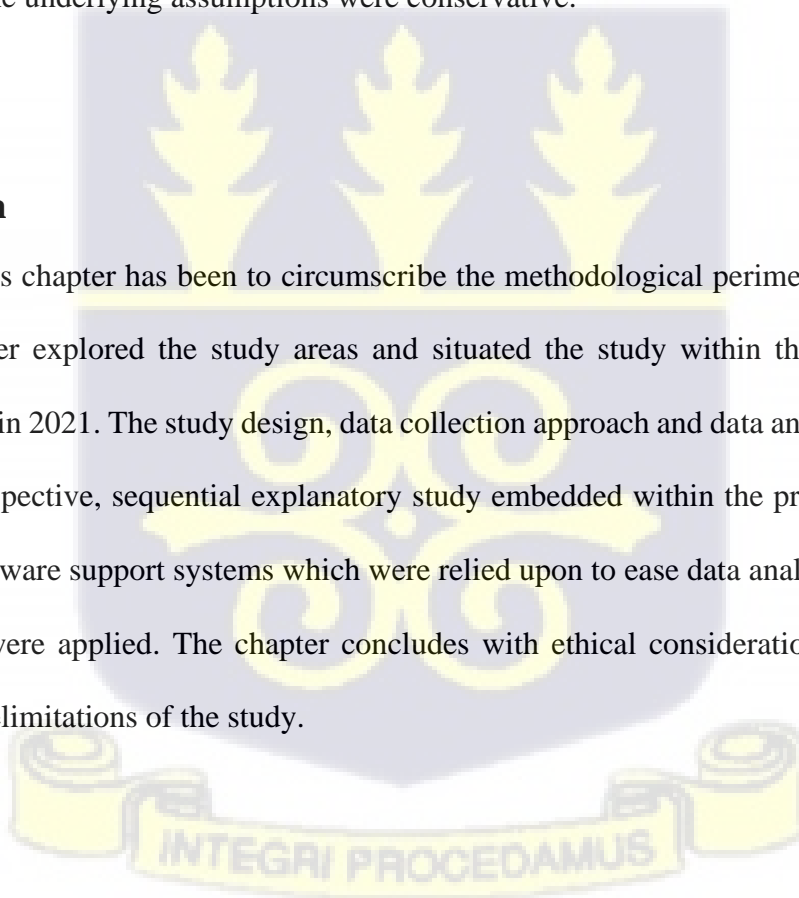
- 2- Unit cost estimates in this study relied on ART coverage estimates for treatment and care instead of total PLHIV estimates. Such a conservative approach minimises the opportunity cost of care because it does not report the economic effect of the treatment gap. Additionally, intangible costs though noted in the literature, are not incorporated into the cost of illness approach because of estimation challenges. The results of this study should therefore be interpreted knowing that the economic burden at societal level may be potentially higher than what is reported.
- 3- There is a risk of the presence of non-random measurement error related to the length of recall (Wollburg, Tiberti, & Zezza, 2021). Farmers have been known for example to understate their assets as the recall period increases. In the current study, PLHIV had spent on average 7 years since diagnosis and may have understated their pre-diagnosis assets as suggested by Wollburg et al. (2021). This understatement of prior conditions due to recall bias may result in understating the burden of HIV.
- 4- Data access was met with various procedural and logistical constraints. Institutional HIV and AIDS expenditure was limited to a few development partner institutions and Ghana Government agencies who either responded to requests for data or disclosed their expenditure for publication through online repositories. Although many more stakeholders than responded to the survey are active within the HIV and AIDS funding space in Ghana, the funding agencies for which data was obtained account for almost all treatment expenditure and the majority of prevention, care and mitigation expenditure (GAC, 2020a).

5- The household survey design selects PLHIV households to the exclusion of non-PLHIV households. Without a counterfactual to compare PLHIV household expenditure with, it may be difficult to determine if the economic burden identified in this study is exclusive to HIV. Mitigation efforts to parry this concern included guidance during data collection to restrict respondents to their recollection of HIV related illness. Additional efforts in discussions and analyses to contextualise illness and expenditure with respect to prior studies, population surveys and epidemiology were made (5.3.1 Disease Burden).

Notwithstanding the limitations cited, the current study provides a minimum expenditure threshold or burden since the underlying assumptions were conservative.

3.7 Conclusion

The subject of this chapter has been to circumscribe the methodological perimeters of the current study. The chapter explored the study areas and situated the study within the macroeconomic context of Ghana in 2021. The study design, data collection approach and data analytics framework presented a retrospective, sequential explanatory study embedded within the pragmatic paradigm as well as the software support systems which were relied upon to ease data analysis for the mixed methods which were applied. The chapter concludes with ethical considerations as well as the limitations and delimitations of the study.



CHAPTER FOUR

ECONOMIC IMPACT OF HIV AND AIDS ON GHANAIAN GROSS DOMESTIC PRODUCT

4.1 Introduction

This chapter explores the effects which HIV morbidity and AIDS mortality might have on Ghana's economic growth.

The chapter focuses on different models constrained by classical regressors for gross domestic product including proxies for land, labour, capital, and trade openness. The following equation was estimated:

$$\ln \text{GDP} = \beta_0 + \beta_1 \ln F + \beta_2 \ln \text{HK} + \beta_3 \ln E + \beta_4 \ln X + \beta_5 \ln H + \beta_6 \ln A + \epsilon$$

Where GDP is gross domestic product, F is fixed capital, HK is human capital, E is the number of active employees in the country, X is the imports/export quotient reflecting trade openness, H is HIV prevalence or mortality, A is land and ϵ is an error term. These variables have been introduced in chapter 3.

4.2 Description of variables

The mean and standard deviations of model variables are listed in Table 7. Per capita GDP over the 30-year period from 1990 is US\$1,301³¹ per year. During the same period, actively engaged persons and those looking for work aged 15 years and above were almost 9 million while enrolment in

³¹ USD value arrived at using median annual exchange rates from the Bank of Ghana from 1990 to 2019, interpolating using simple linear interpolation (5-year averages) wherever there were data gaps in exchange rate data. 1.3767 GHS to 1 USD. Bank of Ghana Interest Rate is also averaged at 21 percent APR.

secondary schools per year (1,560,236) was less than 10 percent of the population which was estimated over the period at an average of 22 million.

Table 7: Means & Standard Deviations of Model Variables [1990 to 2019]

VARIABLES	MIN	MEAN	MAX	STANDARD DEVIATION
<i>Dependent</i>				
Real GDP per Capita (US\$)	544.74	1,301.41	2371.52	624.79
<i>Explanatory</i>				
Land (A)				
Arable Land per capita (Hectares) - pal	0.15	0.18	0.21	0.02
Labour (E)				
Engaged Population aged 15+ - emp	6,153,049	8,903,798	13,220,720	2,344,389
Capital (F)				
Per capita Fixed Capital Formation (Current US\$)-pfcf	52.19	206.69	604.05	179.31
Human Capital (HK)				
Population enrolled in secondary school – sec	812,666	1,560,236	2,851,160	664,740
Population	14,773,280	21,989,600	30,417,860	4,757,081
HIV Morbidity (H)				
Prevalence (Number of PLHIV)	98,076	264,391	342,307	64,032
Mortality (Number of PLHIV)	3,899	16,707	24,004	5,677
Trade (X)				
Trade Index (Import/Export)	0.98	1.43	1.80	0.21

Source: Author (2021)

At about US\$200 per capita, fixed capital formation over the period is a good proxy of domestic savings as it fairly mirrors this metric for the Ghanaian economy, about a fifth of GDP, per the World Bank WDI series (World Bank, 2020).

At almost 17,000 AIDS deaths per year on average for an HIV prevalence of 264,391 persons for the 30-year period to 2019, AIDS mortality in Ghana, represent a grim 6.4 percent³² which is about one half (50 percent) higher than the current global death rate of the COVID-19 pandemic, estimated at about 4 percent (Sinha et al., 2020).

³² It is worth noting that AIDS mortality has declined consistently with the expansion of HAART from about 5 percent in 2017 to about 4 percent in 2020 (GAC, 2018, 2019, 2020c, 2021a). Mortality was much higher in earlier years.

The trade index at 1.43 is consistent with developing countries which often reflect import dependency as they acquire the technology and infrastructure to drive their development (Orem et al., 2012)

Table 8 presents a cursory analysis of the relationships between the economic output of Ghana (GDP per capita) and various inputs including HIV and AIDS morbidity and mortality by way of correlation analysis. The Pearson correlation revealed a significant association between GDP per capita and all regressors at 1 percent significance ($\alpha=0.01$, $p<0.01$) except for trade openness where association was recorded at 5 percent significance. The correlation coefficients were all high (>0.4) except for mortality which denoted an average association (0.3). There was no association for mortality even at 10 percent significance ($\alpha=0.10$, $p<0.10$). The relative weakness in the relationship between economic output and AIDS mortality might be seen as a primitive pointer to the regressive nature of HIV and AIDS (i.e. as a result of unemployment and under employment and therefore diminished resilience, persons of limited productivity may be overrepresented in the mortality variable).

Table 8: Correlation Matrix for GDP per capita & selected regressors [1990 to 2019]

Variables		P – Value
<i>Correlation to Dependent Variable [GDP per capita]</i>		
GDP per capita	1	
Arable Land per capita	-0.59	0.0006
Labour	0.93	0.0000
Fixed Capital Formation per capita	0.92	0.0000
Human Capital	0.94	0.0000
Trade Index	-0.42	0.0193
HIV Morbidity	0.59	0.0006
HIV Mortality	0.30	0.1016

Source: Author (2021)

The correlation matrix and the Variance Inflation Factors (VIF) revealed significant collinearity for labour, human capital and fixed capital formation suggesting the need to simplify model candidates or be mindful of same. The regression models estimating the effect of HIV on the Ghanaian economy were reviewed for appropriateness prior to the presentation of the results.

4.3 Fitness of the models and post estimation

The Cobb-Douglas function specified for estimating the effect of HIV and AIDS morbidity and mortality on the Ghanaian economy is a double log function with arguments culled from time series data. Although it is not unusual to make several assumptions about the applicability of OLS methods given the double log form of the equation, Ordinary Least Squares (OLS) regression assumptions were tested using graphical and other methods in line with Crowson (2018) and guidance addressing linearity considerations and the basis for selecting the vector of explanatory variables in the specified models.

All exogenous variables showed significant relationship with the dependent variable GDP per capita except for trade. Further graphical tests however confirmed linearity in the relationship between the dependent variable and each of the explanatory variables. The predictive relationships were thus found linear and additive (Nau, 2022).

Other misspecification tests undertaken included deriving residuals and plotting them to assess homogeneity of variance and normality of residuals. The plots showed symmetry except for 2 outliers which slightly exceeded the range of two standard deviations. The pattern was therefore found to be compliant with OLS assumptions particularly since a joint skewness/kurtosis test for normality performed on the residuals (Obs=30, $X^2 = 5.7$, p-value < 0.06) for the morbidity model and (Obs=30, $X^2 = 5.31$, p-value < 0.07) for the mortality model confirmed normality in the error distribution (Crowson, 2015, 2018). The test for homoscedasticity using the Breusch-Pagan and

Cook-Weisberg test also confirmed homogeneity of variance ($X^2 = 0.14$, p-value < 0.7) for the morbidity model and ($X^2 = 0.05$, p-value < 0.8) for the mortality model.

Finally, the estimated regressions were tested and corrected for multicollinearity and serial correlation or autocorrelation using the Variance Inflation Factor (VIF) and the Durbin Watson test respectively.

Gujarati and Porter (2009) provided guidance in relation to multicollinearity, noting that multicollinearity has been described as “the will of God and not a problem with OLS” to suggest that model specification should be pragmatic and incorporate enough economic theory such that specification bias, which could befuddle a-priori theory is avoided. In their view therefore, OLS regressions, including Cobb-Douglas functions, should not be unduly restricted by collinearity concerns if the overall model as well as a healthy number of exogenous variables have significant t-statistic values. In the current study, labour and human capital had significantly high (greater than 10) VIF scores, confirming multicollinearity. The adjusted R^2 for example dropped below 0.9 when collinearity was addressed by removing the human capital and labour variables which were highly correlated in both model 1 and model 2. The adjusted R^2 declined to about 0.82 and VIF scores all declined to less than 5. However, many variables did have acceptable t statistic values and complied with a-priori theory even without the adjustment for multicollinearity. Additionally, there was a need to study the effect of HIV morbidity while controlling for investments in human capital and the residuals versus time plot fared much worse when multicollinearity was addressed through the elimination of the variables with high VIF scores (Nau, 2022). Therefore, neither labour nor human capital were dropped from the models.

The final pre-estimation routine which was performed addressed stationarity as well as serial correlation or autocorrelation. Whereas the former refers to an unchanging (stationary) mean,

variance and autocovariance, the later occurs when prior observations of the error term predict the next observation of the error term. Non-stationary and serially correlated distributions are not uncommon in time series models and imply that auto regressive measures may be better suited to model the outcome of the dependent variable.

Durbin Watson statistics were used to check for autocorrelation at lag 1, following which the Dickey-Fuller test for unit root was performed to explore subsequent lags (Hardy, 2019). The Durbin Watson d statistic takes a range between 0 and 4 with values proximate to 2 indicating little or no autocorrelation. The range for failing to reject autocorrelation in the current models ($k=6$, Obs = 30) was one to three [1 to 3]. Both models (HIV morbidity $d=1.63$ ' and AIDS mortality $d=1.51$ ') were in the "indecision zone" which implied that there was insufficient evidence to suggest the existence of autocorrelation (Gujarati & Porter, 2009). Since Adeleye (2018b) also suggested that stationarity concerns be discarded once the Durbin Watson d statistic is greater than the R^2 of the regression model, satisfactory evidence for compliance with OLS assumptions and stationarity of the models was deemed to have been achieved. Nevertheless, an Augmented Dickey Fuller (ADF) test was conducted to evacuate any residual concerns over stationarity and the need for dynamic modelling. Subsequently the dynamic models informed by the ADF results were run and discarded (please see appendix 5) for lack of significant model improvement.

The R^2 and adjusted R^2 values of models 1 & 2 were significantly high (all higher than 0.90). Although this might have raised concerns of collinearity and non-stationarity with implications for spurious results (Baffes, 1997; Munshi, 2016), several reasons discussed earlier including the fact that both models are highly significant (Prob > F = 0.0000) while a decent number of their regressors presented reasonably high t-scores provided comfort in the approach which has been espoused in the study (Nau, 2022).

In addition to the afore mentioned justifications for evacuating dynamic modelling, the findings of Chang, Chang, Chu, and Su (2006) who were emphatic that some classical tests for GDP stationarity may be unfit for purpose, reinforce the current approach which eschews autoregressive modelling by affirming the stationarity of the dependent variable in both model 1 and model 2. They did this by demonstrating for the period 1980 to 2004 that Ghana's GDP was stationary with a very high level of significance (alpha at 1 percent level of significance).

Finally Gujarati and Porter (2009) bemoan the plight of economists and social scientists in general and the fact that they are often compelled to deal with secondary data over which they have no control. They however recommend that the constraints of the OLS assumptions be taken within the context of theory and the purpose of the regression exercise, noting that when the purpose of analysis is prediction or forecasting, rather than reliable parameter estimation, the constraints of OLS assumptions particularly for multi collinearity may be lightened. This measured perspective relating to OLS assumptions and stationarity was held in this study.

Given the above and the risk of misspecification bias in selecting alternate models, the models thus specified were deemed fit for purpose³³.

4.4 Empirical Results

The estimated results of the impact of HIV on the Ghanaian economy are derived from the equation below:

$$\ln \text{GDP} = \beta_0 + \beta_1 \ln F + \beta_2 \ln \text{HK} + \beta_3 \ln E + \beta_4 \ln X + \beta_5 \ln H + \beta_6 \ln A + \varepsilon$$

Where H is either HIV prevalence (model 1) or AIDS mortality (model 2) and ε , the error term.

³³ Alternate dynamic models which do not significantly improve the models were presented in the annexes

The model utilised $\log(F)$, $\log(HK)$, $\log(E)$, $\log(X)$, $\log(H)$ and $\log(A)$ being the natural logarithms for fixed capital, human capital, economically active persons, trade openness, HIV morbidity (model 1) and land respectively as explanatory variables for per capita GDP ($\log GDP$). Table 9 presents the regression coefficients (elasticities) of the explanatory variables on per capita GDP.

HIV prevalence was found to have a causal relationship with GDP per capita denoting a deleterious impact of HIV on the Ghanaian economy at 1 percent significance, $\alpha=0.01$ ($P<0.01$).

The estimated beta coefficient for HIV morbidity (log of prevalence) was -0.57. This implies that when HIV morbidity increases by 1 percent while the other explanatory variables are held constant, GDP declines by 0.57 percent.

The other explanatory variables for GDP per capita under model 1 all depict the appropriate or expected signs based on a-priori theory, except for labour (employment) which posts a negative but significant coefficient at 10 percent level of significance. The beta coefficient for the labour variable was -2.10 for the HIV prevalence model (model 1) and -1.69 for the AIDS mortality model (model 2). This suggests that 2.10 percent economic output declines were observed for every 1 percent incline in the number of persons employed (model 1). The labour variable was insignificant for model 2 (mortality).

Land, capital formation, and trade all reflect signs which conform to a-priori theory (they are positive) but are statistically insignificant at 1, 5 or 10 percent significance levels. Human capital proxied by secondary school enrolment however is positive and extremely significant at 1 percent level of significance using a one-sided t distribution test. About 2.6 percent growth in GDP is occasioned by a 1 percent increase in secondary school enrolment.

Table 9: Impact of HIV and AIDS on the Ghanaian Economy [1990 to 2019]

Impact of HIV and AIDS on the Ghanaian Economy.
Dependent Variable: Per Capita GDP
Period: 1990 -2019

Explanatory Variables	Model 1		Model 2	
	Coeff	t- Stat	Coeff	t- Stat
Land (A) – Pal	0.53 (0.52)	1.03	0.40 (0.58)	0.70
Labour (E) – Emp	-2.10 (1.13)	-1.87*	-1.69 (1.22)	-1.39
Capital (F) – Pfcf	0.13 (0.10)	1.37	0.08 (0.10)	0.77
Human Capital (HK) Sec. School Enrol – Sec	2.6 (0.72)	3.61***	2.28 (0.77)	2.97***
HIV & AIDS Morbidity/Mortality (H) Prevalence (Morbidity)	-0.57 (0.15)	-3.85***		
Mortality			-0.26 (0.09)	-3.00***
Trade Index (I/X)	0.32 (0.21)	1.55	0.55 (0.22)	2.53**
Constant	47.01 (18.35)	2.56**	35.85 (19.41)	1.85*
Durbin Watson Statistic		1.63		1.51
Adjusted R²		0.941		0.930
Root MSE		0.12		0.13
Heteroskedasticity ³⁴		0.71		0.82
Observations		30		30
Standard errors in parentheses ()		*** P<0.01, ** P<0.05, * P<0.1		

Source: Author (2021)

Model 2 substitutes HIV morbidity for AIDS mortality and similarly presents land and fixed capital formation as variables with coefficients that have signs which conform with a-priori theory but are statistically insignificant at 1, 5 or 10 percent significance levels.

³⁴ Breusch-Pagan and Cook Weisberg Test for homoscedasticity (Prob>Chi²)

In model 2, labour is statistically insignificant and posts a negative sign contrary to theoretical expectation like the notation in model 1. The statistically significant variables under model 2 are therefore human capital proxied by secondary school education, the trade index proxied by the import/export quotient and AIDS mortality. The variables are consistent with a-priori theory, negative for AIDS mortality to signal the loss of output because of ART failure leading to AIDS deaths and positive for trade and human capital. Human capital, trade and AIDS mortality are significant at 1, 5 and 1 percent significance levels respectively, using a one-sided t distribution test. For an increase of 1 percent in mortality when keeping all other variables constant, a reduction in Ghana's per capita GDP of 0.26 percent is noted at 5 percent significance, $\alpha=0.05$ ($P<0.05$).

The response of output to a proportionate change in the inputs is the sum of the partial elasticities ($\beta_1+\dots+\beta_6$) is such that there is diminishing returns to scale (0.91) for the HIV morbidity model and increasing returns to scale (1.4) for the HIV mortality model (Gujarati & Porter, 2009)

4.5 Discussion

The current study finds significant deleterious effects of HIV morbidity and mortality on Ghana's economy. The effect of HIV morbidity (0.57 percent decline in per capita GDP for every 1 percent increase in HIV prevalence) and mortality (0.26 percent decline in per capita GDP for every 1 percent increase in mortality) is well within the ranges documented in the literature and has been consistent over time as noted in Dixon, McDonald, and Roberts (2002)³⁵ as well as Nketiah-Amponsah et al. (2019)³⁶. The output depleting effect identified above for HIV morbidity is

³⁵ Growth rate depletion ranging from 2-4 percent per year across Africa

³⁶ Per capita income depletion of 0.47 percent in West Africa and 0.64 percent in Eastern Africa

analogous to about 15 percent of the average growth rate for the five-year period ending 2022³⁷ (AfDB, 2021).

The relative weakness in the relationship between economic output and AIDS mortality might be seen as a crude pointer to the regressive nature of HIV and AIDS (i.e., because of unemployment and under employment and therefore diminished resilience, persons of limited productivity may be overrepresented in the mortality variable).

The findings of the current study suggest that a 10 percent increase in Ghanaian HIV prevalence, i.e. a return to prevalence levels which pertained about a decade ago (about 2 percent) and which are well within the range of current prevalence for Ghana's neighbours within the West African Sub region³⁸ (GAC, 2020a; Nketiah-Amponsah et al., 2019; UNAIDS, 2021) would result in a decline in annual per capita GDP of about 5.7 percent on average, holding all other variables constant. Such a hypothetical increase is not implausible because in terms of PLHIV case load, it closely mimics total new infections in Ghana for the year 2020 (GAC, 2021a). The resulting decline in GDP would be in excess of the total HIV and AIDS expenditure for households, government and international development assistance for the year 2018 (GAC, 2020a)³⁹ and would certainly obliterate by far, the 4 percent growth forecast for the year 2021 and 2022 (AfDB, 2021) in the said hypothetical case of a tenfold increase in morbidity.

³⁷ For the 3 year period ending 2022, the growth depleting effect is almost 18 percent of annual growth.

³⁸ Within the past 5 years, HIV prevalence in East/Central Africa ~[6% -3%](+) in West Africa ~1.2% (-) and Southern Africa ~20%(-)

³⁹ Ghana AIDS Commission in its NASA 2017 - 2018 report estimates annual country HIV and AIDS expenditure of US\$ 92,573,993 for 2017 and US\$67,413,057 for 2018 for an average of US\$79,993,525 per year, an amount which is only about half the value of 5.7 percent of Ghana's average GDP over the period (\$1,301 x 22 million persons x 0.57 percent = \$163 million)

Labour in both morbidity and mortality models denoted a negative effect which was significant for morbidity but insignificant for mortality. This is probably due to the high unemployment situation in the country since the labour variable includes all persons actively engaged who are aged 15 and above, inclusive of those who are unemployed but actively looking for work (World Bank, 2020).

Other studies had found a similar divergence from theory for labour in their models involving developing countries and attributed the peculiarity to the high levels of unemployment and underemployment as well (Kirigia et al., 2002). Unemployment in Ghana is reported at 8.4 percent for the general population but increases to 12.6 percent for the 15-35 age bracket, an age segment which coincides with the most significant age brackets for both HIV incidence and prevalence. Additionally, among the unemployed youth, females experience greater unemployment, representing about 60 percent of all unemployed youth. This disproportionate representation of females among the unemployed is further compounded by a similar overrepresentation of females (66 percent) among persons living with HIV. It is therefore justifiable to attribute the counter-intuitive behaviour of labour to these employment related issues as well as gender and age inequalities (GAC, 2021a; GSS, 2019a). These challenges also point to areas of pain and difficulty for PLHIV households and were addressed in more detail in chapter five.

Economic growth opportunity is usually muffled by HIV since several studies have revealed the condition's depleting effect on education (Hilhorst et al., 2006). It was therefore expected that increases in human capital would manifest in economic output gains. For both the morbidity and mortality models, human capital, as proxied by secondary school enrolment was positive and significant at 1 percent. GDP per capita expanded by 2.6 percent and 2.28 percent for every 1 percent increase in secondary school enrolment in model 1 and model 2 respectively. As suggested by Kirigia et al. (2002) longitudinal studies will show that eventually, human capital accumulation

will begin to suffer as the long term effects of HIV set in. This position was corroborated in model 6 (Table 44)⁴⁰ as detailed by the long run relationship between per capita GDP and arable land per capita as well as secondary school enrolment, reflecting predictions by Grossman (1972) that good health is held in trust as an investment geared by socio economic conditions such that long run deteriorations in health are associated with SES declines.

Developing countries such as Ghana would typically be import dependent (trade) and well served if labour productivity was improved via education as well since human resource capacity expansions are expected to have knock on effects on consumption and novel areas of trade (Ashraf, Lester, & Weil, 2008; Orem et al., 2012). As expected, trade posted the appropriate sign suggesting coherence in the direction of change between GDP per capita and trade for both models (morbidity and mortality). However, whereas the relationship was significant for the AIDS mortality model, it was insignificant for the HIV morbidity model. In the AIDS mortality model, every increase of 1 percent in the trade index triggered an incline in per capita GDP of 0.55 percent at 5 percent significance, $\alpha=0.05$ ($P<0.05$). This may be reflective of the potential for greater responsiveness of economic output to trade inclines under a lower baseline (mortality) than from a much higher baseline (morbidity) since under the latter, PLHIV maintain their incidence on trade.

The reduction in GDP noted under model 1 and model 2 could manifest in diminished household savings and investment, declines in school attendance, current as well as future labour performance and variations in household consumption decisions as well as constriction in the fiscal space available to government with downstream implications for investments in prevention and care for HIV and AIDS as well as other health conditions.

⁴⁰ See Appendix 5

AIDS Mortality has an impact which is more severe than that of HIV morbidity because when PLHIV succumb to AIDS they are no longer available to partake in the limited areas of economic and social engagement which they would otherwise have taken part in had they continued to survive, albeit weakened by the condition.⁴¹

Some efforts have however been made to dismiss the economic devastation of HIV, citing high rates of poverty and unemployment as well as informal sector driven underemployment among PLHIV (Bloom & Mahal, 1997; Kirigia et al., 2002). Proponents of this view posit that the diminished SES of PLHIV accounts for the muted effects denoted by the findings of their studies. In response, several studies (Bloom & Mahal, 1997; Kambou, Devarajan, & Over, 1992; Mumah & Jackson-Smith, 2014; Nketiah-Amponsah et al., 2019) adduce evidence to confirm the view that HIV and AIDS has a very significant socio economic burden on households and the economies of afflicted countries.

The argument that the impact of HIV and AIDS could be explained and perhaps deprioritised because of the low SES of affected households is imperilled by the findings of Mumah and Jackson-Smith (2014) who noted a more significant impact of HIV and AIDS among households with higher economic status. An outcome which in their view was occasioned by the fact that households with higher SES are more empowered to finance risky sexual behaviour such as multiple sex partners, a phenomenon which further exposes the household to HIV. Similarly, Nketiah-Amponsah et al. (2019) document how effective investment and mitigation measures could be accountable for muted impact among wealthier countries, thus confirming the significance of the economic burden of HIV. Furthermore, a tendency for more recent economic impact studies to find negative effects than

⁴¹ In addition to the annual losses computed through the production function it is possible to discount the unfulfilled lifetime earnings using the human capital approach

previous studies has been noted and attributed to plausible improvements in data quality (Asravor, 2013). The spectre of economic decline without adequate HIV interventions therefore remains.

A further dent in the argument which minimises the economic effect of HIV is achieved when Kirigia et al. (2002) acknowledge that given the chronicity of the HIV condition, there must be a significant effect and recommend that alternate approaches be applied to identify this impact, particularly micro-level costing and willingness to pay approaches. Similarly, although Ashraf et al. (2008) argue that the eradication of endemic diseases in a typical developing country like Ghana would not lead to significant gains⁴² for several reasons including high fertility, they recommend that advocates for enhanced health investment espouse a “humanitarian” rather than an economic argument. These authors acknowledge in the process that the mitigated or insignificant effects of HIV reported by some studies may be related more to methodological inadequacies than to the subtlety of the HIV burden.

In line with Bleakley (2009), I abound in the direction of methodological indiscretion and posit that the basis of the conclusions of immateriality of the economic impact of HIV may be premised upon the failure to efficiently capture the counterfactual in many instances. For example, if the focus of the model as in Ashraf et al. (2008) is on the direct effect of health changes or clinical morbidity/incidence, as reported by health facility records and as reflected by the count of days not worked or days hospitalised, summarily referred to as days unavailable to the work force, then the impact of disease might be under reported since a sizeable portion of PLHIV are either lost to follow-up or are simply beyond the reach of ART services. Additionally, focussing on incidence as in Ashraf et al. (2008) may underreport economic effects for HIV since HIV is a chronic disease

⁴² GDP per capita gains were capped at two percent

for which infected persons are treated until they die. A more robust model might account for sub clinical morbidity reflecting cases which do not get reported at the health facility and espouse a prevalence model as well such that the burden of all persons afflicted by the disease condition at any point in time is accounted for. These model inefficiencies “pass through” to the frameworks which are used to estimate the magnitude of the disease burden at societal level. Simply put, efforts must be made to capture the burden of disease in all the domains where impact is felt.

The posture which encourages the documentation of impact throughout all the domains of incidence is justified by Orem et al. (2012) and Gallup and Sachs (2001) who found that when the marginal effects of disease are scaled up to the national or aggregate levels, a clearer view of the opportunity cost of the disease condition is achieved. This approach, detailed in the appendices of this dissertation reflects the said scenario in which HIV morbidity can be seen to instigate significant GDP losses.

4.6 Conclusion

The subject of this chapter has been to explore the burden of HIV as a challenge to economic growth and development in Ghana. The chapter has examined and discussed the output curtailing effects of HIV using the classical Cobb-Douglas production function which is known for its effectiveness in predicting output given various representations of labour and capital.

Some important variables which were presented and discussed provided evidence of the effect of HIV on Ghana’s economy. The import/export ratio which was used as a proxy for trade, fixed capital formation and secondary school enrolment were found to be relevant explicators of economic output in Ghana. The coefficient for labour or employment proxies several gender and age differentials and may be suggestive of a nexus between socio-economic vulnerability, gender,

inequality and HIV. Overall, there is a noticeable effect of HIV on the Ghanaian economy. The effect is felt through HIV morbidity as well as through AIDS mortality. For HIV morbidity, a 1 percent increase in HIV prevalence causes a 0.57 percent decrease in economic output while a 1 percent increase in AIDS mortality triggers a 0.26 percent decrease in economic output. If Ghanaian HIV prevalence was to triple (a situation which has happened before in terms of total number of PLHIV from 1991 to 2019), the cost of HIV morbidity would exceed real GDP per capita two times over.

This study adds to a growing body of evidence which finds significant deleterious effects of HIV and AIDS on African economies including Ghana. The study specifically uses gross domestic product as a measure of economic output in ascertaining the effects of HIV in Ghana. To the author's knowledge, many studies of the economic effect of HIV in Africa including Ghana are obsolete. Many were carried out when ART coverage was only sparsely available and discussions about the ethics of providing, or refusing to provide ART to persons who were unable to afford the cost of treatment abounded (Dixon et al., 2002). A more recent study (Nketiah-Amponsah et al., 2019) used per capita income to measure the economic effect of HIV in Ghana and other African peers. Using GDP per capita, this study adds the output perspective to the debate on the economic effect of HIV in Africa and is in line with the above two studies which conclude that the economic burden of HIV in Ghana and Africa in general is significant. This study is particularly timely for Ghana because it is the first to the author's knowledge to have been done after the implementation of Ghana's treat all policy in 2016 (NACP, 2016). The obsolescence of previous studies, the focus on output rather than income with respect to the use of the dependent variable, the increasing interest and necessity for local funding and the epidemiology of HIV in Ghana make the current study and its findings particularly opportune.

Finally, it should be noted that although the impact of HIV on the Ghanaian economy as expressed above may appear trite, when up-scaled to the level of national GDP the losses become significant enough from an opportunity cost perspective⁴³, easily off-setting total current annual HIV and aids investments in Ghana. This statement is complimentary to the untold weight of the loss of investment in the human capital of the country which is wasted through aids mortality particularly given the recent free education agenda of government and the preponderance of the youth among the newly infected PLHIV.



⁴³ Appendix 4 and 6 expand on the upscaled losses.

CHAPTER FIVE

WELFARE AND PRODUCTIVITY EFFECTS OF HIV AND AIDS ON HOUSEHOLDS

5.1 Introduction

This chapter renders the results of the survey which was designed to obtain the welfare and productivity effects of HIV and AIDS on Ghanaian households.

The chapter commences with a presentation of the demographic characteristics of respondents and proceeds to fit these within the Ghanaian context in a descriptive approach which purposes to elicit HIV driven departures from the norm.

The descriptive approach is pursued as the chapter courses through the prevalence of acute and chronic illness with and without hospitalisation as well as the costs incurred by families for routine anti-retroviral therapy visits.

The next section introduces household expenditure, direct costs of illness and indirect costs or productivity costs of HIV and AIDS.

Intangible costs and coping mechanisms are the subject of the last section of this chapter. Since these costs will not be computed, the section will focus on the evidence elicited from the survey which might constitute a basis for estimations in future studies. Similarly, the section constitutes a basis upon which the findings of the qualitative chapter, chapter seven (7), which takes an in-depth perspective of the experiences and coping strategies of respondents may be reviewed for confirmatory or disconfirming evidence.

5.2 Profile of Respondents

The study compiled results for a total of 505 households instead of the 600 respondents which were targeted. The approximately 15 percent attrition emanated from the Greater Accra region which had been earmarked for 56 percent of all respondents but finally represented only 47 percent of respondents. This decline in representation from the main urban location in the study did not pose any problems for the sample frame as the respondents remained urban by a significant margin.

Data collection lasted seven (7) months from July 2021. COVID-19 restrictions as well as stigma were identified as principal among the causes of respondent hesitancy. Nonetheless the number of respondents (505) was higher than the 400 which was deemed sufficient given Yamane's (1967) power calculations for Ghana's PLHIV burden as indicated in the methodology section.

5.2.1 Demographic Characteristics

Respondents represented PLHIV aged from 0 to 90 years with a mean of 43 years and a median of 42 years. The proximity of both measures of central tendency suggests an acceptable skew, while the age range is wide enough to capture most of the age-related characteristics of HIV and AIDS expenditure.

5.2.1.1 Age of Respondents

Table 10: Age Ranges of PLHIV as reported by respondents - 2021

Age Ranges of PLHIV	%
0-14	<1
15-24	04
25-49	67
50-59	19
60+	10
	100

Source of data: Field Survey (2021)

As reported in Table 10 the majority of respondents were aged 25 to 49 (67 percent), a representation similar to the age skew reported in the national HIV and AIDS estimates report for 2021 (GAC,

2021a). Only two observations were related to PLHIV aged below 19 years, thus restricting the economic experiences of the respondents to adult experiences principally.

5.2.1.2 Educational Attainment of Respondents

Educational attainment was operationalised as the level of formal education which respondents had achieved denoted either in academic levels or in number of years of formal schooling experience. Participants in the study were more likely to have had fewer years of formal education as only 5 percent were classified as having completed any level of tertiary education. The highest educational attainment for about three quarters (3/4) of respondents was the junior secondary school level (JSS).

Table 11: Educational Attainment of PLHIV - 2021

Number of years of formal education of PLHIV	%
No Formal Education	16
Primary – 6 Years	27
JSS – Approximately 9 Years	30
SSS – Approximately 12 Years	22
Tertiary (includes teacher training & postgraduate) 16 years and above	5
	100

Source of data: Field Survey (2021)

Respondent educational attainment in the current survey appears to be associated with lower exposure to HIV infection. This is supported by the fact that a significant proportion of PLHIV (16 percent) were classified as having no formal education experience whereas the GLSS 7 reports that Ghanaians with no formal education should constitute no more than 1.6 percent of the population. Similarly, tertiary education attainment appears to be under represented in this sample as it accounts for only 5 percent of respondents whereas the GLSS 7 predicts about 7 percent for this category of Ghanaians (GSS, 2019a). Other educational attainment tiers in Table 11 reflect the education-HIV relationship. The protective effect of education is also supported by the literature which documents poverty and illiteracy as drivers of HIV infection particularly among the youth (GAC, 2014a).

Among PLHIV with formal schooling experience, 27 percent reported primary education or an equivalent learning experience totalling six (6) years at the time of the survey as their maximum level of formal schooling. For PLHIV reporting the junior secondary school (JSS) level – 9 years of education as their highest educational level, the study documented 30 percent.

5.2.1.3 Sex and Marital Status of Respondents

The enduring story of the missing men in the HIV epidemic (34 percent male)(GAC, 2021a) is evident here as the overrepresentation of women among PLHIV is displayed with 79 percent of all PLHIV respondents.

Table 12: Sex and Marital Status of Respondents – 2021

Respondent Characteristics	%
Sex	
Male	21
Female	79
	100
Marital Status	
Underage (Child)	<1
Never Married	19
Married	32
Living Together	3
Separated/Abandoned	11
Divorced	14
Widowed	21
	100

Source of data: Field Survey (2021)

The generational burden borne by women even as teenagers (GAC, 2021a) finds further expression in the marital status of the largely female respondents as seen in Table 12 where the relationship between a stable home and marriage is visible. PLHIV households which reflect stable unions and marriage represent 3 percent and 32 percent respectively for a total of only 35 percent. A significantly greater proportion of PLHIV households have experienced a disproportionate amount

of adverse marital and relationship events with 46 percent having experienced separation, abandonment, divorce or widowhood.

5.2.1.4 Occupation of Respondents

Farming and agricultural labour account for about 24 percent of respondent occupations even though about 33 percent of respondents were resident in rural locations⁴⁴. An occupational pattern which is energy level dependent is emergent as only 0.52 percent of PLHIV respondents report being engaged in construction work, this notwithstanding the female gender skew of respondents. This combined unpopularity of agriculture and construction work taken together supports the emergence of an energy level dependent occupational pattern consistent with the clinical symptoms reported by many PLHIV.

Table 13: Occupation of Respondents - 2021

Characteristics	%
Occupation	
Farmer/Cultivator	22.22
Agricultural Labourer	1.81
Construction and related work	0.52
Service (Government. /Private)	16.54
Petty business/Small shop	35.14
Large business/medium to large shop owner	0.52
Small artisan in household and cottage industry	6.2
Self-employed/professional	2.84
Truck driver	0.26
Other transport worker (Bus, auto rickshaw - driver/ puller)	0.52
Pensioner/Retired	0.78
Domestic servant	0.78
Housewife	1.81
Student	2.33
Unemployed	7.49
Others	0.26
	100

Source of data: Field Survey (2021)

⁴⁴ GLSS7 reports about 40% of Ghanaians live in rural locations

Multiple source vulnerabilities are woven into the energy deficit narrative resulting in a preponderance of service (17 percent), artisanal/self-employed professional (9 percent) and petty trade occupations (35 percent). Unsurprisingly, significant unemployment levels were noted (7.5 percent) among respondents.

5.2.1.5 Religion of Respondents and Geographies of HIV

The religious denominations to which participants belong and the communities in which they live may hold some explanatory power over the ebb and flow of HIV prevalence and the socio-economic burden which the disease exacts on communities.

Religion of Respondents

About three quarters of PLHIV respondents were Christian. Mainstream Christian denominations such as Catholics (11 percent), Anglican (2 percent), Presbyterian (11 percent) and Methodist (4 percent) were outpaced by Pentecost (19 percent) and Charismatic (28 percent) denominations which together represented 47 percent of respondents.

Table 14: Religion of Respondents - 2021

Characteristics	%
Religion	
Muslim	11.49
Catholic	11.29
Anglican	1.58
Presbyterian	10.30
Methodist	4.16
Pentecost	19.21
Spiritualist/Other Christians	2.38
Charismatic	28.12
Traditional	0.59
No religion	1.58
Other	9.31
	100

Source of data: Field Survey (2021)

Other fringe Christian groups including spiritualists represented 2 percent of respondents. Muslim PLHIV represented only 11 percent of respondents. At 11.48 percent, traditional religious beliefs,

atheism and other religious dispositions were the grouping with the lowest representation among PLHIV respondents while 1.58 percent reported “no-religion” (Table 14).

Geographies of Respondents

The geographical distribution of PLHIV respondents confirms the cultural skew intimated in the religious distribution of respondents above. The geographies which are predominantly Christian (Coastal and Forest zones or Greater Accra and erstwhile Brong-Ahafo region) with a joint representation of 83 percent (Table 15) constitute the main residency locales of respondents.

Although the study protocol for the current study provisioned for about a tenth of respondents to be sourced from the savannah agro-ecological zone due to its low HIV case load, respondents from this zone constituted almost a fifth of all participants. This over representation allowed for the regions under the savannah zone to be representative of the national circumstances with greater fidelity.

Table 15: Geographies of HIV - 2021

Characteristics	%
Region	
Greater Accra	47
Brong-Ahafo	36
Northern	7
Upper East	10
	100
Agro-Ecological Zones	
Coastal	47
Forest	36
Savannah	17
	100
Settlement Type	
Rural	34
Urban	66
	100

Source of data: Field Survey (2021)

About a third of respondents were resident in rural areas which may account for the low level of representation among respondents involved in agricultural occupations.

5.2.1.6 Living Conditions of Respondents

By far the most popular (57 percent) dwelling type in Ghana is the compound house which is typically a cluster of autonomous or semi-autonomous rooms set within a whole and usually enclosed in a single yard (GSS, 2019a). Study respondents over an average of a 7-year period (average time respondents have lived as PLHIV) experienced a decline in the percentage of their households living in compound houses from 44 percent to 38 percent. This represents a 15 percent decline in this category of housing. The conditions for the more comfortable dwellings did not decline much since HIV diagnosis. If anything, they improved. Single family houses and apartments represented 34 percent on average prior to HIV diagnosis but they represented 38 percent of PLHIV housing at the time of this study. Using the 6th and 7th waves of the GLSS (GSS, 2014n, 2019a) which coincide with a significant part of time since HIV diagnosis among the respondents in this study, a comparison with the housing situation among the general population in the country was done. Whereas very little change occurred among PLHIV who lived in huts at the time of their HIV diagnosis, among the general population almost 7 percent fewer people lived in such housing conditions over the period. Similar housing pressures were noted, among the less well-off PLHIV households, as compound housing decreased twice as fast among the PLHIV respondents as it did in the general population. About a third of the PLHIV who moved away from compound housing ended up in uncompleted buildings and other precarious housing circumstances while the more well-off PLHIV experienced upward mobility into single family homes and apartments. The burden of HIV can further be inferred from the fact that in the five years to 2019, growth in single family

homes among the general population was fivefold faster (22 to 33 percent) than among the PLHIV respondents in this study for whom single family homes rose from 25 percent to 27 percent only.

Error! Reference source not found. further illustrates the sources of drinking water of the PLHIV households. HIV diagnosis did not change much for many households which already experienced challenges with their source of drinking water. For the households which had access to water vendors and inside plumbing, both indoor plumbing and standing pipe, usage increased between HIV diagnosis and the present survey from 28 percent to 31 percent. A negligible decline from 35.4 percent to 35 percent was also noteworthy between HIV diagnosis and the current PLHIV survey for rainwater, pond, river and well water usage. The attempt to improve health outcomes by avoiding undesirable sources of drinking water is clear among PLHIV households, particularly because GLSS6 and GLSS7 signal an increase in the use of untreated open sources of drinking water by about 6.3 percent (30 percent to 36 percent) among the general population. Success is however, constrained by the socio-economic status of the most vulnerable PLHIV households.

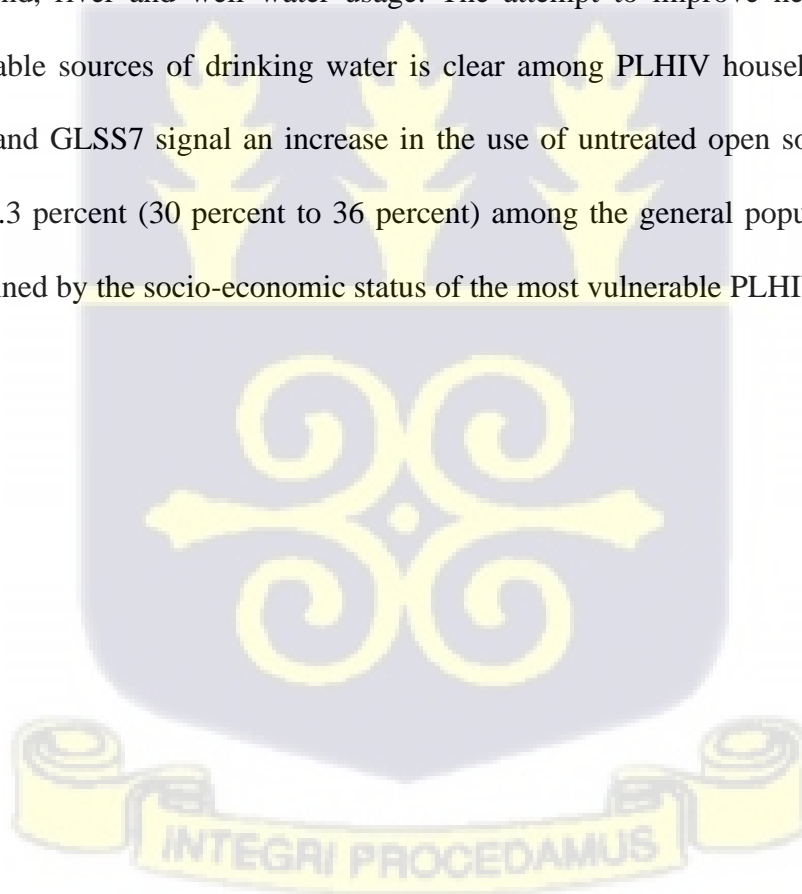


Table 16: Respondent Housing and Drinking Water Sources – 2021

Respondent Characteristics before and after HIV diagnosis	%	
	Before	After
Housing⁴⁵		
Several Huts/Buildings (same compounds)	12	12
Several Huts/Buildings (different compounds)	6	6
Room (s) Compound house	44	38
Single Family House	25	27
Apartment/Flat	9	11
Other	4	6
	100	100
Source of Drinking Water		
River, Lake, Spring, pond	3.2	2.2
Rainwater	0.2	0.2
Well with pump	13	14
Well without pump	19	18.6
Public standpipe	32	30
Indoor plumbing	5	6
Inside standing pipe	13	14
Water vendor	10	11
water truck/tanker service	1	1
Neighbouring Household	1.6	1
Other	2	2
	100	100

Source of data: Field Survey (2021)

Table 17 speaks to PLHIV household access to sources of energy or fuel for cooking and access to sanitation services. The most popular sources of cooking fuel in Ghana, charcoal and wood (GSS, 2014n, 2019a) account for 72 percent of PLHIV household cooking fuels before HIV diagnosis declining to 64 percent during the household survey. Efforts to improve the source of cooking fuels

45 GSS.(2019) pp135,144

are discernible since in the period between HIV diagnosis and the PLHIV household survey, PLHIV households increased their representation in LPG gas usage from 26 percent to 34 percent (30 percent increase). In comparison, the transition to LPG gas by the general population was four times less (22 percent to 24 percent) as documented in the recent waves of the living standard surveys (GSS, 2014n, 2019a).

Table 17: Cooking and Sanitation Characteristics of Respondents - 2021

Characteristics	%	
	Survey Before	Survey After
Fuel for Cooking		
Firewood	31.29	29.11
Coal	40.99	35.25
Kerosene	1.19	0.4
LPG (Gas)	25.94	34.46
Cow dung	0.2	0.2
Electricity	0.2	
Bio-gas		
Other	0.2	0.59
	100	100
Type of Toilet		
Service latrine (Public)	19.15	17.58
KVIP	44.38	37.88
Flush system	32.22	39.09
Other (Bush)	4.26	5.45
	100	100

Source of data: Field Survey (2021)

Sanitation as proxied by the type of toilet used by PLHIV households shows a decline in the use of public toilets and KVIP type toilets since HIV diagnosis from 19 percent and 44 percent to 18 percent and 38 percent for service latrines and KVIP toilets respectively. Conversely, between the time of HIV diagnosis and the current survey, PLHIV households increased their preference for the

more affluent toilet type, the flush system (32 percent to 39 percent) and the least affluent toilet type – open defecation (4 percent to 5 percent).

It is however worth noting that whereas open defecation dropped from about 19 percent to 16 percent in the general population in between the two most recent waves of the Ghana living standard surveys (GSS, 2014n, 2019a), among PLHIV respondents in the current study, open defecation increased by slightly more than 1 percentage point. Given the importance of good health and sanitation practices, particularly in the context of living with HIV, the dire circumstances of PLHIV households of lower socio-economic standing becomes clearly apparent.

The dynamics of PLHIV living conditions, particularly when compared to the changes occurring within the general population as illustrated in the most recent living standard surveys broaches two narratives. The first narrative illustrates the ability and desire of PLHIV households to improve their conditions of life given the requirements of ART. The second narrative illustrates how PLHIV households may stagnate or even lose socio economic ground as they try to cope with HIV.

5.3 Acute and Chronic disease Prevalence of Households

5.3.1 Disease Burden

Seventy six out of 505 respondents reported illness for which they were not hospitalised within the month prior to the survey, representing about 15 percent of all respondents. Out of this number, however only 63 percent (48 PLHIV) could indicate the nature of their ailment. The efforts at sanitation and healthy living among PLHIV households illustrated in **Error! Reference source not found.** and Table 17 possibly display benefits in terms of improved prevalence of diseases, particularly those that are water borne as illustrated in Table 18: Prevalence of Self-Reported Acute and Chronic Disease in past one month among PLHIV. This is because it is well known that healthy living

conditions are likely to lead to better health outcomes than unhealthy living conditions. As noted in 5.2.1.6 Living Conditions of Respondents, PLHIV outperformed the general population particularly in terms of growth in access to improved sanitation⁴⁶ and drinking water supply. These conscious improvements in hygiene are therefore expected to result in fewer cases of water borne diseases among PLHIV than in the general population.

Of the approximately 10 percent of PLHIV who reported bouts of illness in the previous month and could identify the illness, upper respiratory tract infections, colds, gastroenterological conditions without loose motion as well as dermatological issues including boils, abscesses and itches were all significantly lower among the PLHIV survey cohort than in the general population as documented in the national disease burden among the general population (GHS, 2018). For example whereas the Ghana Service (2018) reports gastrointestinal conditions such as typhoid, diarrhoea ulcers and worms at 9.2 percent among the general population, these conditions afflicted only 2 percent of PLHIV respondents in this study. Similarly, upper respiratory illness and skin conditions which afflict the general population at about 13 percent and 3.5 percent respectively are accountable for only 4 percent and 2 percent respectively of PLHIV illness in the current study.

For other diseases except fever and energy sapping conditions which are germane to the HIV condition such as fevers, weaknesses, dizziness, anaemia (which together account for 15 percent of reported illness in the month prior to the study) and by extension malaria (54 percent), ART adherence provided some protection as only 23 percent of those⁴⁷ who reported illness confirmed being stricken by other disease conditions in the 30-day period preceding the current survey.

⁴⁶ 18 percent WC use among general population while 39 percent of PLHIV respondents use the method, period growth was about 50 percent higher than in the general population.

⁴⁷ 23 percent of 10 percent of PLHIV who could identify their illness amounts to about 2 percent of all respondents.

Table 18: Prevalence of Self-Reported Acute and Chronic Disease in past one month

Disease Conditions	%
Common cold, nose and throat discomfort (running nose, sore throat, tonsillitis etc.) pneumonia, bronchitis, whooping cough, respiratory infection.	4
Malaria	54
Fever	9
Weakness, dizziness/anaemia	6
Stomach problems without loose motion: indigestion, gas, acidity, constipation, ulcer	2
Skin diseases/infections (eczema, ringworm, boils abscess, skin itching)	2
Others	23
	100

Source of data: Field Survey (2021)

The pre-eminence of febrile and other respiratory and skin conditions to the exclusion of other major conditions in Ghana's disease burden may be suggestive of respondent compliance with the recommendation to restrict reporting to HIV related conditions. This characteristic is expected to mitigate the absence of non-PLHIV households as a counterfactual in the survey⁴⁸.

Thirty seven percent of all respondents who reported ill in the one month leading up to the household survey could not describe or identify their illness.

5.3.2 Acute & Chronic Disease [previous month]

Slightly more than a tenth (15 percent) of all PLHIV households reported illness on average twice within the previous month to the date of the survey, a figure similar to under 5 febrile morbidity (14 percent) reported under the sixth demographic and health survey (GSS et al., 2015, p. 36). Although infant and adult disease profiles are different, the similarity in febrile case load between both groups is indicative of the intensity of disease burden among PLHIV households. The

⁴⁸ See 3.6 Limitation of Thesis

prevalence of illness within the previous month is also slightly better than the 22 percent incidence and frequency of 6 which was recorded in a similar study by Asante (2018).

Table 19 illustrates the intensity of the bouts of illness occurring within a month to the PLHIV survey. Although the frequency of disease is homogenous (twice in previous month for both mean and median), there is a significant variance in intensity of the illness bouts among respondents as denoted by the departure of the mean from the median for number of days ill (mean 4; median 2), treatment duration (mean 5; median 3) and days not going to work (mean 12; median 2).

Only two thirds of those reporting illness could recollect enough details about their illness bouts to indicate the number of days which these illness bouts lasted. This number represented about 10 percent of all respondents, declining further to about 7 percent of all respondents for those who could recollect the productivity impact in terms of days bedridden or days lost to work. This percentage is within an acceptable range of the 11 percent recorded by a similar out-of-pocket study with data collected in 2010 (Asante et al., 2014) but significantly lower (by about 50 percent) than the incidence reported in another study of PLHIV household expenditure conducted in 2017 which recorded acute and chronic disease incidence of 20 percent (Asante, 2018).

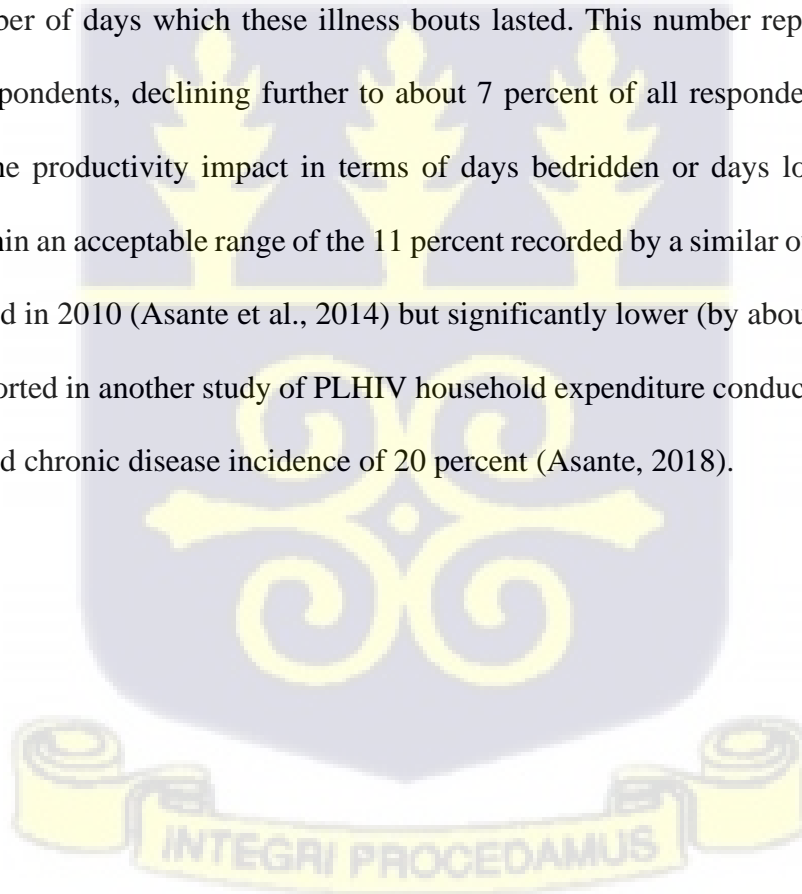


Table 19: Incidence and Duration of acute and chronic disease in past one month

Incidence of Acute and Chronic Disease in past one month						
	N	Median	Min	Mean	Max	Standard Deviation
Illness during past 1 month (# of times)	76	2	1	2	20	2.2
Number of days ill	50	2	0	4.34	99	14
Duration of treatment (days)	34	3	1	4.74	30	6.82
Days bedridden	34	0	0	1	5	1.6
Days not going to work	34	2	0	12	190	36

Source of data: Field Survey (2021)

5.3.3 Acute & Chronic Disease [previous year]

Over the course of the year preceding the current study, about 31 percent of respondents experienced non hospitalised illness on average three times a year. As in the case of the illness in the previous month, only about two-thirds of the PLHIV (n=97) who reported illness could recollect details about the intensity or duration of the illness bouts. On average these bouts lasted 7 days and about 8.5 percent of PLHIV respondents (n=43), went to work even though they were ill, a phenomenon which occurred 20 days on average per year. The average number of days when PLHIV could not go to work because they were unwell equalled 16 days. Ten percent of PLHIV were hospitalised twice a year for about 9 days in total.

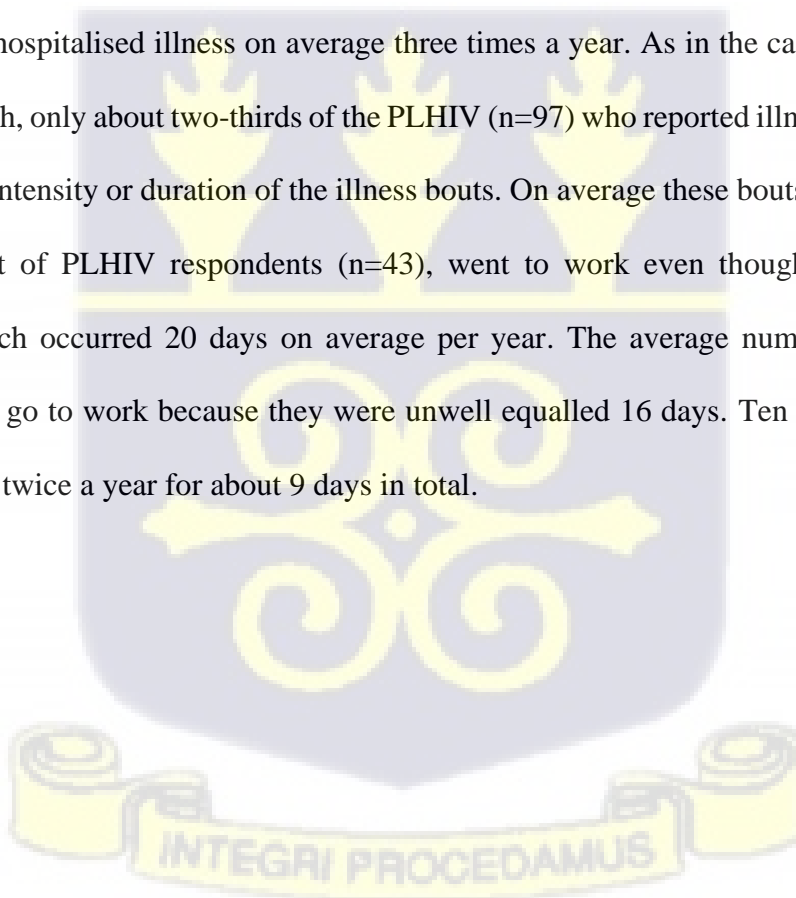


Table 20: Incidence and duration of acute and chronic disease in the past one year

Incidence of Acute and Chronic Disease in past one year

	N	Median	Min	Mean	Max	Standard Deviation
Non-Hospitalised Episodes						
Illness during past 1 year (# of times)	159	1	1	3.2	98	11
Number of days ill	97	5	1	7.3	98	12.5
Duration of treatment (days)	91	4	1	5.3	60	6.8
Days bedridden	21	3	1	5.7	60	12.5
Days not going to work	59	5	1	15.8	99	27.8
Days going to work while ill	43	11	5	20	140	24
Hospitalisation Episodes						
Number of times hospitalised	49	1	1	1.7	7	1.36
Duration of hospitalisation (days)	38	3	1	9.4	99	21.7

Source of data: Field Survey (2021)

5.3.4 HIV - Disease Metrics

Respondents had diverse ways of perceiving the progression of their condition for the 30 percent who were able to provide responses to the relevant questions.

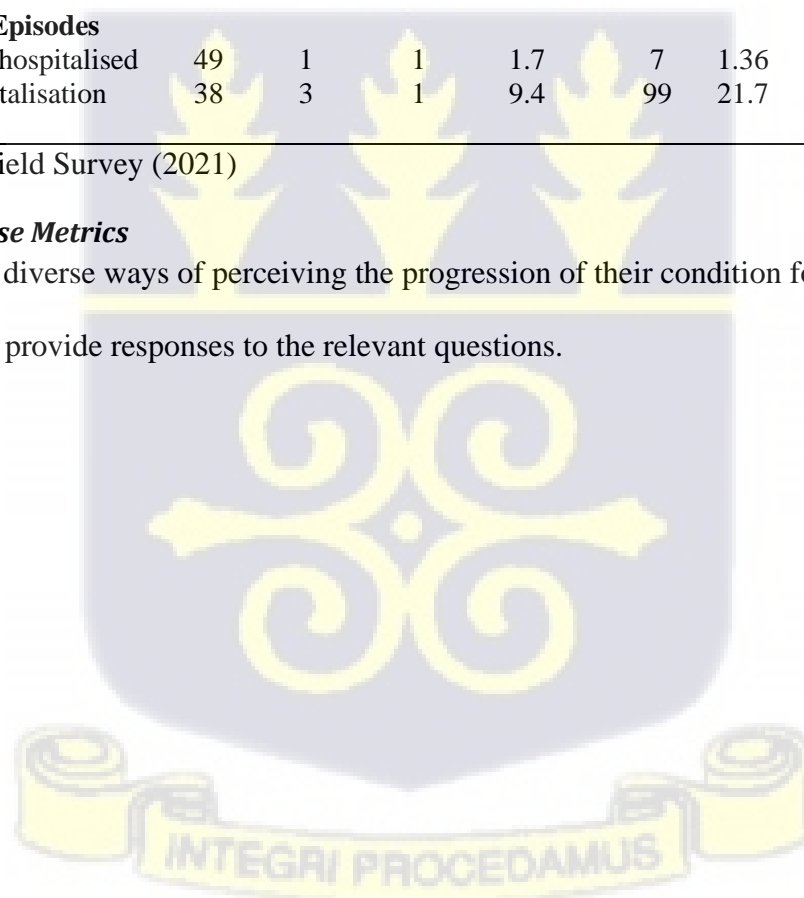


Table 21: HIV Disease progression - 2021

Disease Progression: Self-Reported Progression Metric (%)		(N=158)
Viral Load	75	
CD4 Count	1	
Stage	18	
Therapeutic Regimen (1 st Line/2 nd Line)	2	
Other	4	
	100	

Source of data: Field Survey (2021)

A majority (75 percent) reported the use of viral load tests while about a fifth (18 percent) continued to measure their progress using the stages of the disease which writ large reflect different categories of symptoms.

Table 22 illustrates therapeutic success for PLHIV on ART and is a cause for concern. Although respondents reported pre-viral suppression or symptomatic experiences in only 5 percent of cases, the metrics were more severe among those who could report their most recent viral load test results. Of the 31 percent who could report these numbers, only 89 percent were virally suppressed i.e., had less than 50 copies of the virus per mL (Lokpo et al., 2020; Mugavero et al., 2012; World Health Organization, 2016) per their most recent viral load test results. The 50 copies per mL of plasma standard is preferred to the WHO standard of 1,000 copies per mL because while the former defines non detectable thresholds with ramifications for prevention of mother to child transmission (PMTCT) and drug resistance , the latter defines only therapeutic success (World Health Organization, 2016).

Table 22: Therapeutic success - 2021

Self-Reported Therapeutic success	(%)
Among those who reported disease progression metrics (N=158)	
Viral load < 50 copies per mL	89
Not virally suppressed	11
	100
Among All Respondents (N=505)	
Asymptomatic and/or virally suppressed	95
Symptomatic and/or previral suppression	5
	100

Source of data: Field Survey (2021)

Summarily, Table 22 illustrates the potential for a false sense of security in that symptomatic or pre-viral suppression numbers (5 percent) might potentially be reported at rates much lower than they would otherwise be when routinely confirmed by diagnostic testing (11 percent).

5.4 Direct Cost of Illness

5.4.1 Monthly Health Expenditure [For illness not requiring hospitalisation in previous month]

An amount of GHS140 was spent averagely per PLHIV household for the month leading up to the interview for non-hospitalised health services. Not all respondents incurred the full range of cost inputs. This figure could easily rise by 64 percent to GHS230 in a hypothetical case in which a PLHIV happens to incur all cost inputs from “fees and medicines” to “bribes and tips”. This hypothetical scenario has been labelled “Aggregate Scenario” and has been computed from Table 23 to Table 31 in a bid to estimate a direct cost ceiling.

At GHS50 per household, the median expenditure was less than 36 percent of the average expenditure, indicating significant spread or variability in the expenditure and the conditions being attended to. Median costs also reflected an increase of 114 percent in the case where all potential

cost inputs are quantified, from GHS50 to GS107. This expenditure concerned only about 7 percent of all respondents. Fees and medicine cost an average of GHS103 and clinical tests and diagnostics amounted to about GHS 54 per month making up over two thirds of the monthly non hospitalised health expenditure on average. At GHS31, nutritional supplements, transportation (GHS25) and other expenses such as tips (GHS17) amounted to just below one half, a third and a quarter of the remaining one third of the monthly non hospitalised health expenditure.

Table 23: Monthly health expenditure not hospitalised - 2021

Monthly Health Expenditure [not hospitalised] (in GHS)						
	N	Median	Min	Mean	Max	Standard Deviation
Fees & Medicine	24	50	2	103	1000	136
Clinical Test & Diagnostics	18	13	2	54	500	120
Transportation (Includes carers)	28	14	1	25	150	33
ARV Related Nutritional Supplement	22	20	2	31	300	62
Other (Tips/etc)	13	10	3	17	50	17
Total Expenditure	36	50	1	140	1000	208
Aggregate Scenario		107		230		

Source of data: Field Survey (2021)

Non hospitalised health expenditure in the month preceding the interview illustrated some differentials by gender, geography and length of stay as PLHIV or number of years lived as PLHIV. On average women living with HIV (WLHIV) spent 29 percent more (GHS150 versus GHS116) than their male PLHIV counterparts (MLHIV) on monthly non hospitalised health expenditure driven mostly by medical fees (GHS167 representing 54 percent of average aggregated costs versus GHS27 representing 23 percent for male PLHIV).

Table 24: Monthly health expenditure non hospitalised – WLHIV - 2021

Monthly Health Expenditure [not hospitalised] – Females only (in GHS)						
	N	Median	Min	Mean	Max	Standard Deviation
Fees & Medicine	13	80	5	167	1000	267
Clinical Test & Diagnostics	8	18	5	41	200	66
Transportation (Includes carers)	18	20	1	32	150	39
ARV Related Nutritional Supplement	13	20	2	42	300	79
Other (Tips/etc)	4	30	5	29	50	25
Total Expenditure	25	60	1	150	1000	223
Aggregate Scenario		168		311		

Source of data: Field Survey (2021)

Diagnostics on the other hand indicated a lower level of expenditure for female PLHIV (GHS41 representing about 13 percent of average aggregated costs versus 50 percent for male PLHIV). This might indicate that male PLHIV are reporting with conditions requiring greater diagnostics⁴⁹. For other expenses such as tips and bribes at health facilities, more men (9 percent of the 105 male respondents) than women (1 percent of the 400 female respondents) were likely to pay. Although men are nine times more likely to give bribes at health facilities than women, the average tips handed out however were higher for WLHIV (GHS29) than for men as may be gleaned from Table 24: Monthly health expenditure non hospitalised – WLHIV and Table 25: Monthly non hospitalised illness expenditure- male PLHIV only.

The disproportionate number of men in relation to women who are willing to provide tips and bribes may point to gender-based income inequalities but also to some stigma related structural challenges or cultural dispositions which males may have towards healthcare in general and HIV in particular. Some context specific and gender specific accommodations may be worth exploring to allay

⁴⁹ This is consistent with comparatively lower health seeking behaviour among males.

potential apprehensions about stigma and to better accommodate men and boys. Noticeably when costs from the 2010 Out-Of-Pocket study are inflated to account for non-food inflation of 16.6 percent, median costs fall within the range of current non hospitalised expenditure except for male expenditure which is lower than female expenditure and significantly lower (two thirds lower – GHS92 versus GHS 30) than the expected range (Table 25). Nutritional supplements during illness episodes were more patronised by males (9 percent versus 3 percent) and at an average of GHS14 per month, typically spending GHS28 less than the average WLHIV.

A clear distinction is apparent when the monthly non hospitalised health expenditure is viewed through a geographical prism. Fees and medicines for urban locations (GHS195) are five-fold the average fees in rural areas (GHS37) while all other costs in urban settings are about twice their rural counterparts. In summary, rural PLHIV households (GHS130) are expected to pay about 33 percent of what their urban counterparts pay (GHS394) when all possible cost inputs are aggregated.

Table 25: Monthly non hospitalised illness expenditure- male PLHIV only - 2021

Monthly Health Expenditure [not hospitalised] – Males only (in GHS)						
	N	Median	Min	Mean	Max	Standard Deviation
Fees & Medicine	11	6	2	27	100	32
Clinical Test & Diagnostics	10	6	2	63	500	154
Transportation (Includes carers)	10	6	2	12	50	14
ARV Related Nutritional Supplement	9	7	3	14	50	15
Other (Tips/etc)	9	6	3	11	30	10
Total Expenditure	11	30	12	116	615	178
Aggregate Scenario		31		127		

Source of data: Field Survey (2021)

The rural urban divide is multiple times what it was in previous studies when the differential was less than 10 percent (Asante et al., 2014) The cost differentials are mainly driven by fees and medicines as well as the costs of diagnostics which together account for about 76 percent of

aggregated cost inputs for urban centres and only 50 percent for rural areas. Additionally, it is noteworthy that about 25 percent more rural dwellers incurred illness expenditure in the month leading to the survey than urban dwellers. Transportation which represents about 30 percent in rural areas (GHS28) is barely a tenth (GHS22) of mean urban monthly non hospitalised health costs. This suggests that differentials may exist in healthcare financing and in the availability of health and transport infrastructure and services between urban and rural settlements.

Table 26: Monthly health expenditure - Rural and Urban - 2021

Monthly Health Expenditure [not hospitalised] – Rural only (in GHS)						
	N	Median	Min	Mean	Max	Standard Deviation
Fees & Medicine	14	7	2	37	300	78
Clinical Test & Diagnostics	12	6	2	29	200	56
Transportation (Includes carers)	16	6	2	28	150	42
ARV Related Nutritional Supplement	15	7	2	34	300	75
Other (Tips/etc)	11	6	3	11	30	9
Total Expenditure	20	34	10	97	602	142
Aggregate Scenario		32		130		
Monthly Health Expenditure [not hospitalised] – Urban only (in GHS)						
Fees & Medicine	10	90	30	195	1000	291
Clinical Test & Diagnostics	6	20	10	103	500	195
Transportation (Includes carers)	12	20	1	22	60	17
ARV Related Nutritional Supplement	7	20	5	24	40	12
Other (Tips/etc)	2	50	50	50	50	0
Total Expenditure	16	94	1	193	1000	265
Aggregate Scenario		200		394		

Source of data: Field Survey (2021)

Using the median expenditure, a certain level of stabilisation of the health status or resilience of the PLHIV household is exhibited by Table 27.

Table 27: Monthly non hospitalised health spending by years lived as PLHIV - 2021

Monthly Health Expenditure [not hospitalised] by years lived with HIV (in GHS)						
	N	Median	Min	Mean	Max	Standard Deviation
< 5 Years	13	60	10	159	1000	266
Between 5 and 10 Years	18	104	1	158	615	817
> 10 Years	5	20	12	21	30	7

Source of data: Field Survey (2021)

As the amount of time lived with HIV increases, the frequency of monthly illness bouts declines by about 8 percent from the period below 5 years living with HIV to the period between 5 and 10 years living with HIV. The decline is even more steep when PLHIV exceed 10 years living with the virus, the frequency of monthly illness bouts declines by almost 60 percent.

The cost of monthly non hospitalised illness similarly depicts time bound resilience. At GHS159 per month on average for PLHIV who have lived less than 5 years with the virus to GHS158 per month of non-hospitalised illness expenditure, the 10-year period shows little or no movement in average costs except for the median costs which experienced an incline of 73 percent. The gap is even more staggering when PLHIV exceed 10 years living with the disease, the differential (decline in costs) escalates to 87 percent with an average expenditure for the persons who exceed 10 years of GHS21 per month for non-hospitalised illness expenditure.

Table 28: Monthly non hospitalised health expenditure by PLHIV age - 2021

Monthly Health Expenditure [not hospitalised] by age of PLHIV (in GHS)						
	N	Median	Min	Mean	Max	Standard Deviation
< 33 Years	5	190	24	340	1000	385
Between 33 & 42 Years	13	60	18	116	615	161
Between 43 & 52 Years	8	35	1	147	602	210
Between 53 & 62 Years	6	18	10	24	50	16
> 62 Years	4	135	24	124	200	73

Source of data: Field Survey (2021)

Time bound resilience could also be inferred from Table 28: Monthly non hospitalised health expenditure by PLHIV age as the median shows a consistent pattern of decline in monthly health expenditure. Out of the 7 percent of respondents who reported non hospitalised illness in the month leading to the survey, the median expenditure declined by about 50 percent for every 10-year decline in PLHIV age except for those aged 63⁵⁰ and above for whom there is an uptake in expenditure (GHS135) of about 8 times the median expenditure of the previous age bracket, possibly linked to other geriatric or lifestyle conditions. A similar but less obvious monthly non hospitalised cost of illness trend is visible in the average expenditure which is highest (GHS340) for PLHIV aged below 33 years of age possibly because the age bracket would be proximate to diagnosis. The trend continues to decline for the 10-year bands beginning at age 33 (GHS116), “age 43 – 52” (GHS147) and “age 53 -62” (GHS24). The retired age group “>62” displays an average monthly non hospitalised cost of illness which at GHS 124 is 5 times the cost of the previous age bracket. The concept of time bound resilience in relation to older PLHIV should be interpreted with caution as there may be a justifiable reason for the lower costs noted. For example, there may be a conscious effort to support younger family members leading to self-denial or a prioritisation of other geriatric concerns as noted in Asante et al. (2014).

5.4.2 Annual Health Expenditure

Annual illness expenditure is presented in Table 29: Annual health expenditure, hospitalised and non-hospitalised. About 20 percent of all respondents experienced illness episodes which required visits to health facilities whether hospitalised or not during the year. This incidence of disease is more than double the percentage (7 percent) for monthly non hospitalised illness reported in earlier tables. The reported annual figures will therefore be used to aggregate total health expenditure - 2021.

50 Ghana’s male Life expectancy (GAC, 2021a)

Table 29 illustrates costs of GHS276 and GHS200 respectively for hospitalised and non-hospitalised illness episodes in the year leading up to the interview. Both categories of costs (hospitalised and non-hospitalised) displayed a similar structure with the cost of fees and medicine being the leading cost centre with about 41 percent of the costs of both hospitalised (GHS151 out of GHS372 average aggregated costs) and non-hospitalised (GHS127 out of GHS304 average aggregated costs) expenditure.

Table 29: Annual health expenditure, hospitalised and non-hospitalised - 2021

Annual Illness Expenditure (in GHS)						
	N	Median	Min	Mean	Max	Standard Deviation
Not Hospitalised						
Fees & Medicine	88	80	1	127	810	136
Clinical Test & Diagnostics	58	28	1	46	300	57
Transportation (Includes carers)	69	18	1	40	400	72
Nutritional Supp.	48	28	2	54	500	90
Other (Tips/etc)	14	13	2	37	231	61
Total Expenditure	99	140	10	200	1260	204
Aggregate Scenario		167		304		
Hospitalised						
Fees & Medicine	35	80	2	151	1000	209
Clinical Test & Diagnostics	25	20	2	35	120	33
Hospital Bed	24	45	1	93	980	199
Transportation (Incl. carers)	36	20	0.3	28	150	31
Nutritional Supp.	18	20	2	52	300	76
Other (Tips/etc.)	12	8	2	13	50	14
Total Expenditure	41	165	14	276	1185	289
Aggregate Scenario		193		372		

Source of data: Field Survey (2021)

As prices ranged from GHS1 to GHS1000 due to the diversity of service providers and funding sources there was significant variance in the costs of illness with median costs amounting to slightly above half of the mean cost of services. On average all other cost centres, namely diagnostics,

transportation, hospital beds and nutritional costs averaged around GHS50 except for bribes and tips which averaged GHS37 for non-hospitalised and GHS13 for hospitalised illness episodes.

The differential in the cost of bribes and tips between hospitalised and non-hospitalised episodes may be indicative of inefficiencies within the health system leading to some PLHIV being willing to “tip” for quick turnaround times.

Table 30: Routine Monthly ART Expenditure

	Routine Monthly ART Costs (in GHS)					
	N	Median	Min	Mean	Max	Standard Deviation
Routine Costs						
Antiretrovirals (ARV)	43	6	2	17	100	24
Non-ARV Medication	126	15	3	30	400	51
Clinical Test & Diagnostics	73	8	1	10	23	6
Transportation (Includes carers)	346	10	1	17	200	21
ARV Related Nutritional Supplement	218	40	2	60	900	80
Total Expenditure	431	35	.33	56	906	80
Aggregate Scenario		79		134		

Source of data: Field Survey (2021)

Routine monthly ART expenditure revealed that about 15 percent of PLHIV households did not spend any resources to access ART (74 out of 505 respondents). The proportion of persons not spending any money to access ART may be reflective of inability to pay and therefore indicative of diminished access to care and wellness rather than progress on the precepts of universal health coverage (UHC). On a monthly basis, average cost of ART access was GHS56 for a median of GHS35. The average cost of ART access reported above represents about 4⁵¹ percent of actual average total reported PLHIV household expenditure. As expected, ARV themselves reflected the cost centre for which the least number of respondents indicated that they had made any payments.

⁵¹ Respondents reported GHS17,099 on average as total household expenditure. The annualized figure for routine monthly ART access cost is GHS672.

At 8.5 percent of all respondents, this was lower than the representation for ART⁵² in general as expected. ARV also constituted the cost centre on which households spent the least amount of resources⁵³ (13 percent of aggregate scenario's average costs) while nutritional supplements which were applicable to less than half of all respondents (43 percent) constituted the most significant cost centre (GHS60 or 45 percent of aggregate scenario's average costs). Using total expenditure as the denominator places expenditure on nutritional supplementation "front and centre" of PLHIV households routine monthly ART costs because for many households the GHS60 spent on nutrition represent 100 percent of their expenditure outlay.

There is perhaps some cause for concern given the fact that about 15 percent of PLHIV spent nothing at all for their monthly ART routines. Zero or null reports are concerning because even if it is assumed that ARV are provided free of charge, the cost of laboratory tests (haematology and chemistry) which should occur at least twice a year per the treatment guideline is not known to be covered by NHIS according to PLHIV testimony. Other costs such as nutrition enhancement, another requirement of the ART regimen are expected to have been reported even if the source of the enhancement is from PLHIV's own production. Similarly, trekking to an ART centre for refills does not always suggest that PLHIV live proximate to the ART centre as HIV related stigma remains endemic in the country, with about a third of all PLHIV having been exposed to it at some point (NAP+ et al., 2014). Thus, PLHIV are more likely to move away from their own communities to preserve non-disclosure⁵⁴. The absence of costs related to ART altogether might

⁵² 431 respondents spent an amount greater than GHS1 on at least one of the routine ART monthly cost items representing 85 percent of all respondents. Interestingly only about a tenth of respondents spent money on ARV .

⁵³ This is not unusual as ARV continue to be a main cost center/focus for development partner financing.

⁵⁴ 2014 Stigma Index estimated non-disclosure at 85 percent of all PLHIV and this predominance of non-disclosure was also noted in the in-depth interviews in the current study as a major stigma related coping strategy. Therefore, PLHIV are more likely than not to move away from their communities of residence for ARV refills to ensure that their identity remains protected.

therefore herald greater underlying vulnerabilities and lack of agency within the Ghanaian PLHIV context.

Table 31: Comprehensive annual cost of health (including routine ART) - 2021

Comprehensive annual cost of health including ART Costs (in GHS)						
	N	Median	Min	Mean	Max	Standard Deviation
Description of Costs						
Fees & Medicines	128	125	10	199	1200	220
Non-ARV Medication	126	180	36	365	4800	612
Hospital Bed	24	45	1	93	980	199
Clinical Test & Diagnostics	109	100	2	110	450	85
Transportation (Includes carers)	357	128	4	207	2404	255
Nutritional Supp.	229	480	4	706	10800	947
Other (Tips & Bribes etc)	15	25	4	45	231	58
Total Expenditure	432	480	4	745	10872	981
Aggregate Scenario		1083		1725		

Source of data: Field Survey (2021)

At GHS199 per year, fees and medicines represented 12 percent of health costs. This amount was accounted for by annual ARV costs. At 21 percent of annual health expenses, other non-ARV medicines amounted to GHS365 while ARV related nutritional supplements accounted for 41 percent of annual health expenditure at GHS 706. Together, these three therapeutic interventions (medicines and nutrition as medicine) account for about 74 percent of health expenditure in the year, leaving other interventions such as diagnostics, hospital beds (5 percent) to account for the remaining quarter of expenditures. These figures are in line with previous studies such as (Asante et al., 2014) who found median annual costs of additional nutrition in 2010 (12 years prior to the current survey) to be GHS60. Median annual nutrition costs in the current study for example as reported by almost half of all respondents is GHS480. This amount, when discounted at an annual inflation rate of 16.6 percent (GSS, 2018) is close to the amount (GHS60) which Asante et al. (2014) found;

Formula for 11 year discounted median nutrition costs = 2021 Costs x (1 - r)¹¹. Further simplified as follows: 480 x (1 - 16.6%)¹¹ → 480 x (0.83)¹¹ → GHS65

The corroboration evidenced by the median annual nutritional cost of the current PLHIV cohort thus computed provides some assurance that besides the dynamics of inflation, there is some form of continuity in the economic characterisation of PLHIV households in the country.

Significant variations in health spending were noted for different demographic groupings as seen in Table 32 and Table 33. Gender disaggregation revealed that at GH913, males spent on average 30 percent more than females (GHS702) on annual health expenditure however, expenditure was gender insensitive with respect to the median expenditure (GHS480).

Median expenditure appeared invariant (GHS480 below 10 years and GHS490 for 11 years and above) when seen through the prism of the length of time PLHIV had lived with HIV. On the other hand, average household health costs experience increases from GHS670 to GHS787 (17 percent) as PLHIV transition from 5 years and below for time lived with the virus, to a decade lived with the virus. The cost differentials are much less notable when PLHIV transition to a decade and more (GHS811) lived with the virus (3 percent). The observed inclines may perhaps be explained by people getting older and therefore needing more health care, for example due to a predictable gradient in the prevalence of non-communicable and ageing diseases.

Annual HIV and health related costs illustrated a regional differential as well. The median expenditure for the savannah Agro-ecological zone, namely North East and Upper East regions was GHS600 and GHS260 respectively (averaging at about GHS400). The forest and coastal savannah experienced medians annual costs which were slightly higher at about GHS500 on average. The median for all Agro ecological zones was GHS480, like the expenditure level for Greater Accra

which incidentally represented about 53 percent of all respondents who spent money on these cost centres.



Table 32: Annual Health costs including ART by Sex, Year Lived as PLHIV and Region

		Comprehensive annual cost of health including ART Costs					(in GHS)
		N	Median	Min	Mean	Max	Standard Deviation
Sex							
	Male PLHIV	89	480	16	913	10872	1439
	Female PLHIV	343	480	4	702	6384	819
		432	480	4	745	10872	981
# of years lived as PLHIV							
	< 5 Years	176	480	9	670	3912	687
	> 4 & < 10 Years	153	480	4	787	10872	1230
	> 10 Years	103	490	14	811	5620	993
Region							
	Ahafo	31	1200	180	1530	3750	1029
	Bono	62	240	60	736	10872	1608
	Bono East	33	600	60	817	5620	977
	Greater Accra	228	480	4	657	4450	732
	North East	30	600	96	982	4920	1012
	Upper East	48	260	9	473	3024	608
		432	480	4	745	10872	981

Source of data: Field Survey (2021)

It is noteworthy that 20 percent of households in the Ahafo region have 2 or more PLHIV in their households hence the significantly higher median costs (GHS1200), however like in all other regions the median number of PLHIV per household is one. Similarly, the mean (GHS736) and the maximum (GHS10,872) annual health costs for the Bono region reflect the diversity of respondents and the fact that some respondent households have as many as 10 PLHIV in the same household. It is also worth mentioning that the Ahafo region has median HIV prevalence and low ART coverage (14 percent) while the Bono region has a high prevalence and ART coverage that is only 41 percent of PLHIV needing ART. The regional epidemiology may also be accountable for the higher health costs incurred by the Bono and Ahafo regions.

Table 33: Annual Health Costs including ART by Settlement Type, Health Insurance Status and Therapeutic Success - 2021

Comprehensive annual cost of health including ART Costs (in GHS)						
	N	Median	Min	Mean	Max	Standard Deviation
Settlement Type						
Urban	294	604	4	849	10872	1048
Rural	138	300	9	524	5620	780
	432	480	4	745	10872	981
Health Insurance Status						
Not Insured	51	360	20	768	4440	953
Insured (NHIS)	381	480	4	742	10872	986
Therapeutic Success/Disease Progression						
Viral load < 50 copies per mL	125	624	9	854	10872	1170
Viral load [50-400]c/mL	3	420	96	320	444	194
Viral load [400-1000]c/mL	2	1168	1018	1168	1318	212
Viral load > 1000 copies/mL	12	1241	504	1135	1584	359
	142	670	9	871	10872	1108
Therapeutic Success	347	480	4	709	10872	993
Symptomatic/Not Suppressed	85	600	14	893	4440	921
	432	480	4	745	10872	981

Source of data: Field Survey (2021)

Table 33: Annual Health Costs including ART by Settlement Type, Health Insurance Status and Therapeutic Success further outlines annual PLHIV household health expenditure by settlement type and by insurance coverage serving as proxies for access and by therapeutic success or disease progression. Notable differentials exist between rural (GHS300 median and GHS524 mean) and urban (GHS604 median and GHS849 mean) expenditure. This pattern is consistent with the findings of Asante et al. (2014), however the difference is much more significant in the current study in which median costs for urban settlement are double those for rural settlements. This difference is less evident when mean costs (38 percent lower for rural areas) are considered. These

costs may reflect variations in standards of living rather than diminished access to care in rural areas because therapeutic success defined as asymptomatic status or viral loads beneath 50 copies per micro litre of plasma (Mugavero et al., 2012) do not indicate better treatment outcomes for urban residents, on the contrary rural PLHIV (87 percent) reported better treatment outcomes per the above standard than their urban counterparts (80 percent).

Consistent with Beauliere et al. (2010) health insurance displayed little or no protective effects for PLHIV households. NHIS enrolment (GHS742 versus GHS768) provided only 3 percent protection in terms of average annual health costs for PLHIV households. This differential was consistent even after the residential location (rural or urban) was accounted for. NHIS however appeared to attract a penalty in terms of median costs with NHIS enrolled PLHIV households paying 25 percent more (GHS480 versus GHS360). This counterintuitive occurrence may be related to the disproportionate nature of NHIS enrolment across settlement types with 90 percent of all urban PLHIV households being NHIS enrolled while only 78 percent of rural households were enrolled. This position is also supported by Fenny, Asante, Enemark, and Hansen (2015) who deplore NHIS users' contentious proclivity to use private hospitals which are noted to be more expensive than public hospitals.

Finally, the direct cost of illness pursues a therapeutic path, declining with ART success and viral load viewed generally. Therapeutic success (median GHS480 and mean GHS709) accrues a 20 percent decline in annual median and average costs of health including ART. Beyond therapeutic success writ large i.e., including subjective assessments of wellness and symptomatic improvement as well as recalled clinical metrics, VL scores also confirm the association between the economic footprint of the disease and its clinical intensity or manifestation. Median PLHIV household expenditures decline by a third from GHS624 to GHS420 as VL scores transition from below 50 viral copies per micro litre of plasma to 400 copies per mL. Median health expenditure virtually

explodes from this point by 278 and 296 percent as PLHIV VL scores reach and breach the WHO guideline threshold of 1000 copies /mL respectively.

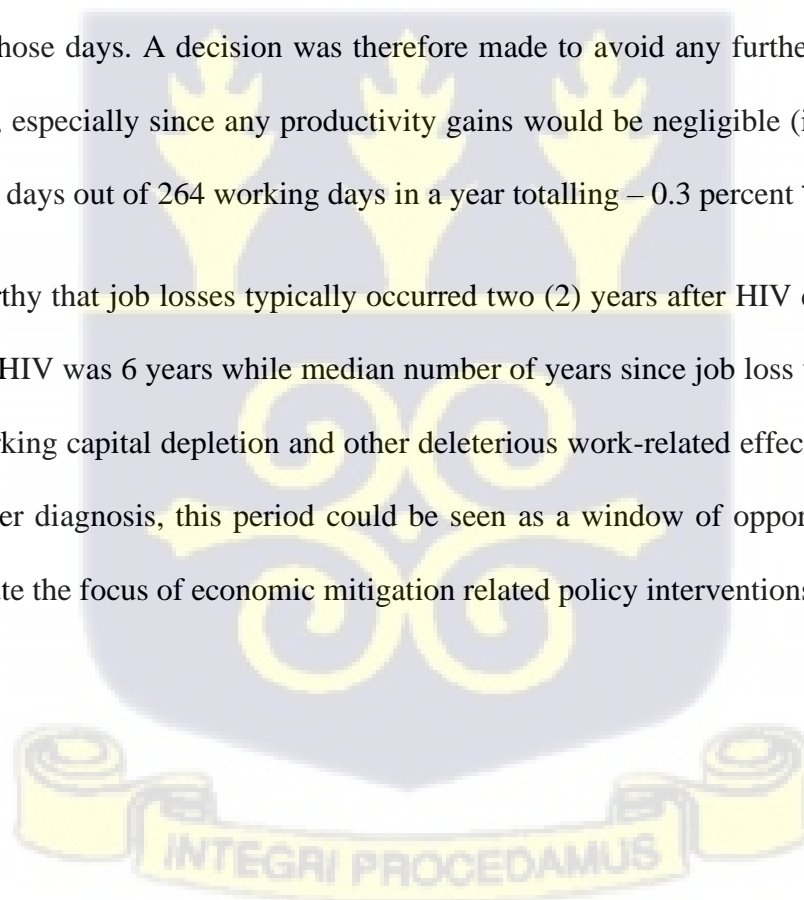
5.5 Productivity Cost - Indirect Cost of Illness

The value of lost market production (affecting 31 percent of respondents) emanating from the inability of PLHIV to undertake their daily activities either as a direct result of HIV related energy depletion (8 percent of all respondents) or indirectly (21 percent) because of precocious self-selection out of the labour force, working capital depletion or stigma and discrimination is noteworthy among respondents. The deleterious effect of HIV was felt most significantly at the level of capital loss and stigma within the informal sector.

The often-unconsidered effect of substitution leading to overstating the effect of productivity losses is curtailed here by efforts to isolate HIV related effects exclusively (WHO, 2009). For example, only job losses which occurred after HIV diagnosis, and which were reported as having been directly attributable to the PLHIV condition were captured as part of the productivity losses. Furthermore, these amounts were only compiled if the PLHIV was still unemployed at the time of the interview. Additionally, the compiled costs were maintained at pre termination or pre job loss values and therefore did not account for inflation even though on average 16 percent of PLHIV had lost their jobs six (6) years prior (median 4 years) (Table 34). This proportion of HIV related job losses is consistent with the findings of NAP+ et al. (2014), an indication that unlike access to treatment coverage, very little progress has been made which affects this area of the lives of PLHIV. In the case of persons employed but not working full time due to HIV convalescence, also referred to as PLHIV working while ill (8.5 percent of PLHIV respondents - Table 34), a 53 percent adjustment in output, using the days of illness driven institutional exposure as a proxy was

scheduled to reflect underperformance during the period when PLHIV worked while unwell. To obtain the said incapacitation factor, the average number of days of hospitalisation (9 days) was divided by the total number of days of institutional exposure (17 days) resulting in 53 percent⁵⁵ as the incapacitation factor or the extent to which performance would decline when PLHIV work while sick. Consequently, the productivity loss was scheduled to be adjusted downward (productivity gain) by 47 percent (1-0.53) such that for the 8.5 percent of respondents who worked while unwell, the mean number of days for which output was expected to be added to household gains (subtracted from productivity loss) would decline from 20 to 9. Further testing however revealed that the respondents who reported working while unwell did not report their sick days given that they were working during those days. A decision was therefore made to avoid any further discounts of the productivity cost, especially since any productivity gains would be negligible (i.e., 8.5 percent of respondents for 9 days out of 264 working days in a year totalling – 0.3 percent Table 34).

It is also noteworthy that job losses typically occurred two (2) years after HIV diagnosis (median years lived as PLHIV was 6 years while median number of years since job loss was 4 years). This suggests that working capital depletion and other deleterious work-related effects do occur within a year or two after diagnosis, this period could be seen as a window of opportunity and should therefore constitute the focus of economic mitigation related policy interventions.



⁵⁵ A similar coefficient of incapacitation was obtained using the number of observations for days working while ill and total days of illness (43/97 – Table 34)

Table 34: Productive time lost to HIV per person - 2021

Annual Estimates of Productivity loss						
	N	Median	Min	Mean	Max	Standard Deviation
HIV related job losses						
Years lived as PLHIV	338	6	1	7	31	6
Years since Job losses	82	4	<1	6	22	5
Reason for job losses						Percentage
Too Ill to work	39					25
Non-HIV Dismissal	3					2
Closure of Institution	8					5
Voluntary Retirement	17					11
Discrimination	11					7
Other (Stigma/Capital Loss)	79					50
	157					100
Time lost to Therapeutic Requirements (Days/Year)						
Leisure	184	13	7	26	195	30
Self-Care	168	30	15	56	365	68
Refill Protocols	444	2	<1	12	225	23
	466	17	<1	42	365	64
Time lost to caregiving/labour substitution						
Caregiver	94	264	10	242	264	67
Time lost to Illness (Days/Year)						
Non-Hospitalised	59	5	1	16	99	28
Hospitalised	38	3	1	9	99	22
	77	5	1	17	198	36
Number of days ill	97	5	1	7	98	13
Days working while ill	43	11	5	20	140	24
Discounted Days working while ill	43	5	2	9	66	11
Total Productivity Loss (Days/Year)	315	48	<1	257	365	365

Source of data: Field Survey (2021)

In addition to job losses, PLHIV households were afflicted by three other categories of time loss; time lost because of illness whether hospitalised or non-hospitalised, time lost because of compliance with therapeutic protocols or anti-retroviral therapy including self-care and ARV refills and labour substitution related to caregivers who would otherwise have allocated their efforts elsewhere within the labour force (Table 34).

Nineteen percent of households reported the use of caregivers for a period ranging from 10 days to 264 days in a year (average 242 days). Only 5 percent of respondents reported paying for care therefore average daily regional labour market wage rates were used to estimate lost productivity from caregiving services which were not costed by respondents (14 percent). These services were provided by spouses, children, parents and siblings as predicted in literature (Asante, 2018; Etiaba, Onwujekwe, Torpey, Uzochukwu, & Chiegil, 2016).

Table 34 also details the time lost to therapeutic requirements (92 percent⁵⁶). Loss of leisure time (36 percent) ranged between 7 days and 195 days per year while self care (daily home routines including ingestion of medicines) ranged from 15 days to the entire year. On average 26, 56 and 12 days were forfeited for leisure loss, self care loss and ARV refill visits to ART centres respectively during the year.

Only 15 percent of respondents lost productive time because they were ill. Hospitalised episodes led to much less loss of productive time (mean 9 days, median 3 days) per year than non hospitalised episodes (16 days on average versus a median 5 days). With a total of 198 days as a maximum for illness episodes some PLHIV were incapacitated for about half the year and therefore unable to work due to the HIV condition.

In summary, Table 34 illustrates productivity losses in terms of days when PLHIV are unable to work. The lost days range from below 1 day per year to the entire year (365 days) when all-source productivity losses are compiled. Productivity losses in days could exceed 59⁵⁷ in a year on average

⁵⁶ This is the share of respondents who incurred this type of loss.

⁵⁷ Illness and therapeutic requirements (17+42 = 59 days). This is a hypothetical ceiling for the few cases where a PLHIV household experiences all categories of lost time (illness incapacity, leisure, self-care & ARV refills) in a single year. These summations use STATA's conservative "missing" option for the "rowtotal" formula. See <https://www.statalist.org/forums/forum/general-stata-discussion/general/1372988-rowtotal-with-missing-values>

when losses are restricted to include leisure time lost, time invested in self-care and in ARV refill visits as well as the days when PLHIV are incapacitated by illness. This down time is significant and already accounts for about a quarter of the work year for affected households. When the costs of caregiver time are incorporated, as much as 92 percent of the caregiver's time could be consumed by care and support activities each year.

Table 35: Productivity Cost of HIV - 2021

Comprehensive annual productivity costs (in GHS)						
	N	Median	Min	Mean	Max	Standard Deviation
Cost of related job losses						
Cost of lost Jobs	43	13380	4	17183	105000	21868
Care/Labour Substitution costs						
Caregiver	94	4356	240	10093	60000	11816
Cost of time lost to Therapeutic protocols						
Leisure	86	848	7	811	2844	731
Self-Care	81	1141	61	1776	15969	2563
Refill Protocols	193	54	1	907	18000	2126
	205	473	5	1896	26683	3457
Cost of time lost to Illness						
Non-Hospitalised	59	250	10	526	6000	890
Hospitalised	38	80	5	310	2079	512
	77	240	5	556	6000	966
All Opportunity cost of time (A)	256	2089	5	8754	105450	15154
Opportunity cost of Dissaving & Fringe Benefits (B)						
Dissaving	71	500	70	1431	24000	3181
Interest lost [21%]	71	105	15	301	5040	668
Fringe benefits	9	50	6	97	200	83
All opportunity cost of dissaving & fringe benefits (B)	80	105	6	278	5040	633
Productivity Loss by Sex of PLHIV Household Heads						
Male	63	764	8	3894	34306	7250
Female	252	1937	5	8008	105450	15188
	315	1508	5	7185	105450	14053
Total Indirect Costs (A+B)	315	1508	5	7185	105450	14053

Source of data: Field Survey (2021)

Table 35, complements Table 34, by adding the opportunity cost of dissaving and by expressing all the afore mentioned productivity losses in pecuniary terms.

Pedrazzoli, Borghi, Viney, Houben, and Lönnroth (2019) and Apanga, Punguyire, and Adjei (2012) have noted the risk of estimation errors if estimates are not standardised enough to avoid large variations and differentiated enough to reflect the nature and character of respondents. In this study the strategy to minimise estimation errors involved the use of the daily regional median market labour rates. This approach avoided the use of one national minimum wage for all PLHIV which might have underestimated indirect costs while maintaining the diversity of economic opportunities which exists across the regions of residence of the respondents.

Using the human capital costing approach, sixty two percent of respondents (n=315) experienced either time loss or interest and fringe benefits loss or both because of HIV. The annual median productivity cost was GHS1508 while the annual average productivity cost amounted to GHS7,185. Indirect costs ranged from GHS5 per year to GHS105,450 per year, confirming the presence of significant variability in the indirect costs incurred by households. The gender disparity which was imperceptible with direct costs is much more visible with productivity losses. Female PLHIV reported about twice (GHS8,008) as much productivity losses annually, on average as male PLHIV (GHS3,894). Logistic regression models however indicated that gender was insensitive to welfare and productivity.

Productivity costs were structured into two main categories: the opportunity cost of time (A) and the opportunity cost of dissaving and fringe benefits (B). Among the most significant productivity cost centres featured jobs losses resulting from illness, weakness, stigma, and discrimination. This

afflicted about 9 percent of households by an annual amount of GHS17,183 on average per household.

Time lost to illness (15 percent of respondents) and related labour substitution arrangements for caregiving (19 percent of respondents) as well as other therapeutic protocols (41 percent of respondents) cost on average GHS556, GHS10,093 and GHS1,896 per year on average, respectively. Contrary to direct costs of care where only about 15 percent of respondents did not report any costs incurred for the year, productivity costs were either null or unreported for about 38 percent of respondents.

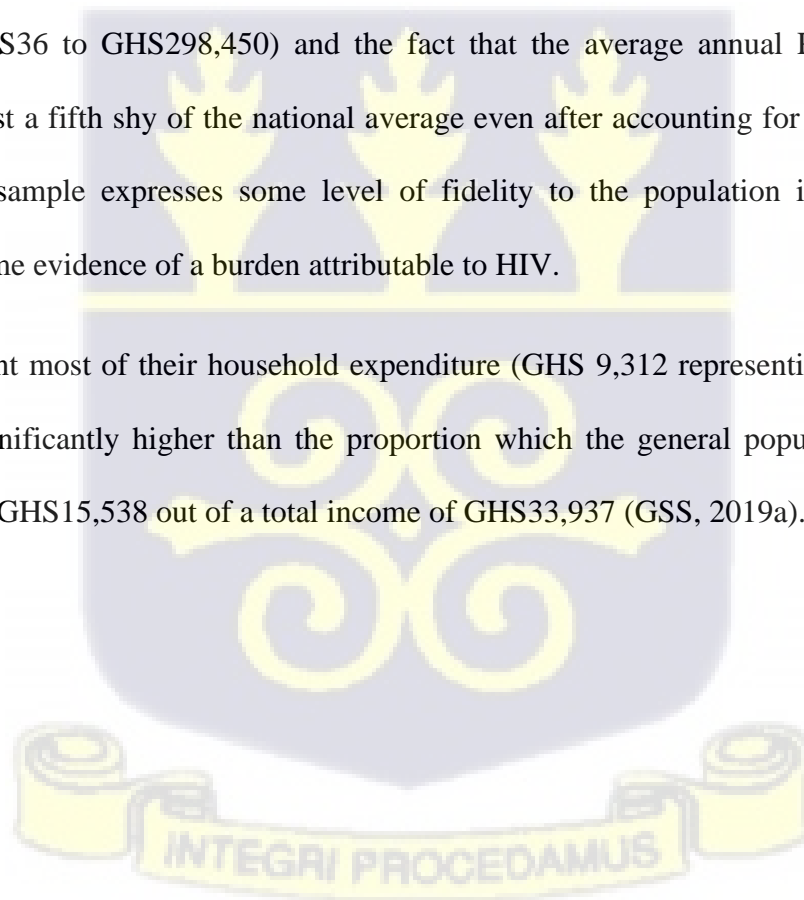
Leisure (17 percent), self-care (16 percent) and ARV refill protocols (38 percent) accounted for an annual productivity loss of GHS811, GHS1776 and GHS907 on average respectively. Respondents lost on average GHS526 on non-hospitalised and GHS310 on hospitalised illness in the year. Non hospitalised illness (12 percent incidence) attracted annual median costs (GHS250) which were several times higher than annual median costs (GHS80) of hospitalisation (8 percent incidence).

Total time-related losses were applicable to about 51 percent of PLHIV households, rising to 62 percent of households when opportunity costs of dissaving and fringe benefits were added, contrary to direct costs which were reported for about 86 percent of respondent households. Fourteen percent of households forfeited interest during the year of about GHS301 on average while about 2 percent of PLHIV reported losing fringe benefits totalling about GHS97 on average during the year because of their HIV status. Total opportunity costs of dissaving and fringe benefits amounted to GHS278 on average per year and were applicable to 16 percent of households.

5.6 Household expenditure

Household expenditure encompasses all the livelihood provisions for families. These include food, utilities, other non-food expenditure, out remittances and net savings. The respondents were slightly poorer (average expenditure was GHS 17,099 for the survey sample in 2021) than the general population which is estimated at an annual household expenditure of GHS12,857 in 2017, a figure which amounts to GHS20,778⁵⁸ when accounting for average inflation (12.75 percent) over the four years to 2021 (GSS, 2018, 2019a). This situation is typical of PLHIV surveys in Ghana where due to endemic stigma and poverty, respondents are often culled from among PLHIV with low socio economic status (Asante et al., 2014). That notwithstanding, the range of annual household expenditure (GHS36 to GHS298,450) and the fact that the average annual PLHIV household expenditure is just a fifth shy of the national average even after accounting for inflation suggests that the survey sample expresses some level of fidelity to the population in addition to the emergence of some evidence of a burden attributable to HIV.

Respondents spent most of their household expenditure (GHS 9,312 representing 54 percent) on food. This is significantly higher than the proportion which the general population spends (46 percent) on food GHS15,538 out of a total income of GHS33,937 (GSS, 2019a).



⁵⁸ Later in this chapter, the household expenditure binary will be shown to average GHS21,560 for households belonging to the top 2 asset index (welfare) quintiles and GHS14,074 for bottom 3 quintiles.

Table 36: Comprehensive annual household expenditure - 2021

Comprehensive annual household expenditure (in GHS)						
	N	Median	Min	Mean	Max	Standard Deviation
Food Expenditure	492	5640	12	9312	291960	20177
Utilities and Non-Food Expenditure	475	3420	12	5678	111360	9080
Other Non-Food Expenditure	470	587	5	1332	26548	2441
Full Medical Expenditure	432	480	4	745	10872	981
Net savings and out remittances	122	800	10	2649	38300	5228
Total	500	10953	36	17099	298450	26770

Source of data: Field Survey (2021)

When adjusted for food inflation (8.9 percent) over the 4-year period to 2021, PLHIV household food consumption is even more stark and constitutes only 43 percent of the general population's household food consumption. The theme of hunger, poverty and nutrition as therapy is evident from the skew towards food expenditure of PLHIV households and is consistent with previous findings for PLHIV households in Ghana (WFP & GAC, 2019). This theme will surface even more significantly in the in-depth interviews.

Utilities and other routine non-food expenditure such as toiletries, rentals, fuels and spirits attracted the second most significant cost centre in PLHIV annual household expenses with a mean of GHS5,678 representing 33 percent of household expenses. Direct health expenditure at GHS745 per year represented 4 percent of household expenditure, direct health costs constituted the lowest cost centre within the items which comprised household expenditure. This suggests that significant portions of the health expenditure of PLHIV households are being covered by sources other than the household. Indeed, National Health Insurance (NHIS) coverage was significant for both rural

(78 percent) and urban (90 percent) respondents. Other commodity and service charges are borne by government and donor funding sources as part of the national HIV and AIDS response program (GAC, 2020a).

At GHS 1,332 per year, “Other Non-Food Expenditure” accounted for 8 percent of household expenditure while savings and out-remittances at GHS2,649 per year represented 15 percent of total PLHIV household expenditure. Savings as a proxy for those households which have sufficiently contained the burden of HIV expenditure such that “excess” income could be saved stood at 24 percent of respondents, an adroit reflection of national savings which are typically a fifth of national output (World Bank, 2020).

5.7 Economic Burden of HIV – at household level

The economic burden of HIV is a metric which documents the intensity of health expenditure occasioned by the HIV condition. It is expressed as the percentage of household expenditure represented by direct and indirect HIV expenditure.

In the literature, total expenditure and non-subsistence expenditure have both been used as the denominator for the computation of the household economic burden of HIV. Several thresholds have also been used to attract policy attention to health expenditure issues. Five percent, 10 percent, through to 25 percent using total expenditure as the denominator and up to 40 percent using non-subsistence expenditure as the denominator have all been used as thresholds to trigger increased attention to health financing. Non-subsistence or non-food expenditure is defined as the residue after the cost of food has been taken into account (Tomini, Packard, & Tomini, 2012; Xu et al., 2003).

PLHIV households' ability to pay was routinely exceeded by the demands of HIV care and support which represented about 230 percent of non-food expenditure on average. Using median expenditure, conditions were more trite as the burden of HIV was only 17 percent (of ability to pay) representing about half of the 40 percent catastrophic threshold noted by Xu et al. (2003). The disparity between the two measures of central tendency is reflective of the variation in household conditions and the intensity of the burden experienced. Whereas some households can carry on unperturbed by the HIV condition (minimum burden of HIV nil), others are significantly diminished by the financial weight of HIV.

The number of PLHIV households suffering deleterious effects is significant. Non-food CHE headcount ratio at the 40 percent threshold was 37 percent (percentage of households with HIV expenditure exceeding 40 percent of non-food expenditure). Similarly, at the 10 percent of total expenditure threshold, the total CHE headcount ratio was high (48 percent), 30 percent higher than the non-food CHE headcount ratio.

Table 37: Economic Burden of HIV -2021

Comprehensive annual HIV morbidity costs (in GHS)						
	N	Median	Min	Mean	Max	Standard Deviation
Total Direct & Indirect Costs	476	1014	5	5431	106040	12107
Total Household Expenditure	500	10953	36	17099	298450	26770
Total Ability to Pay	487	5069	26	8134	137833	11682
Burden of HIV (%)⁵⁹	463	17.07	0.03	230.46	8000	766
Burden of HIV (%)⁶⁰	471	8.78	0.01	108.84	4666	403

Source of data: Field Survey (2021)

⁵⁹ Using Ability to Pay or Non-Food Expenditure as the denominator

⁶⁰ Using Total Expenditure as the denominator

When the burden of HIV is computed using the average annual total household expenditure (GHS17,099), it declines significantly but is still reported at a rate (109 percent) which denotes consumption of the entire household income on average, for HIV care and support (Table 37).

Using the median expenditure, households are burdened to the tune of about 9 percent as they commit to HIV care and support. Both measures of HIV's economic impact on households constitute catastrophic health expenditure when apprehended from the perspective of average costs. This is because the thresholds (10 percent using total expenditure and 40 percent using non-food expenditure) are exceeded several times over by the computed HIV burden (Barenes, Frichittavong, Gripenberg, & Koffi, 2015; Sadoh & Oviawe, 2007). Although catastrophic expenditure levels were undetected using median expenditure, the range of the economic burden denoted in Table 37 speaks to the diverse (the burden extends beyond food) and extreme pressure borne by some afflicted households. Sadly, these overwhelming expenses are often compounded by the costs of other medical conditions that PLHIV frequently juggle, compelling them to deploy additional resources to cater for the comorbid conditions (Ansa et al., 2012; Owusu, 2020).

5.7.1 Effects of HIV on Household Welfare

Household income or expenditure used as a proxy of income could change over time because of changing circumstances including inflation and thus obscure the impact of HIV on PLHIV and other affected persons. A wealth index also referred to as an asset index which measures the longer-term economic welfare of households and is therefore less responsive to short term shocks, was deployed to side step the challenge of income instability while exploring the burden of disease over time as recommended by WFP (2017).

5.7.1.1 Asset Index and disease progression metric

The dimension (asset ownership/consumption), indicators, cut-offs and weights used in the estimation of the welfare effects of HIV have been presented in chapter three of this thesis. The asset index presented 39 variables and was restricted to one dimension (household consumption or ownership of assets) which was further delineated into two components:

- (1) Household characteristics such as building type, drinking water and cooking fuel source as well as sanitary or toilet facility type and their 11 dummy variables and
- (2) Twenty-four (24) other consumer durables and agricultural implements.

The asset index was computed for the period prior to diagnosis as well as the post diagnosis period to gauge household welfare dynamics over time. Thus, models depicting two (2) different metrics for household welfare (dependent variables) were crafted using the post diagnosis welfare exclusively and using the net change in welfare (pre-diagnosis welfare – post diagnosis welfare).

Each asset index deployed as a dependent variable was rendered in quintiles with the bottom three (3) deleterious quintiles marked “0” for the binary variables in readiness for the logistic regression which was applied. The middle quintile was chosen as a cut-off because Boerma et al. (2014) and others have noted that typically, deleterious economic effects of disease would be felt most among the bottom two quintiles of populations and therefore recommend that significant attention be paid to the bottom 40 percent for purposes of equity in particular and universal health coverage in general. Cutting off the variable at the middle quintile would ensure that significant levels of the deleterious impacts are captured.

The disease metric brought together clinical symptoms as reported by PLHIV and the results of their most recent viral load tests in a binary variable which labelled “0” for viral suppression or

asymptomatic cases (VL scores of less than 50 copies of the HIV virus per mL of plasma or the absence of clinical symptoms) and “1” otherwise. Details of this metric and other measures of disease resilience and intensity such as length of time since HIV diagnosis and number of PLHIV living in the household have been presented in chapter three and were used as part of the variables in a vector of determinants of household welfare and productivity.



5.7.1.3 Binary Logistic Regression

The vector of independent variables from (13) denoted x_i , are specified in Table 38

Table 38: Description of Logistic Models and Variables

Model No	Dependent Variable [1/0]	Explanatory Variables [Type]
1	Post Diagnosis Welfare (nwsa) Dichotomised Asset Index Quintiles. Bottom 3 coded “0”, “1” otherwise. [60/40]	Pre-Diagnosis Welfare (nwsb [Binary]); Disease Progression (dprogflag ⁶¹ [Binary]); Length of Time as PLHIV (hiv3 [Quintiles of years]); Number of PLHIV in Household (nplhiv [continuous]); Exposure to Stigma (stigall [Binary]). Household Head’s (sex, [binary], age [continuous – years], formal education [edk3-categorical], occupation [occx-categorical], marital status [mars-categorical]); Post diagnosis household size (hhsaf [Continuous]). Total HIV Expenditure (qtothivcost [Expenditure quintiles]); Settlement type (rururb [Binary]); CHE (qbdnf [CHE quintiles]); Region of residence (regnrc [Categorical]); ART coverage (continuous [rates]); HIV prevalence (continuous [rates])
2	Net Welfare Change (nws) Pre & post net wealth score, negative coded “1” to signal household improvement and “0” otherwise [50/50]	Same as (1) above.
3	Productivity Loss (qploss3) Dichotomised productivity quintiles. Bottom 3 coded “0”, “1” otherwise [60/40]	Same as (1) above except: Total HIV expenditure (qthivx [Expenditure quintiles]) replaced by Post Diagnosis Welfare (nwsa, [Binary]) and Pre-Diagnosis Welfare (nwsb [Binary]) removed.
4	Disease Progression (dprogflag). Asymptomatic or VL cut-off coded “0” and “1” otherwise. [82/18]	Same as (1) above except: Disease progression (dprogflag [Binary]) replaced by Post Diagnosis Welfare (nwsa, [Binary]) and district epidemic variables (ART coverage & HIV prevalence) omitted
5	CHE Non-Food (qbdnfxb) Dichotomised CHE quintiles. Bottom 3 coded “0”, “1” otherwise [55/45]	Same as (1) above except: CHE (qbdnfx [CHE quintiles]) replaced by Post Diagnosis Welfare (nwsa, [Binary])
6	CHE Total Cost (qbdntxb) Dichotomised CHE quintiles. Bottom 3 coded “0”, “1” otherwise [56/44]	Same as (1) above except: CHE (qbdntx [CHE quintiles]) replaced by Post Diagnosis Welfare (nwsa, [Binary])

Source of data: Field Survey (2021)

⁶¹ This variable has been further clarified in chapter 3.

Binary logistic regression models were used to explore the effect which the clinical, epidemiological, socio-demographic and household characteristics of respondents have on the welfare status and productivity of PLHIV households. The effect of household characteristics on disease progression (Model 4) was also explored to improve understanding of the disease/welfare & productivity nexus.

Except for the “net change in welfare” (Model 2 and 4) which were computed directly as dichotomous outcome variables, all other models (1, 3, 5 & 6) presented binary dependent variables which were computed primarily as quintiles and subsequently transformed into dichotomous variables with the middle quintile serving as the cut-off. The bottom three quintiles were recorded as non-occurring (0-Zero) and the top 2 as occurring (1- One). The binary labels were interpreted appropriately during analysis to indicate which binary occurrence was desirable and which was not. For example, the two welfare dependent variables (model 1 and model 2) were appropriately labelled as “occurring” for desirable outcomes such as membership in the top two wealthy quintiles (post diagnosis welfare) and welfare improvement across the HIV diagnosis period (welfare changes). For models 3 through 6, the “occurring” binary outcome was the inverse of the direction of desirability. This characteristic was reflected in the interpretation of the regression results.

The results of the models are presented in Table 39. Model 1 illustrates the logistic regression used to analyse the relationship between post diagnosis welfare (response variable) and pre diagnosis welfare, disease intensity⁶² and other characteristics of the PLHIV, the household head, the household and the local epidemic as predictor variables. These predictor characteristics for model 1 included the household head’s sex, age, formal education, occupation and marital status. Other

⁶² Proxied by the disease progression binary, years lived as a PLHIV, stigma exposure and the number of PLHIV within each household.

household characteristics include household size, HIV expenditure, exposure to non-food catastrophic health expenditure, the settlement type and region of residence of the household. Other characteristics include the length of time which the PLHIV has lived with the HIV condition, the number of PLHIV living in the same household and the exposure of PLHIV to stigma from all sources. Finally, the district level HIV prevalence and ART coverage completed the set of predictor variables.

Results showed consistency with a priori theory in that initial wealth, formal education and survival rate (length of time lived as PLHIV) were positively associated with post diagnosis welfare. Conversely, other disease intensity proxy variables such as stigma and district epidemic variables such as ART coverage and HIV prevalence as well as HIV expenditure and geographies denoted a negative association with post diagnosis welfare and productivity. Some of these relationships were significant at significance levels of $\alpha=0.05$ while others were not.

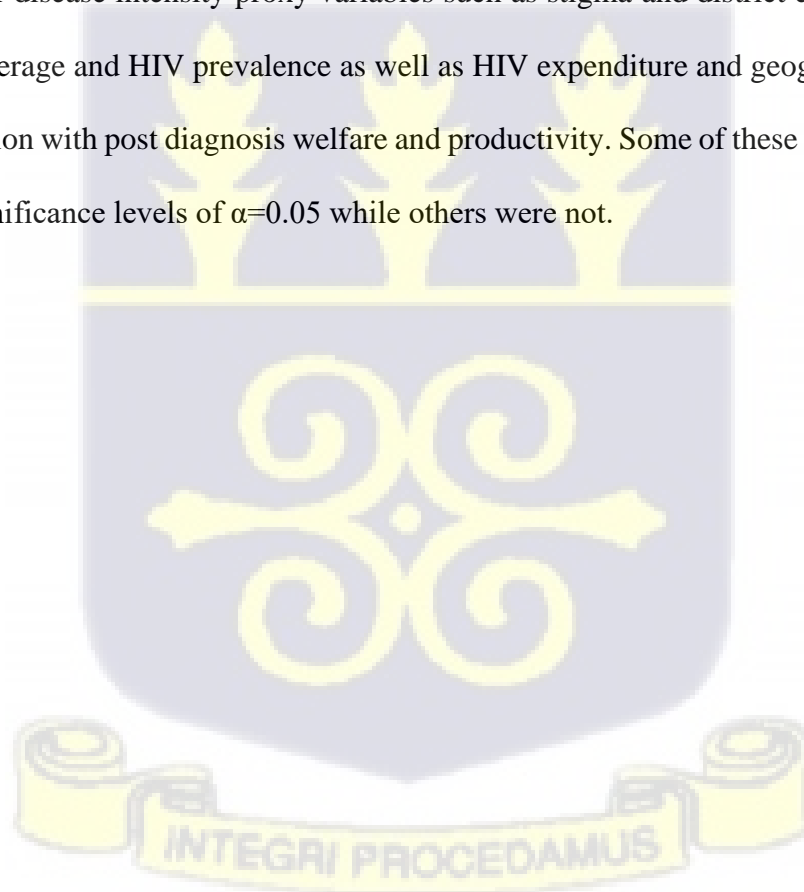


Table 39: Effects of HIV and Covariates on Household Productivity and Welfare

Covariates	Model 1: Welfare		Model 2: Welfare Change		Model 3: Productivity Loss	
	OR	Z-Score	OR	Z-Score	OR	Z-Score
Welfare (Before)	135.4(83.7)	7.9***	1.9(0.7)	1.8*	-----	-----
Welfare (After)	-----	-----	-----	-----	1.0(0.6)	-0.1
Disease Progress	0.6 (0.4)	-0.8	1.4(0.6)	0.9	0.6(0.4)	-0.8
Years PLHIV						
0.2- 02	RC		RC		RC	
03 – 04	1.5(1.0)	0.5	1.2(0.6)	0.4	0.2(0.2)	-1.9**
05 – 08	1.4(0.9)	0.5	1.7(0.7)	1.3	0.4(0.3)	-1.2
09 – 12	2.6(2.1)	1.2	1.4(0.6)	0.7	0.1(0.1)	-2.8***
13 – 31	7.9(6.4)	2.5**	1.6(0.8)	0.9	0.9(0.7)	-0.1
PLHIV Number	1.2(0.3)	1.0	0.9(0.2)	-0.3	1.1(0.3)	0.2
Stigma	0.2(0.2)	-2.0**	0.5(0.2)	-1.7*	1.4(0.8)	0.6
Sex	0.9(0.6)	-0.2	1.5(0.6)	1.1	1.4(1.0)	0.5
Age	1.0(0.0)	-0.5	1.0(0.0)	1.7*	1.0(0.0)	2.1**
Formal Education						
None	RC		RC		RC	
Primary	1.3(1.2)	0.3	0.7(0.3)	-0.8	0.9(0.7)	-0.18
JSS	4.7(4.0)	1.8*	1.8(0.9)	1.2	1.9(1.6)	0.8
SSS	1.6(1.5)	0.5	1.1(0.6)	0.1	2.8(2.5)	1.1
Tertiary	0.7(1.0)	-0.2	0.5(0.4)	-0.9	1.1(1.4)	0.0
Occupation						
Large Busn/Serv/Gov	RC		RC		RC	
Agr/Con/Ptty Bus/Self	0.7(0.5)	-0.4	0.9(0.4)	-0.3	1.1(0.8)	0.1
Transport Worker	-----	-----	-----	-----	-----	-----
Pensr/HWife/Unem/Stud	0.9(0.8)	-0.1	1.5(0.8)	0.7	1.7(1.4)	0.6
Marital Status	0.5(0.3)	-1.1	1.5(0.5)	1.1	1.0(0.6)	-0.0
Household Size	1.0(0.1)	1.0	1.0(0.1)	0.1	1.0(0.1)	0.8
HIV Expenditure	1.2(0.5)	0.6	1.0(0.2)	-0.2	-----	-----
CHE (Non-Food)						
0.00-0.03	RC		RC		RC	
0.03-0.10	0.9(0.7)	-0.1	0.4(0.2)	-1.8*	19.3(21.2)	2.7***
0.10-0.28	0.1(0.1)	-2.2**	0.5(0.3)	-1.2	65.5(75.0)	3.7***
0.28-1.20	0.1(0.2)	-1.7*	0.3(0.2)	-1.6	.2x10 ⁴ (.3x10 ⁴)	5.9***
1.20-80.0	0.2(0.4)	-0.9	0.2(0.2)	-1.5	.5x10 ⁵ (.8x10 ⁵)	6.5***
Settlement	1.2(1.6)	0.1	0.9(0.7)	-0.1	0.2(0.2)	-1.4
Region						
Greater Accra	RC					
Bono	0.5(0.5)	-0.8	0.3(0.2)	-1.9*	29.6(35.2)	2.8***
Bono East	0.2(0.1)	-2.0**	0.1(0.0)	-4.2***	188.7(221.3)	4.5***
Ahafo	.7x10 ⁴ (.3x10 ⁵)	1.7*	.3x10 ⁴ (.1x10 ⁵)	2.3**	.3x10 ⁴ (.1x10 ⁵)	1.6
Upper East	0.2(0.2)	-1.8*	1.0(0.7)	0.0	18.2(18.0)	2.9***
North East	-----	-----	-----	-----	2.6(5.3)	0.5
District ART Coverage	1.3(0.2)	1.6	1.3(0.2)	2.4**	1.3(0.2)	1.5
District HIV Prevalence	0.3(0.2)	-1.6	0.3(0.2)	-2.3**	0.6(0.4)	-0.8
Constant	0.0(0.0)	-1.6	0.0(0.0)	-2.2**	0.0(0.0)	-2.0**
Observations	349		349		358	
LR-X ² (df)/Prob>X ²	(30) 331 /0.00		(30) 172 /0.00		(30) 329 /0.00	
Pseudo R ²	0.69		0.36		0.69	

Source of data: Field Survey (2021)

Standard errors in (), *** P<0.01, ** P<0.05, * P<0.1

Conformity with a-priori theory provided some assurances that the models had been specified correctly. The number of observations in each model (349 – model 1 & 2, 358 – model 3 & 4 and 372-model 5 & 6) as well as the model significance ($\text{Prob} > \chi^2 = 0.0$) provide further assurances that the models are fit for purpose. It is worth noting however that although pseudo R^2 are of secondary importance in logistic regressions only model 4 (disease progression as response variable) denoted a pseudo R^2 which was below the recommended 0.3 threshold per the classical rule of thumb (Gujarati & Porter, 2009)⁶³.

Model 1 results (Table 39) indicate that initial wealth or pre diagnosis welfare (OR 135.4, 99% CI 40.28–455.10; $P = 0.00$) is associated with a greater likelihood of households being well off after HIV diagnosis, while holding all other predictors constant. Thus, households which were deemed less well-off pre-HIV diagnosis were 134 times less likely to be considered well off after HIV diagnosis. This suggests that HIV not only diminishes current consumption but also stymies growth opportunities for affected households as they can neither save nor invest. The direct and indirect costs of the disease quickly trigger intangible costs as illustrated in the findings of the focus group discussion which corroborated model 1 results as follows:

I used all my savings and sold properties when I got diagnosed. I needed money to pay bills and I still owe some people. We have families to feed and children to take care of, any little money we get is “hand to mouth”. Savings is for the rich people. Transportation is my topmost priority because without that, how can I go for my drugs? Now transportation has also increased. If I ever have to save, then it is for my transportation for my drugs.

Male FGD participant Ada

⁶³ Although pseudo R^2 for model 4 was below 3, McKelvey and Zavoina's R^2 was 0.3

If I was wealthy now, do you think I will be this sad. It is because I do not [have money] that is why I'm complaining a lot. Before I got diagnosed, I was rich, but I lost everything due to the disease. I am a contractor, I had lots of businesses, and properties but I lost some and sold some to pay hospital bills. Now I am beyond broke, I cannot even take care of my family as a man should. There have been days that I have cried because I know how it feels to have money. I know that we are supposed to do other tests, but I don't even think about it because I don't have money. The wealthy will not feel it as some of us do because money they say "answereth all things".

Male FGD Participant, Bolgatanga

Model 1 also denotes the deleterious effects of HIV related stigma on PLHIV household welfare (OR 0.25, 95% CI 0.06-0.98; P = 0.01). While holding all other predictors constant, households with sufferers of stigma are 75 percent less likely to be classified as well off than households who do not report any stigma experience.

Length of time lived as PLHIV, formal education, exposure to non-food catastrophic health expenditure and the regions of PLHIV residence were also associated with post diagnosis welfare. With newly diagnosed PLHIV (2 years and below) as reference category, model 1 showed that while holding all other predictors constant, living with HIV for 13 years and above was positively associated with PLHIV households classified as well-off (OR 7.88, 95% CI 1.59-39.08; P = 0.01). Thus, having lived with HIV for 13 years or more increased the odds of a PLHIV being resident in a well-off household by almost 7 times when compared to a newly diagnosed PLHIV.

Using the absence of formal education for the household head as reference category, model 1 showed that while holding all other predictors constant, a PLHIV household where the household head had been exposed to at least 9 years of formal education (JSS) was positively associated with PLHIV households classified as well-off (OR 4.73, 90% CI 0.89-25.07; $P = 0.07$). Thus, having a household head who has been exposed to at least the JSS level of formal secondary school education increased the odds of a PLHIV being resident in a well-off household almost threefold when compared to a household where the household head had never had a formal education experience.

In model 1, the odds of being classified as a well-off household diminished with increasing exposure to non-food catastrophic health expenditure as was noted for the third and fourth non-food CHE quintiles ((OR 0.12, 95% CI 0.02-0.79; $P = 0.03$), (OR 0.14, 95% CI 0.01-1.41; $P = 0.09$)) using the first non-food CHE quintile (burden <0.04) as the reference category. Thus, while holding all other predictors constant, households in the third (burden between 12 percent and 30 percent) and fourth quintiles (burden between 31 percent and 134 percent) were about 88 and 86 percent respectively, less likely to be classified as well-off in comparison to households for whom direct and indirect HIV expenditure was less than 4 percent of total household expenditure.

Model 1 also reflects the association between geographies and the socio-economic status (SES) of PLHIV households comparing the national capital region (Greater Accra) with other regions. The odds of being classified as a well-off household, in comparison to PLHIV households living in the Greater Accra region diminished if households were resident in the Bono East region (OR 0.2, 95% CI 0.02-0.99; $P = 0.049$) or in the Upper East region (OR 0.2, 90% CI 0.04-1.18; $P = 0.076$) while holding all other predictors constant by a magnitude of 85 percent and 80 percent respectively. For PLHIV households resident in the Ahafo region, the odds of being well-off in comparison to PLHIV

households resident in the Greater Accra region increased geometrically (OR 67953.9, 90% CI 0.03-1.8e+08; P = 0.089).

Counterintuitively, marital status, gender, settlement type, occupation and HIV expenditure as well as epidemic markers such as ART coverage and HIV prevalence triggered no sensitivity in household welfare.

Model 2 results (Table 39) were similar in many ways to the results of model 1. They indicated significance for initial SES status or pre diagnosis welfare (OR 1.9, 90% CI 0.96–3.97; P = 0.07). Initial welfare status was associated with the likelihood of households becoming wealthier after HIV diagnosis. Thus, while holding all other predictors constant, households which were deemed better-off pre-HIV diagnosis, were 95 percent more likely to have increased their wealth after the HIV diagnosis.

Under model 2, HIV related stigma retained its deleterious effects on PLHIV households (OR 0.51, 90% CI 0.24-1.1; P = 0.08). While holding all other predictors constant, households with sufferers of stigma are 49 percent less likely to have increased their welfare than households who do not report any stigma experience. The age of the household head also denoted some beneficial effects in terms of wealth accumulation post HIV diagnosis (OR 1.02, 90% CI 1.0-1.05; P = 0.09). While holding all other predictors constant, every additional year in the age of the household head of a PLHIV household resulted in a 2 percent increase in the likelihood of the household being classified as better-off. The relationship between the deleterious effects of stigma and the protective effects of age or time are illustrated in the results of the FGD which corroborate model 2 results as follows:

[...] there are lots of us here who are unemployed, others cannot work due to ill health and those who are employed are faced with stigma so people don't even buy their goods or

services [...]. Most of the people I started with are all dead, but I am alive by the grace of God and the drugs. [...] I believe issues of fear and anxiety usually happen to the newly diagnosed but those of us who have lived with the disease for a long time and are now models have passed that stage.

Female, FGD Participant, Chuchuliga via Sandema

As in model 1, model 2 confirms the diminishing odds of being classified as a well-off household when PLHIV households are exposed to increasing non-food catastrophic health expenditure using the “unexposed” (burden <0.04) cohort as the reference category. In this case, PLHIV households which experienced a burden at the second non-food CHE quintile ($0.03 < \text{burden} < 0.10$) denoted a 58 percent decline in the likelihood of being classified as well-off in terms of welfare improvements, while holding all other predictors constant and in comparison to the unexposed cohort or PLHIV households which did not experience any HIV burden (OR 0.42, 90% CI 0.16-1.08; $P = 0.07$).

Regional and epidemiological differentials in the aetiology of welfare improvements were also noted in model 2. When compared to the national capital (Greater Accra region) and while holding all other predictors constant, PLHIV households resident in the Ahafo region were 3,437 times more likely to have grown wealthier than they were before they got diagnosed with HIV (OR 3438.27, 95% CI 3.78-31.38; $P = 0.02$). Similarly, every additional percentage point increase in the district ART coverage increased the likelihood that PLHIV households living in the district would have grown wealthier than they were before they were tested for HIV by 34 percent (OR 1.34, 95% CI 1.06-1.69; $P = 0.02$).

Conversely, PLHIV households located in the Bono and Bono East regions when compared to the Greater Accra region and while holding all other predictors constant were 74 percent (OR 0.26, 90% CI 0.06-1.02; P = 0.05) and 92 percent (OR 0.08, 99% CI 0.02-0.25; P = 0.00) less likely to have grown wealthier after HIV diagnosis. Similarly, an increase by one percentage point in the district HIV prevalence was associated with a 66 percent decline in the likelihood that PLHIV households who access ART within that district would be classified as having improved their welfare status after their HIV diagnosis (OR 0.34, 95% CI 0.14-0.85; P = 0.02).

Counterintuitively, longevity as PLHIV, marital status, household size, Number of PLHIV living in household, gender, settlement type, occupation and HIV expenditure as well as the household head's level of education triggered no household welfare changes.

Model 3 (Table 39) addresses productivity loss. Longevity as PLHIV provided some protective effects from productivity loss for households in the second⁶⁴ (OR 0.21, 90% CI 0.04-1.08; P = 0.06) and fourth⁶⁵ (OR 0.11, 99% CI 0.02-0.53; P = 0.01) PLHIV longevity quintiles in comparison to PLHIV who had been diagnosed less than 24 months earlier. While holding all other predictive variables constant, membership in the afore mentioned quintiles reduced the likelihood of incurring productivity losses by 79 percent and 89 percent respectively in comparison to newly diagnosed PLHIV.

Deleterious effects on productivity were noted in model 3, for age (OR 1.04, 95% CI 1.00-1.08; P = 0.04), as an increase in the age of PLHIV by one year was associated with an increase in the likelihood of productivity loss by 4 percent while holding all other predictors constant. Similarly, exposure to non-food CHE was associated with a likelihood of productivity loss which was 18 times

⁶⁴ 3 to 4 years since HIV diagnosis

⁶⁵ 9 to 12 years since HIV diagnosis

(2nd quintile), 64 times (3rd quintile), 2.1e4 times (4th quintile) and 4.9e4 times (5th quintile) higher, when compared to PLHIV households who experienced an HIV expenditure burden below 4 percent of household expenditure (unexposed). In model 3, deleterious productivity effects were also triggered by respondents' region of residence such that residence in Bono (OR 29.56, 99% CI 2.87-304.29; P = 0.00), Bono East (OR 188.72, 99% CI 18.94-1.8e3; P = 0.00) and Upper East (OR 18.16, 99% CI 2.61-126.14; P = 0.00) was 28, 18 and 17 time more likely to trigger higher productivity losses than residence in the Greater Accra region while holding all other predictors constant.

Counterintuitively, the number of PLHIV living in the household, marital status, household size, gender, stigma, settlement type, occupation and the household head's level of education as well as ART coverage and HIV prevalence within the district triggered no productivity changes for households. The results of model 3 on stigma are corroborated by the FGD where participants acknowledge job losses but are uncertain if the cause of their joblessness is HIV related stigma from the general population while others believe that stigma, anxiety and fear are transient and cannot be accountable for long term productivity losses or unemployment:

My main problem is the unemployment that comes with the stigma. It makes me think a lot and I am sure I am not the only one. In fact, if there is anything that worries me a lot then it is the fact that I am not getting a job. It is not even the disease itself because I'm taking my drugs and I feel better, but I don't have a job, my customers are rejecting me. How can I get money to cater for my family?

Male. FGD Participant, Bolgatanga

This disease is really costing some of us in terms of finding jobs and I personally blame it on the doctors we meet at the facility. I say they are incompetent. They are the same people who expose us to others, otherwise how will people know about another person's HIV status. Why will my customers reject me as a contractor if they do not know I am PLHIV?

Male. FGD Participant, Bolgatanga

FGD respondents posit that although inbound stigma may be prevalent, particularly within more rural geographies, it is common primarily for the newly diagnosed and occupations which entail selling food and beverages. FGD participants also note that unlawful disclosure even by health professionals is not unusual and hold that to be a greater threat to PLHIV productivity than inbound stigma from the general population. Consequently, they believe that stigma should not impede the ability of PLHIV to obtain and maintain employment subject to the above limitations. This accounts for the lack of responsiveness of productivity losses to the stigma variable in model 3.

Model 4 (Table 40) was focused on isolating predictors of disease progress or disease intensity with the expectation that this could illuminate potential paths to address the economic burden of HIV. Results showed that in comparison to PLHIV households where the household head had not completed any level of formal education, PLHIV households where the head of household had completed 12 years of formal education (SSS) were four times more likely to experience adverse disease intensity or outcomes (OR 5.2, 95% CI 1.4-18.9; P = 0.01). Similarly, using the Greater Accra region as the reference category, residency in the Northeast (OR 7.6, 95% CI 1.2-47.6; P = 0.03) and Upper East (OR 2.7, 90% CI 1.0-7.8; P = 0.06) regions were associated with a greater

likelihood of experiencing adverse disease outcomes (about 7 and 2 times more, for the Northeast and Upper East regions respectively) while holding all other predictors constant. PLHIV residence in the Bono (OR 0.3, 90% CI 0.1-1.2; P = 0.09) region was also associated with about 70 percent lower odds of experiencing adverse disease outcomes in comparison to PLHIV resident in the Greater Accra region, while holding all other predictors constant.



Table 40: Determinants of Disease Progression and Catastrophic Health Expenditure

Covariates	Model 4: Disease Progn.		Model 5: CHE Non-Food		Model 6: CHE Total	
	OR	Z-Score	OR	Z-Score	OR	Z-Score
Welfare (Before)	2.4(1.5)	1.4	-----	-----	-----	-----
Welfare (After)	0.6(0.4)	-0.8	0.8(0.4)	-0.4	1.5(1.0)	0.6
Disease Progress	-----	-----	0.7(0.4)	-0.6	1.4(1.0)	0.5
Years PLHIV						
0.2- 02	RC		RC		RC	
03 – 04	2.0(0.9)	1.5	2.3(1.4)	1.4	1.4(1.0)	0.5
05 – 08	0.8(0.4)	-0.4	1.7(0.9)	1.0	1.2(0.8)	0.3
09 – 12	0.7(0.4)	-0.8	1.0(0.6)	0.0	0.4(0.3)	-1.4
13 – 31	0.6(0.4)	-0.8	0.8(0.5)	-0.3	0.4(0.3)	-1.2
PLHIV Number	0.6(0.2)	-1.5	1.0(0.2)	0.0	0.9(0.2)	-0.4
Stigma	0.7(0.3)	-0.8	3.0(1.5)	2.1**	2.2(1.2)	1.4
Sex	0.7(0.3)	-0.9	1.4(0.7)	0.6	2.6(1.5)	1.6
Age	1.0(0.0)	0.3	1.0(0.0)	-1.7*	1.0(0.0)	-0.7
Formal Education						
None	RC		RC		RC	
Primary	1.8(1.1)	1.0	2.7(1.9)	1.5	0.9(0.7)	-0.1
JSS	2.3(1.4)	1.3	1.3(0.9)	0.4	1.6(1.1)	0.6
SSS	5.2(3.4)	2.5**	2.0(1.7)	1.0	4.6(4.2)	1.7
Tertiary	0.8(1.0)	-0.1	2.5(2.9)	0.9	3.5(4.1)	1.1
Occupation						
Large Busn/Serv/Gov	RC		RC		RC	
Agr/Con/Ptty Bus/Self	1.3(0.6)	0.6	3.1(2.2)	1.7*	1.9(1.5)	0.8
Transport Worker	-----	-----	14.6(22.9)	1.7*	52.4(90.2)	2.3**
Pensr/HWife/Unem/Stud	1.2(0.6)	0.3	10.1(8.0)	2.9***	5.7(5.2)	1.9*
Marital Status	0.9(0.3)	-0.2	1.2(0.6)	0.4	0.3(0.2)	-1.9*
Household Size	1.1(0.1)	1.5	0.9(0.1)	-0.9	1.0(0.1)	0.1
HIV Expenditure	1.1(0.3)	0.5	10.5(2.8)	8.3***	20.1(7.8)	7.7***
CHE (Non-Food)	0.9(0.2)	-0.3				
Settlement	1.3(0.7)	0.6	2.4(1.9)	0.9	0.9(1.0)	-0.12
Region						
Greater Accra	RC		RC		RC	
Bono	0.3(0.2)	-1.7*	2.6(2.3)	1.0	4.5(5.2)	1.3
Bono East	0.4(0.4)	-1.0	3.1(2.5)	1.4	14.5(14.6)	2.7***
Ahafo	1.3(0.9)	0.4	0.0(0.0)	-2.1**	0.0(0.0)	-3.1***
Upper East	2.7(1.5)	1.9*	1.4(1.4)	0.5	5.4(6.2)	1.5
North East	7.6(7.1)	2.2**	2.5(4.3)	0.3	16.6(29.1)	1.6
District ART Coverage	-----	-----	0.7(0.1)	-2.1**	0.5(0.1)	-3.3***
District HIV Prevalence	-----	-----	2.9(1.7)	1.8*	7.2(5.3)	2.7***
Constant	0.1(0.1)	-1.6	7291.7(7x10 ⁵)	0.9	1.9x10 ¹¹ (2.4x10 ¹²)	2.1**
Observations	358		372		372	
LR X ² /Prob>X ² /	(26) 39/0.04		(28) 302 /0.00		(27) 333 /0.00	
Pseudo R ²	0.13 ⁶⁶		0.61		0.69	

Source of data: Field Survey (2021) Standard errors in (), *** P<0.01, ** P<0.05, * P<0.1

⁶⁶ McKelvey and Zavoina's R²=0.3

Model 5 and model 6 (Table 40) explore the drivers of the economic burden of HIV. Both models consistently identify occupation and region of residence of PLHIV household as significant predictors of catastrophic health expenditure.

Model 5 results showed that while holding all other predictors constant and in comparison to large businesses, the service sector and government services which have better established employee protection and standardised labour practices, PLHIV households whose household heads were retired, students, housewives or unemployed (OR 10.07, 99% CI 2.1-48.0; $P = 0.00$), transport workers (OR 14.6, 90% CI 0.7-313.9; $P = 0.09$) or in construction/agriculture or self-employed (OR 3.1, 90% CI 0.8-12.1; $P = 0.1$) were more likely to experience non-food catastrophic health expenditure. The magnitude of exposure to non-food CHE was 9, thirteen and 2 times respectively, more than households whose household heads were employed in the large business, service and government sectors.

For catastrophic health expenditure in general (model 6), while holding all other predictors constant and in comparison to households whose household heads were employed in the more stable large business/government service sector, occupation within the transportation sector (OR 52.4, 95% CI 1.8-1.5e3; $P = 0.02$) and retiree/unemployed/housewife status (OR 5.7, 90% CI 1.0-23.5; $P = 0.05$) were predictive, by a magnitude of 51 and 4 times respectively, of a higher exposure to CHE.

Similarly, under model 6, while keeping all other predictors constant and in comparison with the households resident in the Greater Accra region, households resident in the Bono East region were 13 times more likely to experience CHE in general (OR 14.5, 99% CI 2.0-104.8; $P = 0.00$). Under the same reference category (residence in Greater Accra) and while holding all other predictors constant, residence in the Ahafo region predicted a lower likelihood of experiencing CHE in both

model 5 (OR 0.0, 95% CI 0.0-0.5; $P = 0.03$) and model 6 (OR 0.0, 99% CI 0.0-0.003; $P = 0.00$) although the odds ratios were almost nil.

For stigma (OR 3.0, 95% CI 1.1-8.3; $P = 0.03$), HIV expenditure quintiles (OR 10.4, 99% CI 6.0-18.2; $P = 0.00$), and HIV prevalence (OR 2.9, 90% CI 0.9-9.2; $P = 0.07$), increases in exposure by one unit led to increases in exposure to non-food catastrophic health expenditure while holding all other predictors constant by a magnitude of 2, 9 and about 2 times respectively. Increases in age (OR 1.0, 90% CI 0.9-1.0; $P = 0.08$), and ART coverage (OR 0.7, 95% CI 0.5-1.0; $P = 0.04$), conversely expressed a 3 percent and a 27 percent less likelihood respectively, of being associated with exposure to non-food CHE (model 5) while holding all other predictors constant.

Marital status (OR 0.3, 90% CI 0.1-1.0; $P = 0.05$) and ART coverage (OR 0.5, 99% CI 0.4-0.8; $P = 0.00$) in model 6 also expressed 67 percent and 47 percent less likelihood respectively, of being associated with catastrophic health expenditure in general, while holding all other predictors constant. As expected, HIV expenditure quintiles (OR 20.1, 99% CI 9.3-43.1; $P = 0.00$) and HIV prevalence (OR 7.1, 99% CI 1.7-30.2; $P = 0.00$) in model 6 were associated with CHE in general such that increasing them by one unit was associated with 19 times and 6 times greater likelihood respectively, of PLHIV households experiencing CHE in general while holding all other predictors constant.

Counterintuitively, model 5 denoted that the number of PLHIV living in the household as well as their longevity as PLHIV, SES, marital status, household size, gender, settlement type, and the household head's level of education triggered no non-food CHE changes for households.

Similar counterintuitive scenarios held sway under model 6 where SES, longevity as PLHIV, number of PLHIV living in the same household, household size, settlement, stigma, gender, age, and the household head's level of education triggered no CHE in general.

5.8 Discussion

The findings of the household survey reveal that several PLHIV households routinely experienced demands of HIV treatment and care which exceeded household income. Significant variability in household productivity and welfare, driven by various socio-economic and epidemic differentials were noted. Indeed, initial wealth status (SES), the age of PLHIV households as well as the longevity of PLHIV and ART coverage illustrated protective effects on household welfare.

The protective effects of initial wealth were such that households classified as wealthier before HIV diagnosis were only about 10 percent more likely than households classified as not well-off to have experienced welfare decadence, post diagnosis. This is significant because many households regardless of SES typically exhausted all available resources seeking help from multiple sources including prayer camps before resigning themselves to the reality of their HIV status. This key delay was accountable for the devastation of household welfare subject to the margins of manoeuvre afforded households by their initial wealth status. The welfare outcomes of HIV infection are in conformity with Grossman's health capital theory (Grossman, 1972) as it demonstrates that households which were empowered (due to better SES) to invest in the durable capital stock (pre diagnosis health status) which they were endowed with, continued to produce an output of relatively "healthy⁶⁷" time, diminished only by age (as noted in model 3 where productivity loss increased with the age of the PLHIV household head). PLHIV households which were less well-off were

⁶⁷ Subject to ART success

therefore unable to make the necessary investments which protect and grow the initial stock of health even under the national donor funded ART program. As predicted in literature, HIV diminishes the ability of households to absorb and grow resources (Titus J Galama & Van Kippersluis, 2019; Rugalema, 1998). Households which are economically vulnerable are, understandably then pushed to engage in risky behaviour, exacerbated by intangible costs such as pain, anxiety and other drivers of depression leading to self-harm. Undoubtedly, one of the pillars of the SDG, UHC is violated, as vulnerable PLHIV households are not protected from financial hardship in seeking access to care (MoH, 2019).

As denoted in the illustration of the conceptual framework (**Figure 4**), the circular flow of HIV effects is initiated by SES and risky sexual behaviour. This study confirms this relationship and reinforces the view that the effects flow through direct and indirect costs as well as intangible costs which in turn influence household and national welfare and productivity, through the success or failure of the national HIV and AIDS epidemic response. The epidemic response triggers a feedback loop which is either protective of PLHIV households and therefore inhibitive of prevalence or fails to promote HIV prevention and treatment with results which include an escalation in the number of people living with HIV. The association between low socio-economic status and the sub-optimal epidemic response in Ghana is confirmed in this study.

Investments in ART coverage also illustrated welfare protective effects in line with a-priori theory because the multiplication of ART centres which enhance proximity and access to PLHIV households including free HAART and transportation support, contribute significantly to adherence and therefore viral suppression. The association between ART coverage and improved welfare outcomes is also indicative of the effects of direct costs of HIV on household welfare and the opportunity which still exists for Ghana to make good on its UHC promise of mitigating

household's exposure to poverty from health shocks (MoH, 2019). In other words, although ART services (professional care and ARV) are donor funded and therefore free, direct costs such as nutrition and transportation still constitute a barrier to treatment adherence and therapeutic success.

Deleterious household welfare effects were catalysed by HIV prevalence, stigma, CHE, Occupation and HIV expenditure. This is understandable since increasing HIV prevalence heralds a greater demand on local treatment and care resources including direct out of pocket costs. Similarly, catastrophic health expenditure is associated with increasing cost of treatment particularly if the treatment costs are not circumscribed by some comprehensive health and social protection mechanism as is common with large and formal employers who may offer PLHIV, comprehensive health insurance plans, sick leave, and sick pay.

Although stigma was predictive of household welfare, no direct effects were discernible linking stigma to productivity losses. This may be related to the high levels of non-disclosure and the resilience of households which successfully identified alternate support structures to continue existing. It is noted that although job losses attributable to stigma and discrimination are circumscribed to the newly diagnosed in general and are applicable to about a tenth of the respondents, the cost of non-disclosure and survival within communities is significant. Anecdotal evidence of sharp declines in sero-discordant couples in recent years abounds.

Household productivity was enhanced as PLHIV households survived over time, learning how to navigate the stigma and CHE bottlenecks which HIV and society has saddled them with. There appears to be very little hope that change is possible under the current disposition. It may seem from a structural functionalist perspective that the tension is not sufficiently intense as the HIV burden is regressive, afflicting the poor and the voiceless much more than it does the well-off (Tsai,

2015). Productivity losses in this study were insensitive to traditional protections such as occupation, formal education, marriage, gender, stigma as well as ART coverage and HIV prevalence (Adedigba et al., 2009). This suggests that the existing policy framework may have maximised its potential for change and portends the need for an added impetus targeting the remnants of stigma as well as scaling up social protection for PLHIV.

The survey respondents were exclusively comprised of PLHIV on ART and therefore reported very few illness episodes for which they could recollect length of bout and intensity or symptoms (below 10 percent). After all, the ART routines are designed to secure PLHIV health by rebuilding and protecting their immune systems. The frequency of the reported illness bouts was surprisingly lower than expected for some conditions such as gastroenterological, dermatological and respiratory illness while malaria, fatigue and anaemia were much higher (almost double) than one would expect given the major causes of morbidity in the country as reported by the Ghana Health Service (2018) and the sector ministry (MOH, 2022a). Respondents (10 percent) reporting the higher-than-normal malaria and fatigue related conditions appear to reflect the percentage of PLHIV who are yet to achieve viral suppression (see Table 22: Therapeutic success - 2021). This may support the view that reports of illness in this study are more likely to be HIV related than not.

Additional evidence of the adequacy of the survey design which excludes non PLHIV households, may be gleaned from the following points: first, the transportation costs detailed in Table 29 and Table 30 appear to reflect the recommended frequency for ARV refills as mandated by NACP (2019b)⁶⁸. The ART guideline recommends frequency of refills below or equal to 4 times a year for stable clients or clients experiencing viral suppression. Almost 9 in 10 respondents in this survey

⁶⁸ According to NACP, refills of ARV are to be done every 3 months or more for stable clients.

fell within this category per their self-reporting. At annual median transport costs of about GHS20 for both hospitalised and non-hospitalised illness, it appears that PLHIV health facility exposure may be restricted to the refill frequencies.⁶⁹ The second point which supports the choice of PLHIV-only respondents is the fact that the annualised median cost of routine monthly ART expenditure outweighs the median annual illness expenditure of PLHIV households.⁷⁰ This further corroborates the view that, the recollection of illness may be HIV related or to be more specific, ART related. Nonetheless, the above points do not eliminate entirely the possibility of other non-HIV conditions being expressed under the annual illness costs of households.

The relative wellness of the respondents (less than a quarter reported illness of any kind in the one month preceding the survey) is not unexpected as many PLHIV receive prophylactic medicines to help them stay healthy. This may be reflective of the success of the ART program. Thus, increased adherence or health system exposure/access may contribute to lower overall health expenditure, given the reduction in the frequency of opportunistic infections. This is a lesson that could be replicated to the general population.

The state of health of respondent households could also be attributable to some noticeable improvements in the living conditions of PLHIV households. A proxy for knowledge and awareness (exposure to senior secondary school) was also associated with therapeutic success (model 4)

⁶⁹ In-depth interview respondent #5 indicates that transport fares have increased from GHS7 to GHS16 per return trip. This means that it is fair to assume that transport fares range from GHS3 to GHS8 each way. This suggests that at GHS20 median costs for annual illness cost estimates, PLHIV may be visiting facilities only twice a year. This coincides with the refill frequency in practice (every 6 months) following NACP's ART treatment guideline update in 2019 for stable PLHIV.

⁷⁰ See Table 29: Annual health expenditure, hospitalised and non-hospitalised - 2021 & Table 30: Routine Monthly ART Expenditure

suggesting that there is potential for improvement in the quality of client engagement and counselling as well as overall compliance with the national ART guidelines in general.

Half of PLHIV households experienced improvements in their welfare status (Table 38). This improvement is reflective of the overall buoyancy of Ghana's economy which outperformed its west African neighbours consistently over the past 5 years driven mainly by significant FDI flows into the upstream and downstream oil sectors, financial services and construction (AfDB, 2021). There was a noticeable decline in the number of respondents who experienced the promiscuity of compound housing between the pre-diagnosis and post diagnosis state (44 to 38 percent). Access to clean water also improved for the average PLHIV household with the use of lakes and open ponds declining from 3 to 2 percent as well as the patronage of public standpipes declining from 32 to 30 percent.

The self-preserving efforts undertaken by PLHIV households following their HIV diagnosis was also noticeable through the decline in the use of KVIP toilets from 44 to 37 percent and the incline in the use of the flush system toilet from 32 to 39 percent.

The apparent improvement in the living conditions of PLHIV households noted above may speak to the scope of welfare improvements but it hardly addresses the price which PLHIV households must pay to survive within an environment which they legitimately expect to support their recovery and sustain their wellness. The logistic regression results lifted the veil on the aetiology of the welfare and productivity characteristics of PLHIV households, bringing front and centre, articles 34 and 35 of Ghana's 1992 constitution and society's appetite for universal health coverage (Republic of Ghana, 1992, p. 31).

5.9 Conclusion

This chapter has illustrated that HIV exacts a significant burden on households in Ghana. An overwhelming majority (about 3 quarters) of all PLHIV households report varying levels of deleterious effects catalysed by HIV prevalence and mitigated by ART coverage. Households spent most of their income on food, a trend which is consistent with previous OOP and food security studies suggesting that nutrition as treatment, is an abiding theme requiring urgent policy attention due to the related adherence and drug resistance risks.

Although women living with HIV incurred higher medical costs than men, total annual direct expenditure was a third lower for women by average and sex invariant by median. The epidemic may be gender sensitive, but its economic impact is not. Urban locations incurred higher costs than rural locations although rural locations experienced greater CHE. As terminal welfare was not associated with CHE, the view that severe economic hardship occurs among PLHIV households irrespective of their wealth status is verified. Catastrophic health expenditure headcount ratio remains significant (more than a third for both thresholds) and compromises the resilience of PLHIV households.

Households are committed to their own welfare and express their agency wherever possible. SES is significantly explicative of HIV induced welfare changes but insensitive to productivity. Many households had exhausted their support mechanisms and relationships suggesting the need for policy interventions to mitigate the economic effects of HIV by addressing stigma and social protection.

At GHS1,508 per year, median indirect costs exceed direct costs by a factor of 3. This speaks to the persistence of stigma in Ghana. Stigma has declined by about a third over the decade, particularly

in-bound stigma and at 27 percent is still significant enough to keep indirect costs much higher than direct costs. Stigma and related coping strategies are more intense proximate to HIV diagnosis. Corrosive coping practices include commercial sex work and begging and tend to peter out with increases in survival rates. NHIS was seen to provide very little protection from CHE even though an overwhelming number of PLHIV were enrolled onto the NHIS, savings and ability to save declined while family support accounted for only 22 percent of succour for households. This suggests that PLHIV households may be running out of coping resources to alleviate their plight. The disease related economic exhaustion of households has dire consequences for adherence, drug resistance, disease progression and epidemic control.



CHAPTER SIX

UNIT COSTS FOR HIV AND AIDS TREATMENT AND CARE

6.1 Introduction

This chapter presents a unit cost perspective of the economic burden of HIV from a comprehensive cost or societal outlook. The unit costs presented combine secondary institutional data, and the current household study to gauge output efficiency in the production of positive life years for affected households.

6.2 Approach to comprehensive costing

Kennedy (1997); Rajan and Reichelstein (2009); Spencer (1994) together explain how production efficiency may be attained by comparing historical average costs to marginal costs in the short run keeping in mind that inefficiencies embedded in fixed cost centres may not be easily changed. A similar approach which scours the HIV funding landscape via secondary data, including institutional performance reports such as the financial statements and annual reports of sector ministries and donors including the NASA (GAC, 2022a) and other published sources for HIV relevant institutions (policy, health, education and social protection) and their expenditure was implemented to identify fixed and overhead costs as well as variable costs through the use of coverage data.

A comprehensive institutional unit cost which when merged with household out of pocket unit costs, would constitute the comprehensive unit cost of HIV in Ghana was obtained. When computed over time this total cost which includes variable and fixed costs may be filtered to identify the cost of providing an enabling environment to one additional PLHIV and thus extract the marginal cost of HIV in Ghana, a possible key performance indicator worthy of tracking.

This approach could potentially be used in tandem with the annual sentinel survey or the national estimates report to measure the cost effectiveness and efficiency of Ghana's response to HIV and AIDS.

6.3 Institutional Costs of HIV and AIDS in Ghana

There are two main methods for estimating health expenditure for HIV and AIDS. These are the System of Health Accounts (SHA) and the National AIDS Spending Assessment (NASA). Whereas the SHA, also called the National Health Accounts (NHA) is an international accounting framework which systematically tracks health expenditure regardless of disease, the NASA framework focuses on HIV and AIDS.

In Ghana the most frequent of the approaches has been the NASA (GAC, 2020a). The NASA aggregates household out of pocket payments and all institutional prevention, treatment and mitigation expenditure as well as the necessary overheads, synergistic and enabling environment investments.

As indicated earlier, due to the frequency of the NASA study, previous NASA reports were used to identify data sources of interest. Institutions which accounted for the overwhelming majority of institutional costs were identified for secondary data collection. The institutions included the Ministry of Health, Ministry of Education, Ministry of Gender, Children and Social Protection and the Ghana AIDS Commission. Donor institutions such as the Global Fund and the US government were also key funding partners over the past decade and were targeted to establish the institutional cost of HIV in Ghana (GAC, 2014b, 2016a, 2020a).

The US government's investment in Ghana's national response to HIV and AIDS is driven by the President's Emergency Plan for AIDS Research (PEPFAR). Under the west and central Africa

regional operational plan, Ghana's Country Operational Plan (COP) has averaged about US\$10 million per year with a median around US\$8 million in allocations while actual expenditure averaged US\$8.5 million per annum in the six years to 2021 (The American Foundation for AIDS Research [amFAR], 2022). The actual expenditure for 2021 was however reported at US\$5,948,561 and was deployed to finance the bilateral flagship HIV and AIDS project, a community monitoring mechanism and a global health supply chain procurement and supply management award.

Disbursements from The Global Fund to fight AIDS Tuberculosis and Malaria (GFATM) under the current round of funding under the new funding model (NFM3) totalled US\$10,285,732, US\$11,921,558 and US\$83,129,112 for the West African Program to Combat AIDS and STI (WAPCAS), the Christian Health Association of Ghana (CHAG) and the Ministry of Health, respectively (GFATM, 2022). These amounts were apportioned equally to year 2021 and 2022 to reflect the two years already consumed within the three-year allocation period (2021-2023). The allocations were also earmarked for key populations (WAPCAS), community mobilisation (CHAG) and treatment and care services (MoH), respectively. The disbursement to the Ministry of Health was inclusive of tuberculosis investments so the traditional country allocation and program split ratio between tuberculosis⁷¹ and HIV was used to apportion HIV specific disbursements to MoH before apportioning the disbursement over years 2021 and 2022 (Edington, 2016). Allocations for the three principal recipients for 2021 thus reflected US\$5,142,866, US\$5,960,779 and US\$31,173,417 for WAPCAS, CHAG and MoH, respectively. Total expenditure from the Global Fund towards HIV in Ghana for year 2021 thus amounted to US\$42,277,062.

⁷¹ Tuberculosis is typically 25% of joint grants, see allocation letter for NFM3

Institutional costs of HIV in Ghana also included some mitigation investments from the British Department for International Development (DFID) and the World Bank with a 50 percent matching financing from the government of Ghana under the Livelihood Empowerment Against Poverty (LEAP) project, a social cash transfer program (Akweongo et al., 2022, p. 2; GAC, 2021b, p. 64).

According to the United Nations' Children Fund (2021b), even though its investments in social protection in general are below 1 percent of GDP⁷² and lower than the ratio for low income countries, Ghana has a strong social protection framework with a basis in social cash transfers (LEAP), school feeding (Ghana School Feeding Program - GSFP), school fee waivers and subsidies, public works (Labour Intensive Public Works - LIPW), health insurance (NHIS) and disability support. The LEAP and the NHIS were flagged to proxy social protection investments for HIV and AIDS as recommended by GAC (2016b). For the year 2021 Ghana government's 2021 investment in LEAP affected 344,023 households with an additional payment to enrol 76 percent of LEAP beneficiary households on the NHIS (Ghana Government, 2021). A study by NACP (2019a) provided further guidance on the nexus between HIV and the orphans and vulnerable children (OVC) who are expected to be primary beneficiaries of the LEAP program. The study noted that 1 percent of orphans were PLHIV, and this proxy was used to apportion HIV related LEAP investments. The current study revealed that households in Ghana have on average only one PLHIV and therefore the bi-monthly payment rate (GHS64) for households with one vulnerable person was used. This figure was multiplied by the HIV prevalence among OVC to estimate the HIV related institutional cost outlay from LEAP expenditure (Citi, 2022). This economic mitigation expenditure amounted to US\$230,549 for the year 2021. The NHIS investments were not included

⁷² Middle Income countries range between 6.7% and 8.7% (UNICEF,2021)

to avoid double counting as health insurance premiums are merely an advance on expenditure which was incurred and reported by the Ministry of Health and other health facilities.

HIV related expenditure primarily focused on behaviour change and prevention activities in the educational sector and were primarily driven by the school health education program (SHEP). However, cultural, didactic and funding challenges particularly following the withdrawal of non-state actors, resulted in Ghana's inability to continue to expose pre-tertiary learners to sufficient prevention and behaviour change messaging (Ocran, 2021). In 2021, 62.9 percent of all schools from the basic to the SHS level infused HIV and AIDS examples and prevention messaging into their lesson notes (Arku, 2022). Weiler and Martin-Weiler (2012) however noted through a year-long teacher trainee study in Ghana that only about 25 percent of classrooms experienced multiple occurrences (routine) of HIV learning and/or HIV infusion in their learning plans. They found that the frequency of HIV infusion was nil or below two (2) for about 75 percent of schools. The weight of HIV infusion was obtained in a three-step process.

First, "infusion" of HIV suggested that HIV would be present throughout the curriculum as much as possible. Thus, sector respondents agreed that of the six hours of tutelage available to learners each day, one sixth (17 percent) was attributable to HIV prevention exposure (Arku, 2022). Nonetheless, because only 25 percent of these interactions were multiple in nature, the weight of the prevention messaging under the SHEP was further discounted by 75 percent resulting in a prevention footprint of 4 percent. This constituted the second step in ascertaining the weight of HIV infusion.

The third step applied the weight of HIV infusion obtained in steps I and 2 above as a factor of the relevant education service compensation expenditure for the year 2021. About fifteen percent of

the Ministry of Education's budget in 2021 was allocated to the pre junior high school level while 19 percent was allocated to the tertiary level (Acquah, 2021; UNICEF, 2021a). This suggests that junior and senior high schools which hold the in-school youth under the SHEP program accounted for 66 percent of the compensation expenditure of the Ministry of Education.

A further two-step layer was employed which discounted compensation expenditure of the Ministry of Education to reflect only the 207,972 teachers who were dedicated to the secondary level in 2020 (Sasu, 2021). This staff strength was maintained for the year 2021 as recruitments in the sector have plateaued after an initial spike to accommodate the free SHS program. The discount factor was 53 percent given that the total workforce of the sector ministry was 393,821 for year 2021 (Government, 2020; Sasu, 2021). As a final step, guidance from Arku (2022) was used to set a time box of 15 minutes out of the 360 minutes (6 hours) available for learning during the school day, within which examples and activities to aid HIV infusion during classroom lessons would be completed. The discount factor on this second step was 4 percent.

Consequently, the total sector outlay for compensation in 2021 at the Ministry of Education which was GHS 10,412,416,118 (Government, 2020) was discounted to reflect only 0.06 percent⁷³, producing US\$1,099,574 as Ghana government's investment into prevention and behaviour change for in school youth.

Public sector investments for treatment and care of the entire disease burden in Ghana for year 2021 totalled GHS11.998 billion including provision for depreciation which was proxied by maintenance

⁷³ (4 percent x 66 percent x 53 percent x 4 percent) = 0.000605; exchange rate of US\$1 = 5.73

costs amounting to 10 percent of non-current assets (MOH, 2022b)⁷⁴. Since the major donor funding sources for HIV (US government and the global fund) have already been factored into the institutional funding model, a coefficient representing donor funding (11.6 percent) was deducted as a first step in identifying HIV treatment and care costs borne by the ministry of health. Subsequently a 17.4 percent factor was removed to account for user fees (internally generated funds – IGF) paid by households (MOH, 2022b; UNAIDS, 2019; WHO, 2009). Finally, the disease prevalence factor (1.67 percent) was added to obtain US\$25,387,050 as the total treatment and care expenditure borne by the Ministry of Health in 2021, 56.9 percent of which was allocated to human resources (GAC, 2022b). Institutional treatment and care costs for 2021 amount to US\$42.1 million when global fund contributions (US\$31.2) are combined with public sector contributions.

Institutional expenditure was also incurred for HIV by the Ghana AIDS Commission and the District Assemblies Common Fund (DACF). Whereas secondary data were easily accessible from the Ghana AIDS Commission, it was more difficult to obtain records allocating resources to the decentralised agencies with detailed reporting on HIV and AIDS key performance indicators. This impediment in addition to materiality concerns accounted for the elimination of DACF data from the institutional data set (GAC, 2020b). For the year 2021 the Ghana AIDS Commission spent US\$2,517,467 coordinating the national response to HIV and AIDS in Ghana (Kpogo, 2022).

The total institutional cost was therefore US\$77,460,263.19 and summarised as follows (see Table 41):



⁷⁴ 10% maintenance charge was obtained by averaging the weights of materials and consumables (20%) as well as repair and maintenance (0.1%) with respect to non-current assets less current year additions. Current year additions are removed since depreciation does not occur in the year of capitalisation.

Table 41: Institutional Cost of HIV in Ghana - 2021

No	Intervention Areas	Amount	Lead Institutions
1	Human Resources	14,449,872.92	Ministry of Health
2	OVC – Mitigation	230,549.00	Ministry of Gender, Children & Social Protection
3	Treatment & Care	42,110,594.24	Ministry of Health, GFATM
4	Key Populations	5,142,866.00	GFATM
5	Community Mobilisation	11,909,340.00	USG, GFATM
6	In School – Youth Prevention	1,099,574.00	Ministry of Education
7	Coordination	2,517,467.00	Ghana AIDS Commission
	Total	77,460,263.19	

Source of data: Field Survey and Desk Review (2021)

Paediatric and adult ART coverage were estimated at 73.26 percent and 43.3 percent respectively for populations that amounted to 319,021 (age 15+) and 26,578 aged below 15 years (GAC, 2022b). This suggests that 245,223⁷⁵PLHIV were on treatment in 2021. Total institutional costs of US\$77.46 million were divided by the number of PLHIV on treatment to obtain institutional per prevalence unit costs for 2021 of US\$315.88. Similarly, for treatment and care exclusively, the related expenditure outlays by the MoH and GFATM were divided by the number of PLHIV on treatment to produce US\$171.72 as the estimated institutional unit cost of ART for year 2021. This includes ARV which cost under US\$100 per PLHIV per year (Ford et al., 2018) and US\$71.72 for

⁷⁵ 233,715 & 11,508 totals 245,223 PLHIV on ART in 2021

testing and diagnostics⁷⁶ as well as overheads⁷⁷. This suggests that the ART program in Ghana is cost effective as it closely mimics standardised costs at the institutional level.

6.4 Direct Unit Cost of Illness (Household and Institutional)

The total direct unit cost for HIV in Ghana, for year 2021 was obtained by combining direct out of pocket household costs (US\$100⁷⁸ per PLHIV) and the direct institutional costs of HIV (US\$315.88) obtained above, for a total figure which amounted to US\$416 per household. This amount was composed of expenditure for medicines (ARV and prophylaxis), nutrition and transportation costs.

The average direct OOP unit costs were standardised for one PLHIV by considering the average number of PLHIV living in affected Ghanaian households (1.3). Thus, the average annual direct OOP unit cost of GHS745 was divided by 1.3 for a total of GHS 573 per PLHIV. Expressed at the relevant exchange rate (1US\$=GHS5.73) direct household costs amounted to US\$100 per year on average. It is noted that given the skew of HIV expenditure data, the application of the median rather than the mean would have reduced the computed unit costs by about US\$16 per person per year. This discount is obtained by expressing the difference between the average direct household unit cost GHS573 and the median – GHS 480, in US\$ (GHS93/\$5.73). Under the auspices of such sensitivity assumptions, the direct unit cost of HIV would then be discounted to US\$400 per PLHIV per year. As noted earlier, this value (US\$400) uses the median rather than the mean. This figure is

⁷⁶ Diagnostics include viral load testing as well as chemistry and hematology which average \$30 per test or GHS200 for both as opined by 20-year-old R9 in Sunyani.

⁷⁷ Overheads include hospital-based overheads, in-bound shipping, as well as procurement and supply chain management costs which range from 15% to 30% as noticed by the author through various rounds of national quantification sessions between 2012 and 2017.

⁷⁸ GHS745 using 1\$= GHS5.73

about 1.1 times the amount found in Nigeria (\$358) by Adedigba et al. (2009) even though it should be noted that the Nigerian study did not include institutional costs.

6.5 Indirect Unit Cost of illness

Productivity or indirect costs were restricted to household costs as all institutional expenditure was deemed to be directly related to epidemic control (prevention, mitigation, treatment and care as well as coordination of the national response).

The current study found that time-related losses were applicable to about 51 percent of PLHIV households, rising to 62 percent of households when opportunity costs of dissaving and fringe benefits were added. The annual household median productivity cost was GHS1,508 while the annual average household productivity cost amounted to GHS7,185. Indirect costs ranged from GHS5 per year to GHS105,450 per year, confirming the presence of significant variability in the indirect costs incurred by households.

The indirect unit cost of illness was obtained by accounting for PLHIV density in households. Results obtained in chapter 5 were leveraged to obtain unit costs. Thus GHS7,185 was divided by 1.3 to obtain GHS5,527 (US\$964.5⁷⁹) as the average productivity loss per unit in Ghana for the year 2021.

The consolidated average unit cost of HIV in Ghana for year 2021 therefore amounted to US\$1,380 (household direct and indirect costs \$1,064⁸⁰ + institutional costs-\$316) while using average costs. Utilising median costs reduced the consolidated unit cost of HIV in Ghana for year 2021 by 52

⁷⁹ Average Household productivity unit cost = 964. Median Household Productivity unit cost = US\$263

⁸⁰ Average Household Costs = Average Direct Unit Costs (\$100) + Average Indirect Unit Costs (\$964) = \$1,064

percent to US\$663 (median household direct and indirect costs \$347⁸¹ + institutional costs US\$316).

Table 42: Societal Cost of HIV in Ghana - 2021

Societal Cost of HIV and AIDS in Ghana		
	Median	Mean
Household Costs		
Household Direct Costs	84	100
Household Indirect Costs	263	964
Total Household Costs	347	1,064
Institutional Costs		
Institutional Costs ARV	100	100
Institutional Costs -Labs & Overheads	72	72
Institutional Costs -All Other Costs	144	144
Total Institutional Costs	316	316
Consolidated Total Societal Unit Cost	663	1,380
Total Societal Cost of HIV in Ghana	229,132,137	477,272,219

Source of data: Field Survey and Desk Review (2021)

The approach which uses unit costs and prevalence to estimate aggregate impact for decision support has been used in the literature (Gallup & Sachs, 2001; Orem et al., 2012) to good effect. Scaling the unit costs found in this study using the HIV prevalence estimates⁸² to obtain a comprehensive economic cost of HIV in Ghana for the year 2021 produced an amount of US\$ 477,272,219.

6.6 Unit Costs of Stigma, Discrimination and Other Intangible Costs of Illness

Historically, intangible costs have been avoided because they are seen as difficult to measure as noted in Adedigba et al. (2009). In some earlier efforts to quantify intangible costs of illness and

⁸¹ Median Household Costs = Median Direct Unit Costs (\$84) + Median Indirect Unit Costs (\$263) = \$347

⁸² PLHIV estimates in 2021 total 345,599 (GAC, 2022b)

disability, Harwood (1998) references the economic burden of road safety and pollution for guidance in extracting intangible costs through the proxy of adjudication costs, applying same to the cost of alcohol and drug use. He however notes that intangible costs are a limitation of the cost of illness approach. Others corroborate this view by positing that because the legal fines and damages are merely a shift of resources from defendant to plaintiff, they constitute transfer costs and should therefore not be computed as part of societal costs (Johansson et al., 2006). This study espoused a similar view and omitted this category of costs⁸³.

6.7 Discussion

Routine programme data and secondary sources were used to estimate the average unit cost of HIV in Ghana. This was achieved by compounding household unit costs and institutional unit costs. Although prior studies differed in their methodology from the current study, they highlighted similar cost centres and expenditure within the treatment and care class was consistent. A study in Ghana (Mikkelsen et al., 2017) for example found institutional costs of US\$113 for the first six months of HIV care. This figure is about a third lower than the findings of the current study adjusted for the six-month treatment period. The difference in estimates is potentially accounted for by the absence of other costs such as overheads or coordination costs incurred beyond the confines of the ART clinic which were the focus of the Mikkelsen et al. (2017) study.

Rosen and Asante (2010) similarly estimated the institutional cost of ART in Ghana. The unit cost of HIV service delivery at teaching, regional and district hospitals which they found in 2010 was \$534. Similarly, when apportioned over PLHIV reached with ART services between 2015 and

⁸³ Compensatory orders relating to lost sales of GHS5,000 for a 34 month period, stigma 15,000 and costs of GHS2,000 was ruled against defendant in the first case of the sort in Ghana (Sakyiwaa Akuaa V Kwaku Ameyaw, 2021)

2018, total institutional costs of HIV in Ghana yielded a unit cost of US\$553 (GAC, 2017, 2020a). The findings of the current study (US\$316) reflect a decline of about 40 percent from the average institutional costs of HIV culled from the varied approaches listed above (GAC, 2017, 2020a; Rosen & Asante, 2010). This is not unusual since ART costs are known to decline in low- and middle-income countries – LMIC annually by about 2 percent (Dutta, Barker, & Kallarakal, 2015).

The gentle but consistent decline in costs could also be attributed to the phenomenal increase in ART coverage⁸⁴ which resulted in better economies of scale⁸⁵. The slow decline in costs further suggests that treatment costs may have reached a floor beneath which they may continue to decline only sparingly. This plateauing of cost declines has been confirmed by other studies (Adedigba et al., 2009; Dutta et al., 2015)

Changes in therapeutic regimen that have seen a shift from Nevirapine and Efavirenz based therapies to more expensive ARV hitherto deemed second line medicines on the other hand militate against further declines in cost. Antivirals such as Tenofovir and Dolutegravir in line with WHO recommendations have been introduced, to counter hepatic, gestation, and drug resistance challenges (NACP, 2010; Rosen & Asante, 2010; South African Department of Health, 2019).

Leveraging the unit cost found in this study as a marginal cost and any combination of the findings of earlier studies as proxies for average costs, the efficiency gains in Ghana's national response to HIV and AIDS are nuanced, i.e. costs are clearly declining (Rajan & Reichelstein, 2009) for institutional costs of treatment and care while the direct portion of household costs experience

⁸⁴ Coverage has risen tenfold between 2010 and 2021 (GAC, 2018, 2022b) and may account for the additional ~25% decline in costs from the projected estimates from Rosen and Asante (2010) - \$428 to the current study's finding ~US\$316

⁸⁵ High case load facilities such as teaching and regional hospitals were on average 25% cheaper than district facilities with lower caseloads.

sustained increases⁸⁶. Additionally, Rosen and Asante (2010) predicted that as the Ghanaian ART program spreads geographically to fulfil UHC goals, the unit costs would escalate as the improvement in ART access would imply forays into more remote regions, resulting in less efficiency in service delivery and therefore higher costs. Notwithstanding the afore-mentioned declines in marginal costs, the improvements in ART coverage have occurred, providing even further evidence of the efficiency gains achieved by Ghana's national response to HIV and AIDS.

The gains in efficiency and coverage have come at a grave price for PLHIV households who continue to bear significant direct costs of HIV and the full extent of household indirect costs which was found to be at least twice (using the median) the size of direct household costs. In comparison to countries like Namibia with a similar PLHIV case load, Ghanaian households are overrepresented by about 14 times in the burden of financing of the national HIV and AIDS response (Halasa-Rappel et al., 2021).

6.8 Conclusion

Unit costs have been computed to include both household and institutionally financed treatment and care expenditures. Contrary to many studies, the present study expanded its scope to include all the enabling interventions as well as prevention costs. The justification for this societal approach was to show a comprehensive economic burden of HIV given the counterfactual of no HIV occurrence in the country. After all, there would be no need to trigger mass prevention campaigns if HIV were not endemic and a public health concern in the country.

⁸⁶ 2009 \$11 (GHS15 @GHS1.4 to \$1), 2018 \$42 (GHS200 @GHS4.8 to \$1), 2021 \$84 (GHS480 @GHS5.7 to \$1). Data culled from Asante (2018) and the current study. US Dollar values were obtained with year-end exchange rates from Bank of Ghana.

As expected, unit costs have declined with increasing HIV treatment access. The escalation of the number of PLHIV on treatment from about 66 thousand in 2015 to 245,233 in 2021 (GAC, 2018, 2022b) significantly contributed to the decline in costs as the same systems, equipment and other fixed costs continued to facilitate service delivery to an ever-increasing number of PLHIV.

Comprehensive unit costs of HIV morbidity per the current study compounded direct and indirect unit costs from institutions (US\$316) and households (US\$100+US\$965) to make a total unit cost of HIV in Ghana of US\$1,381. Escalated to the level of prevalence, a ceiling of about half a billion US dollars was obtained as the societal cost of HIV for the year 2021. This level of cost is clearly prohibitive for any constructive vision of Ghana's development and must be addressed with the urgency that it deserves.

The economic cost of HIV is comprised of both direct and indirect costs. Direct costs are comprised of medical charges (ARV, diagnostics and prophylaxis), nutrition and transportation costs, while indirect costs are borne by households and are triggered by job losses and time lost to ART protocols as well as savings and fringe benefit losses occasioned by illness. Indirect costs could also be triggered by stigma and discrimination episodes.

Utilising medians rather than averages, the comprehensive unit cost of HIV included institutional costs (US\$316), household direct costs (US\$84) and household indirect costs (US\$263) to make a total of US\$663 as unit costs of HIV in Ghana for year 2021. Even this conservative approach scales to a quarter of a billion US dollars using prevalence estimates which continue to rise with the growth in new infections particularly among adolescent girls and young women (GAC, 2022b).

Annual indirect costs constitute a significant cost centre for households and represent 76 percent of household HIV expenditure using the median or 91 percent using average indirect household

expenditure. This speaks to the persistence of stigma and discrimination bottlenecks which need to be addressed.



CHAPTER SEVEN

EXPERIENCES AND COPING STRATEGIES OF PLHIV HOUSEHOLDS

7.1 Introduction

This chapter focuses on the experiences and coping strategies of PLHIV following the disruption of HIV diagnosis and the prevailing HIV condition. The analysis purviews the changes in identity formation and maintenance practices as respondents course through the various levels of biographical disruption theory.

7.2 Results and characteristics of participants

In-depth interview respondents were selected sequentially in each data collection district. Having completed the administration of the questionnaires the participant list was used as a sample frame from which probable interviewees were selected randomly without replacement. Saturation occurred after 23 respondents representing about 5 percent of survey respondents instead of the 10 percent which was targeted.

The FGD would subsequently include 4 participants each in the northern belt and the middle belt FGD while the Greater Accra region held its FGD with the full complement of 6 participants. In total therefore, the three FGD culled responses from 14 respondents instead of 18 as proposed. The author was compelled to revert to the pool of survey respondents whenever interview respondents

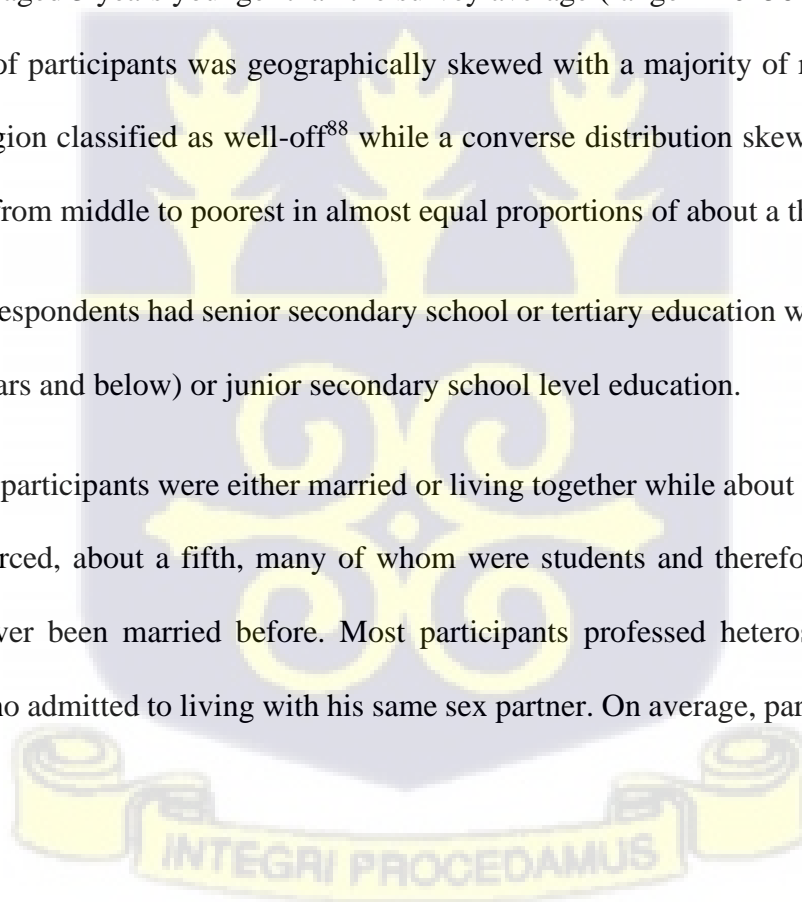
declined to participate in the FGD. Nonetheless, each FGD represented at least a tenth of all interview respondents and together, all FGD participants represented almost two-thirds of all interview respondents.⁸⁷

7.2.1 Characteristics of Respondents

The participants selected for the in-depth interviews were 16 females and seven males, a distribution similar to the survey results except for the fact that in the case of the in-depth interviews, Greater Accra represented only about a third of respondents contrary to its preponderance in the wider survey where it accounted for almost half of respondents. At 40 years on average, interview participants were aged 3 years younger than the survey average (range = 20–56 years). The socio-economic status of participants was geographically skewed with a majority of respondents in the Greater Accra region classified as well-off⁸⁸ while a converse distribution skewed respondents in all other regions from middle to poorest in almost equal proportions of about a third each.

About a third of respondents had senior secondary school or tertiary education while all others had either basic (6 years and below) or junior secondary school level education.

Nearly half of all participants were either married or living together while about a third were either widowed or divorced, about a fifth, many of whom were students and therefore unprepared for marriage had never been married before. Most participants professed heterosexual orientation except for one who admitted to living with his same sex partner. On average, participants had been



⁸⁷ 14 FGD participants represent approximately 60 percent of all interview respondents. This represents a good number for validating the opinions expressed during the interviews. It constitutes robust member checking.

⁸⁸ 22 percent, 32 percent and 33 percent of Greater Accra respondents were classified in the middle, fourth and richest wealth quintiles respectively.

diagnosed HIV-positive for 9 years (range = five months to 25 years). About a third (n=8) of respondents were diagnosed between one and five years earlier.

7.2.2 Results

The word cloud in Figure 9 illustrates the themes which emerged from content analysis of the qualitative data. Body weakness, the image of self and performance failures were prominent. These principal personal failures were exacerbated by the burden of direct costs of HIV including nutrition and transportation costs and to a lesser extent the cost of medicines. Increased cost of living (COL) as well as varying levels of stigma experienced by PLHIV further constrained their access to resources and social participation.

The word cloud presented in **Figure 9** illustrates the pre-eminence of transportation costs as the foremost concern of respondents while educational, occupational and stigma concerns in general featured less prominently in the responses culled from the in-depth interviews.

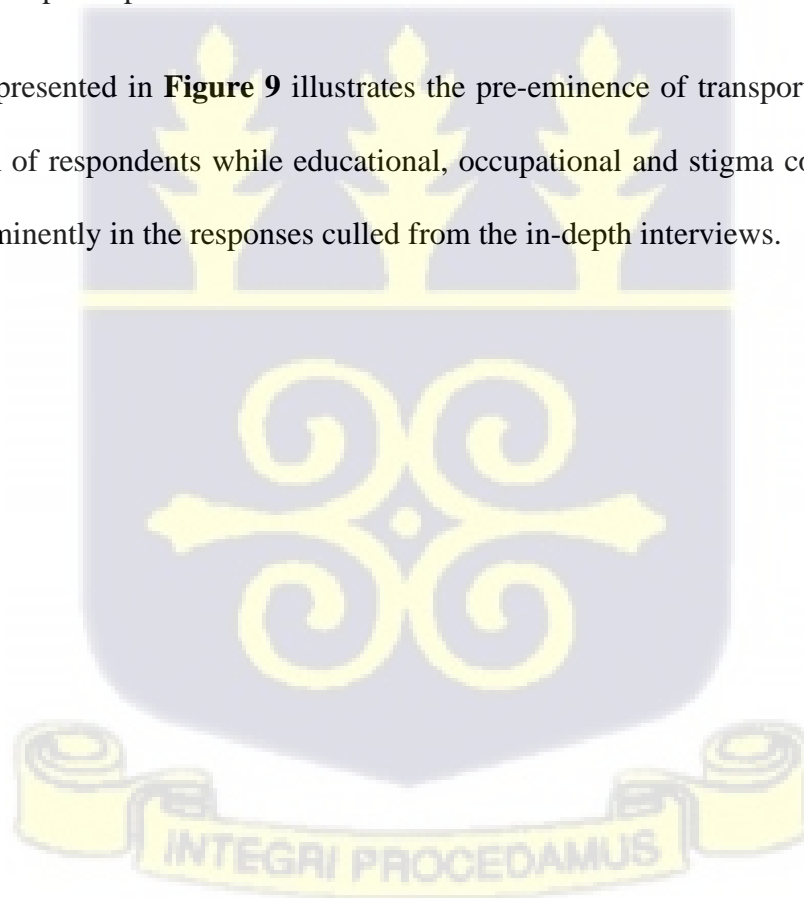


Table 43: Emerging Themes from In-depth Interviews

Emerging Themes	
PLHIV Experiences	Coping Mechanisms
Body & Performance Failure	Personal Agency
Loss & Relationship Failures	Family & Community Support
Uncertainty & Emerging Disability	Risky occupations & Cultural norms
	Depletion of Savings
	Government financing & public policy

Source of data: In-depth interview of 23 respondents (2021)

7.2.2.1 PLHIV Experiences

Thematic content analysis of the in-depth interviews revealed three (3) major themes from the narratives of PLHIV about their lived experience. PLHIV routinely experienced bodily or performance malfunctions and outright failures. Many respondents could no longer perform the rituals which undergirded their identities. These bodily failures affected the relationships of PLHIV and were associated with the second emerging theme: Loss and relationship failures. PLHIV also reported uncertainty and insufficient knowledge about their disease outcomes, adding to the fear and anxiety which they had to contend with following their HIV diagnosis. Thus, uncertainty and emerging disability constituted the third and final theme classified under the PLHIV experience category.

7.2.2.1.1 Body and Performance Failure

Biographical disruption was pervasive among respondents after HIV diagnosis. It manifested through a radical disturbance emanating from the performance failure which afflicted the bodies of PLHIV (Bury, 1982). Bury's biographical disruption theory describes the influence or effect of sudden and significant chronic illness and how such life-threatening illnesses denature an individual's social and cultural experiences by destroying their identity or sense of self. Some

PLHIV could no longer “perform” the rituals of their identity, including the ability to desire and be desired or to engage in romantic relationships, as found by Owusu (2019; 2020). Other PLHIV transitioned from a more elevated status within their extended families to a lower status, from “provider” to “dependent” while others had to contend with practices which might have been unthinkable hitherto (as espoused by Owusu 2019 and Owusu and Laar, 2018). This disruption continued for several years after diagnosis, suggesting a very slow path to recovery.

Now because of my status when guys even approach me, I tell them I'm married. I do that to prevent any mode of transmission to them.

R10 – Student, single female, aged 37, Dormaa, Second Wealth Quintile, PLHIV for 7 years.

R10 a single female student was concerned that she could no longer construct and maintain romantic relationships. Her identity as a desirable young lady had been compromised and she struggled with the new purpose that she had to construct for her life given that romantic relationships including marital relationships now appeared forbidden.

Performance failures extended beyond immediate binary relationships to include the standing of PLHIV within their families and community.

Before my diagnosis, I was working, so I had money and I could take care of my father and my family too. We are six girls, and I'm the eldest so I could take care of them, [buy food] and even pay school fees for my siblings in school. Now that I'm not working, I'm not able to do all that again. Sometimes I have to beg the teachers to keep [my children] in class [until] I get the fees and pay later.

R4-Divorced, Unemployed Trader, Nalerigu, Second Wealth Quintile, PLHIV for 12 years

Respondent R4 expresses in the above submission, the performance failure which has been occasioned by the disruptive effect of her HIV condition. As the first among siblings, she has a culture-informed duty of care to her younger siblings which she is now unable to fulfil. Since the respondent sero-converted over 12 years ago, it is interesting to note that she appears to have remained within an extended phase of biographical disruption. Under the current disposition, the roles and relationships are made blurry because the PLHIV who was once the “provider” now needs to be “provided for” leading to the disruption of bounded normative structures. The radical disturbance occasioned by HIV is also evident in the life of respondent R18:

I stopped working with my brother because I couldn't take my drugs regularly. Even though I'm home and not getting much, the little I'm making is enough for me once I'm able to take the drugs. First, I used to chill, I used to take alcohol, but I learnt alcohol isn't good for this disease, so I stopped because once I go out, I have to drink [...] in this [HIV] situation, you need to eat a lot. Sometimes you may not have money to go to the facility for your drugs but because it's a necessity, you'll have to find ways and means [including gifts and begging] to go for your medication.

R18-Living Together, Male, Former Trotro⁸⁹ mate now employed only once a week, Ada, Middle Wealth Quintile, PLHIV for 4 years

Respondent R18 witnessed material changes in his immediate setting. He was compelled to abandon a fairly lucrative cash handling job and the leisure benefits which the occupation enabled

⁸⁹ Trotro mates are assistants/partners of drivers for vehicles/buses within the public transportation system in Ghana. Their main task is transport fare collection and accounting.

to ease compliance with ART adherence requirements. He relied on the diversity of his skill set to be able to acquire alternative sources of income when HIV related job losses occurred. He emphasised the intangible loss of leisure and opportunities for community engagement even though from time to time he experienced challenges with food and transportation to the ART centre.

Respondent R5 exemplifies the potential for gendered burdens of HIV in Ghana. Gendered indirect losses are common in a few communities but do not reflect the totality of the experiences of women living with HIV in Ghana. Although female PLHIV reported twice as much productivity loss as their male counterparts (chapter five Table 35), the logistic regression (Table 39) indicated that welfare and productivity are insensitive to gender. The experience of R5 thus illuminates the ambivalence noted in Table 35 and Table 39 as it speaks to the potential for latent gendered inequalities to cause harm, exacerbated by HIV. Contrary to respondent R18 who had alternatives for resource access (employment opportunities), R5 illustrates the challenges which women living with HIV face when their bodies fail and reflects how community and social resources fail them. Their children are also affected as underlined by the teasing and stigmatisation which respondent R5 and her children were subjected to, following her extreme weight loss. Ineffective health systems including insufficient access to ART led to job losses (R16) and premature death (R5). Even where the extended family might have been expected to provide support and solace in line with African and Ghanaian culture, the widowed PLHIV and her children were deprived of social support for resources, diminishing the family's potential for continued improvement:

[...Due to late enrolment into care, husband passed on...]. After I recovered and went back to my normal business, I realised people were not buying from me anymore [...]. People realised I had gotten the disease because I really lost weight before I recovered. people also pointed hands at my children and called them names such as "HIV ba" (literally, HIV's

child) in the community so I just had to stop selling the pito. Financially, things weren't easy for us [...] My husband had a farm, we used to farm on it to feed but after his death, his family took over the farm, so we were left with nothing [...]. We are 8 in the house and I'm the head, eating is even a problem.

R5-Widowed Unemployed female Trader, Bunkpurugu, Poorest Wealth Quintile, PLHIV for 5 Years.

When it started, my parents and I didn't know it was HIV so we spent a lot on drugs [...] First of all, I've lost so much weight. I had some blisters on my lips due to the disease and it has left scars around that area of my body. I also had some sores in my mouth, especially my tongue. It looks like it's healed, but I still feel some pains there sometimes. My body also itches a lot, I can be scratching my body saaaaaa⁹⁰. I think a lot. I heard a lot about the disease before I even got infected, so I knew about the symptoms. Truly too when I got infected, I experienced and [am] still experiencing the symptoms. There are times I even fear that I'll die.

R16-Never married, Aged 37, Unemployed former hotel worker, Bunkpurugu, Middle Wealth Quintile, PLHIV for less than 1-year, experienced CHE

Loss of income, consumption power, wellness and a triggering of severe symptoms including AIDS cohere to disorient the PLHIV and deprive them of significant agency and productive power. As predicted by Bury (1982), R16 expresses the fear of imminent death and anxiety which are indicative of the problem onset stage in biographical disruption theory. The loss of body weight is seen as an outward testament of HIV infection which makes it difficult for traders and artisans for

⁹⁰ A colloquial superlative indicating the extreme occurrence of itching

example (R5), to reclaim any market share which they might have lost while they were unwell or convalescent.

7.2.2.1.2 Loss and Relationship Failures

At all levels of society, a story of loss prevails for PLHIV. Loss of image and denaturing of identity within the immediate material setting of the PLHIV, loss of trust and power within intimate partner and family relationships and finally exposure to resource deprivation and negative gender and social norms. Understandably, a flurry of emotions proximate to disbelief, denial, anger and anxiety accompanied respondents throughout this phase:

I have lost siblings [whom I supported financially and] who have to look after me and because of my status they don't consider me as a human being, so they don't want to look after me and also the small savings I had is now finished.

R8 – Trader, married female, aged 45, Dormaa, Poorest Wealth Quintile, PLHIV for 4 years. Experienced CHE.

I don't have time to be engaging with men anymore because of what my husband did to me. [...] My husband had multiple sex partners and girlfriends while we were still married and that was a problem between us before I was diagnosed, yet I was still married to him because I had a child with him. He decided to leave me for another lady after I was diagnosed.

R1-Divorced female, unemployed trader, Bunkpurugu, Second Wealth Quintile, PLHIV for 17 years

Respondent R1 expresses anger and resentment against men as she attributes her infection to her ex-husband's promiscuity. Other respondents expressed denial and disbelief, spiritualising the disease:

First of all, I lost my job because I spent all my money on fake pastors and herbalists. From the beginning I thought it was a spiritual thing, I still think it is because I dreamt that someone was injecting me with blood before I got sick and was diagnosed of it.

R23- Female trader, living together, 33 years of age, Accra, Fourth Wealth Quintile, PLHIV for 8 years

When mine started, my mother turned it into prayer, and we spent a lot of money on it. We detected it early, but my mother thought it was a spiritual problem. My mum used her cocoa as a collateral for a loan to take care of me. I also stopped studying. I used to be a catering school [student] but because I was frequently getting sick I had to stop.

R9- Female apprentice, never married, 20 years of age, Sunyani, Middle Wealth Quintile, PLHIV for 5 years

R9's experience demonstrates the multiplicity of strikes which families experience when they deal with HIV. The shock of HIV diagnosis in this case deprived the victim's mother of her share of the family inheritance (cocoa farm) which is traditionally expected to provide for big ticket items such as school fees and other major family expenses. In the case of this household, the respondent indicated that the intention was to allocate the proceeds of the cocoa farm to a housing project prior to the HIV diagnosis. This investment did not materialise because of the necessity to reallocate funds to HIV treatment. The respondent indicated that suspicion and resentment within the family

had grown as relatives who notice cocoa harvests being taken from the farm are unable to identify the purpose to which the funds are applied each year:

You see, nobody knows what my mum used the money for, but people are aware my mum has used her cocoa farm for a loan. I can't also go explaining to people that it's because of my sickness that my mum went for the loan. The farm belonged to her family, and they had just started cultivating the cocoa when she insisted, she needed money urgently and used her share of the farm as collateral. Now each harvesting time, she doesn't get any money from the farm because it's been used as a collateral. That was her property, she wanted to build a house from the sales she would have been making each harvest time (R9).

The loss of the inheritance to HIV transcends the mother's generation as R9 had to drop out of school due to the frequency of illness and the depletion of resources available to the family to support HIV treatment and care services.

Almost all respondents indicated that other structural constraints at community and national level proved more difficult to unlock. Public policy and Act 938 (Ghana AIDS Commission Act, 2016) notwithstanding, negative gender and cultural norms inflict significant loss on affected households and delay the transition of affected persons to the resource mobilisation stage or biographical flow. Act 938 was enacted amongst other things to promote and protect the rights of PLHIV as well as provide financial resources through the establishment of an AIDS fund, for the treatment, care and socio-economic support of PLHIV. Almost all respondents were of the view that the objectives of Act 938 were not being met and that many of our cultural norms and traditions had a negative impact on PLHIV.

[I] will rate [our] cultural norms [and traditions] 2% because they promote HIV instead of prevention especially in the case of marriage. The spouses of deceased people are forced to marry their siblings without disclosing the status of the deceased or spouse. They usually hide it and marry because marriage is considered an honour especially for the women, in our culture.

R1-Divorced female, unemployed trader, Bunkpurugu, Second Wealth Quintile, PLHIV for 17 years

If the drugs were not free I am sure some of us would be dead by now [however], I have never heard or seen anything in relation to our cultural values in the Volta region that influences HIV prevention or support PLHIV.

R3- Delivery man, married, 39 years of age, Accra, Richest Wealth Quintile, PLHIV for 8 years

Respondents R1 and R3 do not think much of the governance and cultural structures of Ghanaian society in terms of their ability to prevent the spread of HIV and AIDS, except for the fact that antiretrovirals are provided free of charge to PLHIV.

7.2.2.1.3 Uncertainty and Emerging Disability

A significant number of respondents indicated their satisfaction with access to ARV but emphasised the pain and anxiety of not knowing about the progression of the disease. The uncertainty reinforces intangible costs and elongates the emerging disability and uncertainty phase of the disease. Extended emerging disability phases limit respondents' ability to mobilise resources and overcome the restrictions of the chronic illness. As Bury (1982) indicated, disease knowledge and subjective

norms are brought to the fore as respondents become aware of their emerging disability and the uncertainty of the disease course:

I don't know about all the other tests except the viral load, so I'm not concerned about what the medicine does to me. I make sure I eat very well before I take the drugs and once, I take it, I'm okay. If we were to pay for the drugs, it would have been a problem, but we don't, so I don't think too much about the sickness. My main problem is money.

R1-Divorced female, unemployed trader, Bunkpurugu, Second Wealth Quintile, PLHIV for 17 years

To avoid dealing with the uncertainty of the disease course, respondent R1 decided to do her best complying with ART guidelines on rest and nutrition, refusing to think about any deviations from therapeutic protocols to avoid getting into anxiety and depressive bouts. She is of the view that indirect costs occasioned by the lack of productive activities for PLHIV due to their low levels of energy may be a bigger challenge than any uncertainties related to fidelity to ART guidelines.

Respondent R3 is equally in uncertain territory as his subjective moral norms are tested by the mode of transmission of HIV:

I wasn't like this before. I was a hard-working young man living in the Volta region. I was not a womanizer, so I found myself one lady I wanted to marry, and we lived together. She fell sick one time and was diagnosed with HIV after several visits to the hospital. The doctors checked my blood three times on different occasions, but all proved negative. She died and I moved in with my auntie at Kokomlemle in Accra. Three years after I moved to Accra, I fell very ill and was rushed here only to find out I was now positive and since then

my life has not been the same. In fact, if it wasn't for the counselling sessions with one lady here in the clinic, I would have preferred to die rather than stay alive with this sickness.

R3- Delivery man, married, 39 years of age, Accra, Richest Wealth Quintile, PLHIV for 8 years

The reality of the emerging disability is so profound that it appears that respondent R3 continues to languish in an extended problem onset phase in which denial, disbelief anxiety and resentment often overwhelm him as he tries to distance himself from the disease to isolate its probable causes even after 8 years of living with the disease:

I don't know how I got the disease. I am not a womanizer; I was never a womanizer (respondent broke into tears). My first wife was still in SHS when I met [her], and she got pregnant, so she stopped schooling because of me. When she got sick and was diagnosed of the disease, I was very surprised because after several check-ups from different hospitals I was still negative. I used to even come here with her, and I even told her about a dream I had that someone slept with me. it was 5 years after her death that I also got diagnosed after an illness. During all those years after her death I was not sleeping around too so I really don't know how I ended up with the disease. I really think a lot (R3).

The attempt to identify probable causes of disease is also evident with respondent R20 who like many PLHIV self-identifies primarily through physical appearance, including weight:

I used to think a lot and wonder how I got the disease, I'm sure that's the reason why I'm not gaining weight though I'm taking my drugs. Initially I wasn't okay but after going through counselling I got better. Sometimes I talk to my husband but he's not always around, he works in Accra.

R20 - Housewife, married, 26 years of age, Accra, Second Wealth Quintile, PLHIV for 1 year

Although respondent R20 attempts to distance herself from the disease as she investigates probable cause, her condition is mediated by existing biomedical and biographical knowledge. She can rely on her intimate partner and family relationships:

Sometimes It hurts me [that I have not disclosed to my family] and I want to tell them, but my husband says it should be between us, so I still haven't told anyone. My husband is negative. As for my life, nothing has really changed because I'm still the way I am, I can't say I'm not able to do anything because of the disease. I haven't been a victim of stigma as well (R20).

R22 illustrates how some PLHIV are burdened by self-stigma and guilt. It is also worth noting that living with the disease for 16 years provided no protection from anxiety, sadness or catastrophic health expenditure.

My last born is also positive and anytime I think about it I get sad. I know I'm old and lived my life but what about him, he's too innocent and young for all that. Sometimes I look at him and I tear up. One time he asked me why he's always taking drugs and I told him its necessary for him to take it. He's 14 years and it hurts me a lot. (Respondent was crying all along when answering this question).

R22 - Widower, 47 years of age, Accra, Richest Wealth Quintile, PLHIV for 16 years, Experienced CHE.

Respondent R1 and R22 are resigned to their fate, however, although R1 believes that life is hard in general and therefore nothing could be done to offset the burden which HIV places on PLHIV household incomes, R22 feels that more can be done by society and lays claim to further resources:

I used to be a sports man, I played soccer a lot. I was a very happy and lively person but now I don't feel that way anymore, but I don't feel disadvantaged at all. [...] My only wish is that we could be healed from this but as it stands now it's not possible but then if I could be assisted with my son's education until he's done with school, I would appreciate it too (R22).

Nonetheless the emerging disability and uncertainty phase far from signalling an end-of-life scenario, constituted an opportunity for respondents to flow, finding relief in classical coping mechanisms as noted in the household survey from medical insurance through savings, extended family help, debt as well as additional work, begging and sex work. This finding corroborates Owusu (2019; 2020) and Owusu and Laar's (2018) findings from studying the livelihoods of PLHIV in the Lower Manya Krobo Municipality in Ghana.

7.2.2.2 Coping Mechanisms:

The narratives of PLHIV culled from the in-depth interviews revealed five (5) major themes that illustrate the conditions which secure access to the resources needed for survival post HIV diagnosis. These five themes may be viewed as providing a possible outline for surviving HIV and AIDS in Ghana. Personal agency was reported by many PLHIV as a requirement for resilience and this constituted the first emerging theme under the "Coping Mechanism" category of emerging themes. Illustrating the second emerging theme under "Coping Mechanisms", PLHIV relied heavily on family and community support. The family and community support theme was followed by risky occupations and norms as the third theme under the "coping mechanisms"

category of emerging themes. The frequency of such deleterious practices speaks to the dire economic circumstances of the PLHIV households which are left with no option but to engage in risky behaviour to survive. Depletion of savings constitutes the fourth emerging theme while public financing and public policy constitute the fifth and final emerging theme.

7.2.2.2.1 Personal Agency, Resilience and Biographical reinforcement

Biographical reinforcement typically kicks in if all the conditions referenced by Bury (1982) are present. A few PLHIV had transcended the disruptive and uncertainty phases of the biographical disruption theory and succeeded in mobilising resources for biographical flow and reinforcement. Leveraging their personal agency, they had learnt to live with the disease and thrive as best they could. Their survival tools include a supportive family and work environment, a community of friends and the degree of flexibility which formal and informal institutions are prepared to allow. Typically, this took a significant amount of time as is customary with chronic diseases such as HIV. In the present study, the path of change percolated from the societal level through the community level all the way to the individual's material settings where their view of self was transformed, reclaiming their identity in the process. Subsidised ARV, personal agency, savings, family and community support all featured prominently in the narratives of resilience and survival.

My husband ran away to marry another lady in Wa, so it is my first daughter who supports me financially. She has completed SHS and works as a teacher in a private school with a salary of 300 per month. Every three to four days she sends me GHS 20. She sometimes sends money (GHS 50) to her father to come and check his viral load, but he refuses to come because of his new wife (R1).

R1-Divorced female, unemployed trader, Bunkpurugu, Second Wealth Quintile, PLHIV for 17 years

Respondent R1 continues to convey ARV supplies anonymously to her ex-husband stating that she would do her best to encourage and facilitate ARV access for him regardless of the outcome of their marriage. In this manner R1 demonstrates personal agency, strength of character and resilience. The success she has achieved in being able to overcome any restriction in mobility and social participation, leveraging family and community resources in the process to assist herself and other PLHIV is commendable. She is well within the biographical reinforcement phase of Bury's (1982) biographical theory.

Other respondents activate their agency particularly when they can mitigate indirect costs by holding on to jobs. This indicates the opportunity which might exist for policy action in terms of employment protections within a stigma endemic environment:

Oh "masa"⁹¹! I think I'm better than some of them [refers to other people within his environment such as neighbours, who may not be HIV positive]. I believe that life itself is about how we as individuals live it in terms of attitude. Sometimes I believe I'm equal with some people.

R13 – Married male trader, 48 years of age, Sandema, Poorest Wealth Quintile, PLHIV for 20 years.

Similarly, respondent R7 was able to demonstrate agency and illustrated her ability to reclaim the narrative of her biographical course. This was not a respondent who allowed herself to be swayed by despondency and given the fact that she has lived with the condition for almost a decade (8 years post diagnosis), she was clearly in the biographical reinforcement phase of Bury's biographical

⁹¹ A noun typically used in broken or pidginised English to show respect but which colloquially in Ghana has come to precede a strongly held truth or belief, a superlative of sorts.

disruption model (1982). She had overcome the disruption and had learnt to live with it, lifting prior restrictions on physical and social mobility imposed by the condition. R7 distances herself from economic hardship when asked about how she fared post diagnosis. The respondent, a tertiary educated health practitioner who surprisingly experienced catastrophic health expenditure (CHE) entirely driven by productivity losses⁹² suggests that PLHIV are merely harder hit by ambient economic adversity. It may be inferred from her testimony that indirect costs constitute the main burden of OOP expenses and that these might be easily addressed if the stigma related impediments to social participation are addressed.

[HIV related economic hardship] doesn't apply to me [...] The financial situation in the country is getting bad [...However,] before contracting the disease my money issues were better, both monthly and annually, because then I used to make sales. Like I said earlier, I sell food but when you contract the disease you cannot be selling these things.

R7 – Married female health worker, 30 years of age, Tertiary educated, Dormaa, Middle Wealth Quintile, PLHIV for 8 years. Experienced CHE.

Respondent R7 vividly demonstrates how the agency which she manifests in surviving the chronicity of HIV is centralised by the linkages between her immediate material setting and the accepting wider community. An accepting community promotes the confidence which she now relies on to make the “changes” necessary to survive HIV and AIDS:

I involve myself [in my community] because it helps you to know how to adjust to the community and especially with church my pastor prays for us and advise[s] us especially

⁹² Household survey data revealed that respondent R7 experienced CHE driven to the tune of 99 percent by productivity losses, mainly related to ARV refills and stigma related lost wages and income.

those who tested positive, this makes us happy. Our pastor really encourages us, this makes us feel we are indeed human beings (R7).

Respondent R7 also demonstrates the potential which communities of faith and their leadership have in driving PLHIV resilience and the construction of positive outlooks on life with the disease, also known as biographical reinforcement.

7.2.2.2.2 Family and Community Support Mechanisms

PLHIV who survive the disease display significant levels of agency. Personal agency is reinforced by a supportive community. Religious and faith-based support systems constitute only one among many coping strategies which respondents in this study use to reclaim their identity. Sadly, the study also documented some negative religious practices which delayed treatment initiation and led to extreme economic hardship (R23 and R9).

I go to church. In church I'm able to talk to my pastor and let them know my situation, so they can remember me in prayers. My pastor knows my status, I told him. In my community I feel empowered because nobody treats me bad (R9).

[...] most of the churches claiming to have the cure for HIV may have pastors who are carriers themselves. Meanwhile they deceive naive PLHIV with concoctions. They shout, "in the name of Jesus, I've healed you. Don't go for your drugs again". Most of our pastors are deceiving the PLHIV with these things. A lot of people especially women can put their trust in the pastors too much.

R6 – Female Student aged 20, Sunyani, Middle Wealth Quintile, PLHIV for 5 years experienced CHE.

Respondent R9 reveals how easily she was able to disclose her status when the wider community of faith (pastor and fellow believers) showed support and understanding. This is in sharp contrast to other religious leaders who for their own selfish gains delay the onset of treatment or exacerbate treatment adherence challenges by making false claims about HIV treatment (R6).

Other PLHIV, burdened by self-stigma, continue to use non-disclosure as a coping mechanism despite the reported supportive nature of their community of faith:

Well, I still go to church but not like before and it's because of my status. As I said, it's not anybody's fault because I haven't told anyone about my status. I'm stuck up in my head and I'm always thinking I'm being watched. Due to that, I don't feel comfortable in a crowded area, but I go to church once a while when I want to. Since people don't know about my status, I am accorded some level of respect in the community. I believe once they find out about my status, all that will change (R6).

This suggests the existence of some deep-seated mistrust which some respondents including R6 attribute to the negative messaging which occurred at the beginning of the pandemic when the imagery of a “wasting” disease was used to “shock” the public into awareness and behaviour change:

There should be public education in our villages and communities about the disease. People should be made to understand that being a PLHIV is not the end of the world, and all hope is not lost. That we are all human beings, therefore the stigma and discrimination should stop. The effect of the disease was not communicated well especially when it first began. I remember that people used to say once you get the disease you won't last up to a year. (R6).

7.2.2.2.3 Risky occupations, activities and cultural norms

Coping mechanisms also included resorting to energy intensive menial jobs such as construction work. This was all the more traumatic as the respondent already experienced depleted energy levels and as a female had to convey heavy construction materials throughout construction sites to be able to feed her family:

The transport used to be GHS7 for TNT in and out, now it is GHS16. The transport keeps going up. [...] Now I work with the construction workers so whenever the foremen get a job, they invite me to either go and fetch water or carry some of the mortar [...] Other times I go and break wood for firewood and sell. That's how we survive. Sometimes the foremen complain that the job isn't good for me but what can I do. There is no money, I would have started a business that doesn't involve cooking. (R5).

Respondent R5 confirms the escalation (2.3 times)⁹³ of some treatment and care costs even though ARVs are currently free of charge to PLHIV, exposing in the process the inability of the NHIS to provide comprehensive protection even for direct costs. The burden of direct costs cited above is compounded by job losses and other forms of under employment (indirect costs) as reflected in the variety of jobs which respondent R5 had to undertake to survive. Other degrading coping mechanisms related to indirect costs included transactional sex. When asked if they were privy to any information concerning PLHIV who were not known commercial sex workers but who engaged in transactional sex for survival, respondents had this to say:

⁹³ Similar growth rates have been noted between the 2010 OOP study and the 2017 OOP study (Asante, 2018; Asante et al., 2014)

Well, I know 2 ladies. One is someone I personally took to the clinic for drugs, she has a boyfriend but hasn't informed him yet, but they have sex. The other is my ex-girlfriend, the mother of my first child. She's even married now with her own kids but has not told her husband too. anytime I ask her to [disclose], she tells me its none of my business, so I stopped asking (R22).

There are a lot of them. Those days when we were put into income earning activities such things were less. [...] Most of them for the lack of money engage in such risky sexual activities once they feel better. Some even travel to other towns to do it [commercial sex work] because, perhaps, over here, their status has been disclosed to many. I know a lot them...oh! plenty koraaa. I suggest that the Ghana AIDS Commission should step up their support system for us. They used to give us some money. As it stands now, the whole Bechem here, I'm the only model of hope here who knows most of the PLHIV and the situation they are in. Most of them come from the villages, others also go to other places for their drugs due to stigma.

R17 – Trader married female, aged 45, Bechem, Middle Wealth Quintile, PLHIV for 19 years.

The severe nature or intensity of the burden of indirect cost is felt when the sums received in return for transactional sex are considered:

Okay I know one person who is involved in that. She is not working now so she moves around with all sorts of men for some small money, GHS2 or GHS5 or more she will take just to survive (R6).

7.2.2.2.4 Depletion of Savings

Some of the more popular coping strategies include support from relatives and savings which are depleted and therefore not indicative of wellness or coping but of a state of very basic survival:

The main issue is the job issue since [I] lost all my savings [to treatment routines] so am unable to cater for some things [...] I have lost siblings [whom I supported financially and] who have to look after me and because of my status they don't consider me as a human being, so they don't want to look after me and also the small savings I had is now finished.

R8 – Trader, married female, aged 45, Dormaa, Poorest Wealth Quintile, PLHIV for 4 years. Experienced CHE.

Respondent R8 illustrates the suggestion that the traditional African extended family support system may no longer be as protective as one might have expected. The respondent is all the more consternated since she had provided succour prior to those who now reject her and deny her the support she so badly needs from her extended family. This declining trend in the African family's ability to provide social protection was noted almost two decades ago and related to the confluence of increasing pressure on households emanating from chronic diseases such as HIV and the generally challenging state of many African economies (Young & Ansell, 2003). Nonetheless, the immediate and extended family system constitutes a major segment in the support infrastructure of PLHIV households wherever residual resources allow for the additional burden:

Some PLHIV have relatives who support them, others have good jobs that pay well so their savings may be more than mine. Sometimes too when I see some PLHIV I get very sad because some of us are really hungry and without money. It's not everything that I have to

say but there are some of them when I meet, I know they aren't just sad and depressed but also very hungry (R13).

Almost all my hard-earned money from my past business was used for my recovery. Now I depend on my father and sister (R4)

It's my husband who supports me with everything (R20)

I sometimes get support from my sister; she complains but she helps when she can (R22).

7.2.2.2.5 Government Funding and Public Policy

Respondents premised their view of public policy effectiveness on the level of access to ARV. The view of R4 about government financing was illustrative of the general perception of PLHIV:

The leadership is good because without that we wouldn't have the free drugs. [...] I can say they have helped us [...]. Now there are laws that protect we the PLHIVs

R4-Divorced, Unemployed Trader, Nalerigu, Second Wealth Quintile, PLHIV for 12 years.

Even though very few PLHIV are willing and able to report stigma and discrimination for redress, R4 notes with gratitude the promulgation of Act 938, the Ghana AIDS Commission act 2016, which punishes stigma and discrimination against PLHIV. She posits that in addition to the direct costs which are addressed by the free treat all policy, Act 938 by addressing the indirect and intangible costs would complete the required protections for PLHIV. Currently however, public funding principally targets ARV and a limited number of other ART services. The primary channels supporting PLHIV survival and access to care are private household savings as well as public and development partner support for health system access including ARV access and ART in general.

Since public funding is limited in terms of the scope of services covered, PLHIV rely on the immediate and extended family to complement sources of funding for treatment and care. The family takes on a significant role because of the extent to which savings are typically depleted.

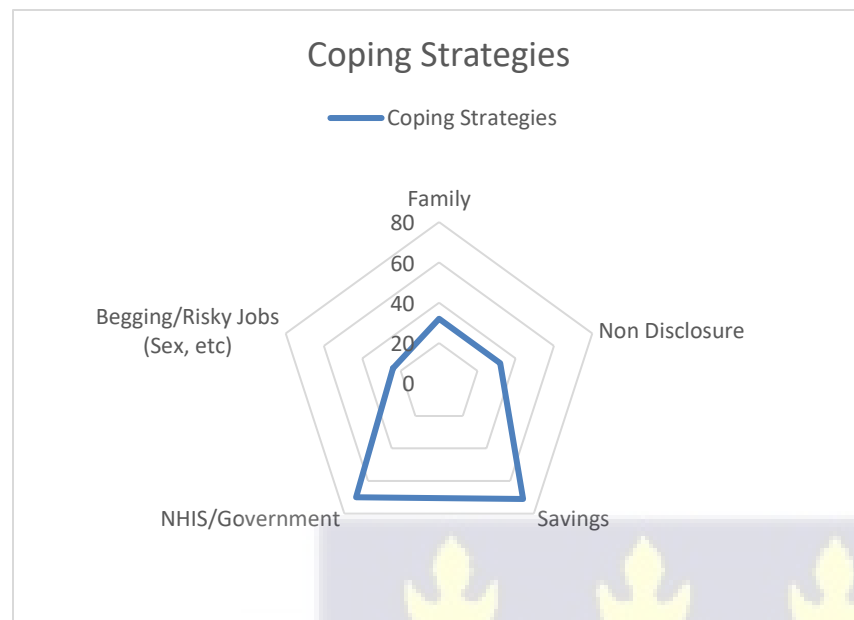
Public policy challenges noted by respondents extended beyond the inability to scale government funding to fully support economic mitigation interventions as provisioned in several strategic plans. Participants in the FGD noted that health facility-based stigma and discrimination was present in many communities and severely undermined the efforts of government and stakeholders in eradicating the disease.

This disease is really costing some of us in terms of finding jobs and I personally blame it on the doctors we meet at the facility. I say they are incompetent. They are the same people who expose us to others, otherwise how will people know about another person's HIV status. Why will my customers reject me as a contractor if they do not know I am PLHIV?

Male. FGD Participant, Bolgatanga

As evident in Figure 10, financing which is sourced from household savings has an equivalent weight to public funding in terms of importance or meaning to PLHIV. This situation is corroborated by several NASA studies which found that household funding of HIV in Ghana was regularly proximate to the publicly financed share⁹⁴ (GAC, 2020).

⁹⁴ Typically one third of all costs

Figure 10*Household coping mechanisms - 2021*

Source of data: In-depth interview of 23 respondents (2021)

Figure 10 graphically details the coping mechanisms activated by PLHIV households to deal with HIV and AIDS. The blue line represents the frequency with which families relied upon public funding, personal savings and extended family support as well as on non-disclosure, begging and risky practices such as multiple sexual partners or sex work for survival.

As indicated earlier, most households relied as much on public funding as they did on their own savings. A majority of households relied exclusively on these two coping mechanisms. The over reliance on household financing of HIV in Ghana is untenable and signifies that there is enough scope for improvement in public policy. This is because when families deplete their savings, they are denied future income earning opportunities and this exacerbates their vulnerability to HIV transmission.

In addition to savings and public funding, extended family support, begging and other risky sexual behaviours including commercial sex work constituted the main strategies for confronting direct and indirect costs of HIV and AIDS. As indicated in **Figure 10** only a very limited number of households had to rely on risky sexual behaviour and begging as well as extended family support.

Non-disclosure was reported for some families as the main approach to handling intangible cost.

7.2.2.3 Taxonomy of costs and emotions

Respondents placed cost increases front and centre of their HIV experience. Thus, the intensity of the economic burden of HIV was interrogated using the prism of emotions experienced by PLHIV as a result of the costs which they were exposed to. Guided by Bury's (1982) biographical disruption theory⁹⁵, the thematic content analysis conducted in the current study revealed that four times as many references to disruptive themes were made as there were references to themes suggesting biographical flow or coping. In the same vein, there were even fewer references to themes reflecting biographical reinforcement and recovery than there were references to biographical flow. These results confirm that HIV within affected households remains a disruptive presence against which families have limited tools. Consequently, many families are unable to transition from the initial disruption of HIV diagnosis to the more stable state of "flow", reinforcement, and recovery.

Almost thrice as many mentions of cost increases were made in the qualitative interviews as there were suggestions of indifference to costs, a finding which is in keeping with the results of the present household OOP survey as well as the two surveys held in the past (Asante, 2018; Asante et al., 2014). This also confirms that households continue to experience a significant cost of HIV in Ghana.

⁹⁵ Bury's biographical disruption theory proposes that persons dealing with chronic diseases would experience a disease progression which approximates the following path: Disruption → Flow → Reinforcement.

The preponderance of mentions relating to the image of the self suggests that respondents were more concerned about the joint effects of direct costs (body failure⁹⁶) and indirect costs (performance failure) than they were of intangible costs. Intangible costs, however, were the single most dominant category referenced by respondents (Figure 11). Additionally, some respondents who experienced intangible costs felt it so intensely that it elicited depressive and suicidal thoughts:

Knowing that I have to take drugs every day, sometimes it makes me really sad, and I don't enjoy being in the world anymore sometimes. Now because of my status when guys even approach me, I tell them I'm married. I do that to prevent any mode of transmission to them.

R10 – Student, single female, aged 37, Dormaa, Second Wealth Quintile, PLHIV for 7 years.

Another female respondent (R6) indicated that the loss of her body image was experienced with such intensity that she refused social participation, became depressive and contemplated suicide.

I started by stating that living with HIV has affected my finances negatively and my body. I no longer have the joy to hang out or even socialize. I have changed a lot. I was affected so much that at a point I wanted to commit suicide. In our generation now, weight loss is seen as a symptom of illness or poverty and weight gain is seen as a symbol of wealth or well living. I really lost weight, it almost looked like I left my body.

⁹⁶ Challenges with direct costs may impede treatment access and adherence, potentially leading to therapeutic failure and ultimately body failure.

R6 – Female Student aged 20, Sunyani, Middle Wealth Quintile, PLHIV for 5 years experienced CHE.

Owusu (2019; 2020) and Owusu and Laar's (2018) qualitative studies of PLHIV in the Lower Manya Krobo Municipality in the Eastern Region of Ghana also found that the respondents used self-isolation and non-disclosure of HIV status as coping strategies, particularly with reference to their looks and related feelings of stigmatisation, although these pertained to the female PLHIV primarily. The self-isolation constitutes an act of self-stigmatisation. The sad and depressive disposition of PLHIV is plotted in

Figure 12 **Figure 11** illustrates the pre-eminence of intangible cost mentions (particularly among male respondents) above direct and indirect costs. It is worth reiterating that female PLHIV reported twice as much productivity losses as their male counterparts even though welfare and productivity loss were insensitive to gender (Table 39). Similarly, Owusu (2019; 2020) documented vast differences in the gendered effects of HIV on job losses and productivity as well as the resultant coping strategy the PLHIV she studied in the Lower Manya Krobo Municipality used. This nuanced predominance of intangible costs provides some guidance for potential corrective interventions. Interventions targeting female PLHIV could prioritise both psychosocial support and income substitution while interventions targeting male PLHIV emphasise intangible cost mitigations.

A graphical confirmation of the predominance of intangible costs is seen in Figure 11.

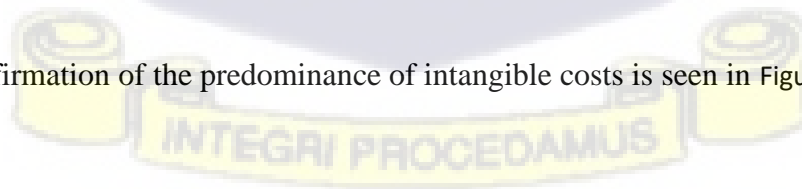
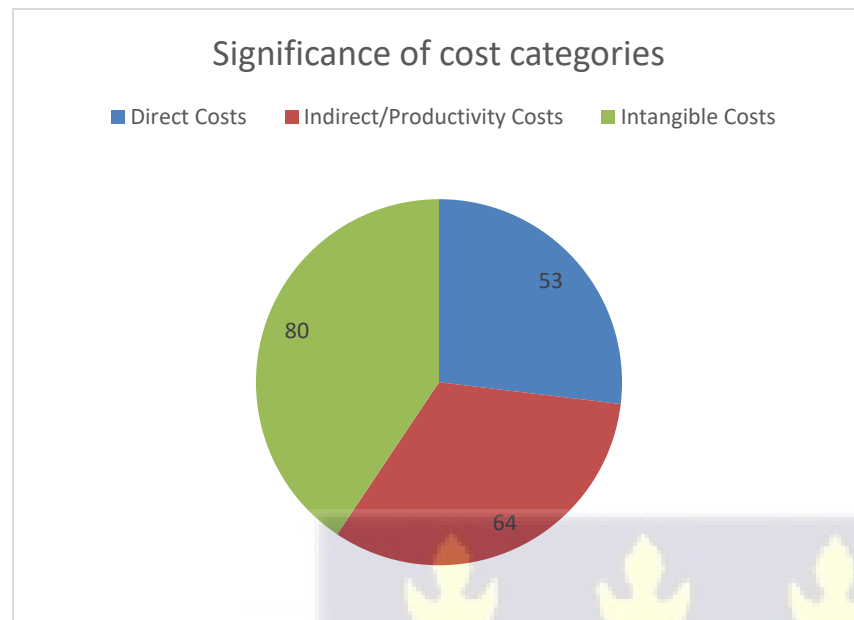


Figure 11*Cost Taxonomy*

Source of data: In-depth interview of 23 respondents (2021) - Number of times cost categories mentioned.

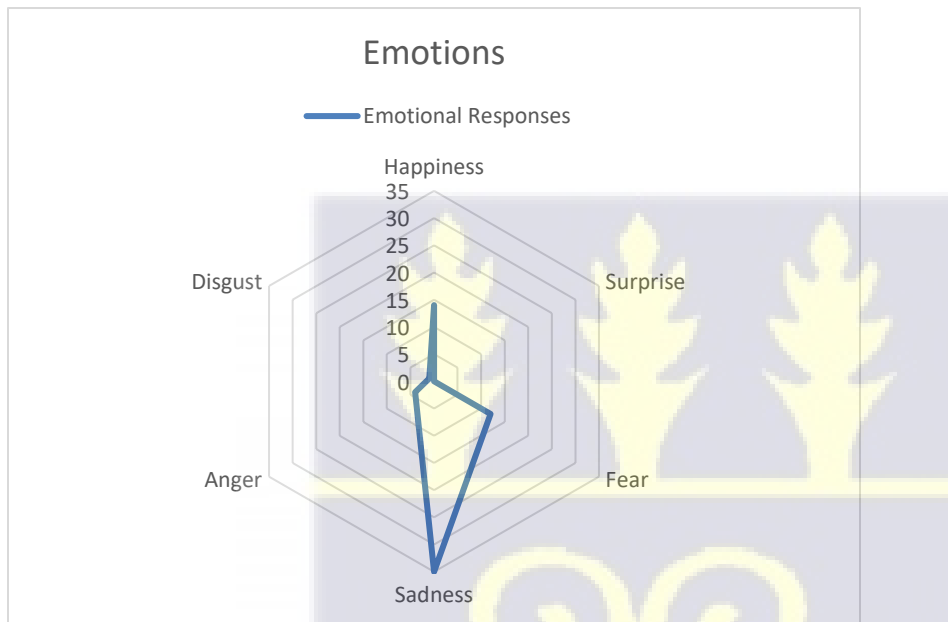
Figure 11 illustrates the frequency of mentions of the major cost categories of HIV and AIDS. Intangible costs were mentioned about eighty times while direct and indirect costs were mentioned fifty-three and sixty-four times respectively. The frequency of mentions of expenditure types or classes might point to the areas of greatest need for PLHIV. As displayed in Figure 11, intangible costs constitute the area of greatest need.

This state of affairs is reflective of some limitations in the national response to HIV. The said limitations are relevant to the extent that the Ghana AIDS Commission and other duty bearers have been unable to create an enabling environment which sufficiently mitigates the economic burden of HIV on affected households as proposed by successive national strategic plans.

A lot more respondents were therefore of the view that their life course had been disrupted by HIV and very few were hopeful to ever recover their past life. This deleterious state of affairs, mitigated somewhat by SES and length of time lived as PLHIV is corroborated in the following emotional web diagram (Figure 11):

Figure 12

Emotional Web Diagram



Source of data: In-depth interview of 23 respondents (2021)

Radar charts or web diagrams are two-dimensional graphics designed to display one or more data series over multiple variables (Holtz, n.d.).

Figure 12 is a radar chart which presents the prevailing emotions experienced by respondents in graphical form. As noted in Figure 11, intangible costs and related emotions such as fear, hopelessness and pain constitute the mainstay of PLHIV everyday experiences. Figure 12 corroborates the perspective by detailing the nature and intensity of emotions experienced by

PLHIV. The blue line represents the frequency with which respondents experience each of the six (6) emotions which they reported. As Hume (2012) posited, emotions are intense feelings directed at someone or something and can be ordered as follows: happiness—surprise—fear—sadness—anger—disgust, detailing a transition from very good feelings to very bad feelings.

The emotional map generated from the in-depth interviews (Figure 11) illuminates the meaning which PLHIV make of their lived experience. Respondents are fearful and sad. It is an experience which is more or less stuck in the disruptive state of Bury's biographical theory although a small number of older PLHIV appears to have made peace with their condition and have proceeded to find happiness and solace in the resources to which they have access including time as predicted by the conceptual framework of the current study.

Sadness was very prevalent among a majority of respondents who had not lived with the disease for very long typically 5-8 years and below. However, even some respondents who had lived more than 10 years with the disease routinely experienced intense sadness:

As for pain and sadness, I am used to it now because it's been long (R5 – 5 years PLHIV).

I don't know how I got the disease. I am not a womanizer; I was never a womanizer (respondent broke into tears) [...] I am not who I used to be, and it makes me think a lot (R3 – 8 years PLHIV).

First, I could give myself to a man but now due to the disease I can't do that and it's a problem (R4 – 12 years PLHIV).

Fear was the next most prominent emotion among respondents after sadness. Many respondents were afraid that they would eventually lose their lives to AIDS. Fear was driven by uncertainty

surrounding the sustainability of AIDS funding, compliance with and effectiveness of therapeutic protocols and the fear of abandonment. It was not related to the number of years lived as PLHIV and was often the cause of non-disclosure of status even to intimate partners:

Where I come from, I used to pay for my labs. When it started, I paid GHc200 before it dropped to GHc15 but here it's free. The drugs are also free. If it happens that we need to pay for some labs, I won't be able to afford (R9).

The lab is expensive for me. I also learnt that we were supposed to have our brains checked but since I got infected, I have never done that scan. I don't even think I have the kind of money to even do that scan, and I also don't know if my brain is being damaged due to the disease. I don't have the money to cater for all those costs unless the government makes provision for it. Perhaps, there may be provisions for it but you the health workers may have refused to enforce it, I don't know...hahahaha! (R6)

Also, most of us get abandoned when we disclose our status to the people close to us. Sometimes I feel like telling my relatives, but I fear they may abandon me. A lot of us have been abandoned by family and friends. It's also a big problem for us.

R21 – Unemployed former cook, single male, aged 32, Accra, Second Wealth Quintile, PLHIV for 3 years.

The fear of mistreatment and abandonment led to very high levels of non-disclosure, a situation which is dire particularly when non-disclosure involves an intimate partner with whom PLHIV may be sexually active:

My wife doesn't know about it, but I have planned to bring her for check-up soon. I know I will definitely tell her about it, and I know she may decide to leave me [even though] we have been together for almost 3years (R3).

There are times I even fear that I'll die [...] I've also realised that I'm no longer happy like I used to. I usually isolate myself from my friends and even when I'm around them, I'm not able to laugh at their jokes anymore like I used to. It's not their fault but I have just decided to be like that, I don't feel like hanging around with them anymore. (R16).

Respondent R16 was newly diagnosed (less than a year) and unsurprisingly had fears about therapeutic success. Interestingly, prior to her diagnosis, she had significant knowledge about the symptoms of the disease yet her family experienced CHE because of late diagnosis. She has lost all joy and the desire to laugh.

Anger and disgust themes together occurred just five times signalling the limited occurrence of very negative feelings which the condition of living with the virus elicited among respondents:

My last born is also positive and anytime I think about it I get sad. I know I'm old and lived my life but what about him. He's too innocent and young for all that. Sometimes I look at him and I tear up. Onetime he asked me why he's always taking drugs and i told him it's necessary for him to take it. He's 14 years and it hurts me a lot (respondent was crying all along when answering this question) R22.

Respondent R22 expressed disgust and anger at the inter-generational impact which his HIV status was having on his family. The feelings were so intense that the respondent, a middle-aged man (47 years) allowed himself to weep in public, a rather unusual situation within Ghana's cultural context.

Feelings of anger were almost certain to surface when multiple generations were impacted directly or indirectly by the disease⁹⁷.

7.3 Discussion

The study confirms the notion that stressful life events and trauma affect clinical progression of HIV (Antelman et al., 2007; Leserman, 2008). The intensity of the said deleterious experiences is mediated by the level of access to the necessities of life (Wright, Zalwango, Seeley, Mugisha, & Scholten, 2012). In other words, PLHIV who have access to greater economic and social resources should fare much better than PLHIV of more modest socio-economic status (SES). The biographical disruption model used in analysing the data confirms this pattern.

Respondents noted that low SES and negative cultural practices and traditions were often associated with negative coping strategies which promote HIV transmission. The tendency to engage in multiple sexual partnerships, early sexual debut and other risky sexual behaviour when no other sources of succour can be accessed which was found in this study has also been documented by other works (Adongo, 2018; Amo-Adjei & Tuoyire, 2018).

An example of such deleterious circumstances can be deduced from respondent R6 who describes the condition of a fellow PLHIV. The said woman living with HIV (WLHIV) after losing her job was compelled to engage in “high frequency⁹⁸” commercial sex work. It is widely known that

⁹⁷ Also see frustration of a PLHIV mother who has to rely on her daughter for sustenance, even though the daughter can barely survive on the wages she earns (R1).

⁹⁸ The phrase “high frequency” is deduced from the use of the phrase “moves around with all sorts of men for some small money, GHS2 or GHS5”. The author deduces that if the PLHIV is unemployed and obtains between GHS2 and GHS5 on average per sexual act she would be required to engage in multiple risky encounters to hope to achieve even the 2021 monthly minimum wage of GHS326 (Please see <https://countryeconomy.com/national-minimum-wage/ghana>)

multiple risky sexual encounters increase the likelihood of HIV re-infection as well as the prevalence of other sexually transmitted infections (STI). This is one of the reasons why HIV prevalence among commercial sex workers (4.6 percent) is several times higher than the 1.6 percent HIV prevalence among the general population (GAC, 2021b) . So, although the case referenced by respondent R6 may have been initially triggered by HIV infection, it is also clear that the negative coping mechanism of the WLHIV (commercial sex work) puts her disease recovery in jeopardy since female sex worker HIV prevalence is 3 times the national HIV prevalence in Ghana. Respondent R6 attributes WLHIV's transition into sex work to the job loss which occurred post diagnosis.

PLHIV feel powerlessness and struggle to express their agency. The feelings of loss and sadness are chronic and are exacerbated by the experience of catastrophic health expenditure with implications for mental health. Respondent R8 for example said she could not afford to provide for some of her "basic needs" because all her savings had been depleted as she attempted to comply with her ART routine. She alluded to the abandonment which she felt particularly from siblings whom she had supported prior to her diagnosis hoping that they would return the favour if she ever needed it. She concluded that because of her HIV diagnosis her siblings did not consider her as a human being and as a result she had depleted all her savings and could not afford the most basic of needs. R8 described her exposure to catastrophic health expenditure in her own words. A situation in which her health expenditure so depleted available resources that basic life sustaining functions can no longer be financed adequately. The emphasis here is the rupture in the financial ritual. The said rupture, flowing from the disease condition, compromises even the most basic of needs, those that make one "human". This is par excellence, the definition of catastrophic health expenditure.

Time did not always provide “answers” for many PLHIV as they continued to experience catastrophic health expenditure, intense sadness, and depressive thoughts even after several years of living with HIV. An extended emerging disability and uncertainty phase of the biographical disruption model was prevalent among respondents as they were constantly reminded of their HIV status through the experience of catastrophic health expenditure exposure or through other discriminatory or adverse social encounters including cultural practices which demand that widows be inherited along with the estate of their deceased partners. Thus, very few PLHIV could transition to the biographical flow and reinforcement phase of the biographical disruption model.

With the reported success in coverage and access to ART, it may be intimated that commendable progress has been achieved for direct costs. Imminent action is however required for indirect costs and intangible costs.

PLHIV must report discrimination to trigger change within the structural functionalist paradigm. If sufficient feedback, advocacy, and action are not triggered following the experience of stigma and discrimination, a negative course of the epidemic is to be expected. Predictions of an explosion in incidence among adolescent girls and young women have already been fulfilled in recent prevalence estimate reports (GAC, 2022).

This study confirmed the preponderance of non-disclosure as a coping mechanism and a reluctance to report cases of discrimination (Epeh, 2019) due to fear and self-stigma. In this regard, and assuming that the concept of disability insurance for PLHIV is pursued, there may be value in pursuing the concept of subrogation which is the ability of an insurance company to legally pursue a third party for causing a loss. Such a strategy might “shift” the reporting and litigation burden

away from PLHIV who may be unable to exercise their agency under the Ghana AIDS Commission, Act 938, 2016.

There is a realisation of the need to flow rather than be held down by the disruption of disease diagnosis. The role of significant persons and relationships in building agency and trust is therefore inescapable (Carricaburu & Pierret, 1995; Faircloth et al., 2004)

7.4 Conclusion

The study yielded three major themes namely failure, loss and uncertainty. Respondents experienced failure within their bodies and their identities. They could not perform the daily rituals which structured their identities. These body and identity failures then triggered relationship failures at the personal, family, community and societal level. The break down in identity and relationships was often coincidental to loss.

The losses experienced included physical assets, emotional and relationship rights as well as social participation opportunities. The intensity of the loss experience for many PLHIV was so intense that some of them questioned their sanity and their humanity. Many highlighted the pain of not knowing if they would ever recover or lead normal lives ever again.

The three themes of failure, loss and uncertainty led to feelings of fear, sadness and anger as respondents coursed from the disruptive phase which typically deprived them of access to resources, through the problem recognition and emerging disability phases of their biographical disruption. The disruption and emerging disability phases often overlapped with respondents experiencing flux between disruption (onset) and emerging disability. The flux between the two phases suggests that respondents may be experiencing multiple shocks from the environment,

which is not sufficiently supportive, hence the persistence of the biographical disruption phase in the lives of respondents. Respondents were often unable to provide for themselves or others, unable to love and be loved, quite simply, many PLHIV were unable to do the things which undergird their identity. Many PLHIV were in some form of suspended existence. The biographical reinforcement phase which occurred in a minority of cases (typically long term PLHIV), illustrated more positive emotions such as happiness.

The study also featured personal and group agency as major drivers of resilience. Length of time lived as a PLHIV and socio demographic characteristics of participants as drivers of the resource mobilisation phase of respondents' disrupted life courses. This corroborated the findings of the logistic regression models presented in chapter 5. Identities, resources, relationships, and rights were among the many losses suffered by PLHIV while resilience architecture featured anti-stigma mechanisms, stable and supportive marital and extended family relationships, social networks as well as occupational and income stability.

Respondents established a taxonomy of costs with intangible costs being the most significant particularly for male respondents while direct costs proved least difficult to bear except for travel, transport and nutrition which are linked to the general inflationary price levels in the country. The emotional map of respondents portrayed PLHIV as generally sad, afraid, and angry, with very little hope of ever getting away from the economic burden of HIV.

Several long lasting (intergenerational) and gendered effects were identified in this study and should be addressed through increased public education on the extra economic and emotional burden which PLHIV households contend with, particularly in more rural and remote communities. This should significantly mediate the burden of intangible costs. Existing business support and social protection

programmes such as the Livelihood Empowerment Against Poverty (LEAP - household cash grants) and the National Health Insurance Scheme (NHIS) should be tweaked to target PLHIV households more purposefully.



CHAPTER EIGHT

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

8.1 Introduction

This chapter articulates a summary of key findings and conclusions and presents some policy recommendations. The chapter sketches some institutional, cultural changes and social transformations which may be required to alleviate the burden of HIV in Ghana and effectively achieve epidemic control of HIV on or before the year 2030. Suggested areas for further research are also broached in the chapter.

8.2 Summary of Key Findings

This inquiry plunged into the discourse on health financing and disease burden studies, attempting to address lacunae within the economic burden of disease literature with specific reference to HIV and AIDS in Ghana. The study is an assessment of the economic burden of HIV in Ghana, and it estimated the effect of HIV and AIDS on the Ghanaian economy as well as the welfare and productivity effects of HIV and AIDS on households in Ghana. The study further contextualised the burden of HIV by calculating unit costs per capita for HIV and AIDS treatment and care in Ghana with a view to establishing efficiencies in the delivery of HIV interventions over time. Finally, the effectiveness of mitigation interventions in Ghana was explored through the prism of coping strategies and the lived experience of PLHIV.

A mixed method approach was employed to execute the study. The study design, data collection approach and data analytics framework presented a retrospective, sequential explanatory study

embedded within the pragmatic paradigm. The work was designed using a mixed method approach, the combination of both qualitative and quantitative methods and techniques in sampling, data collection and analyses secured the attainment of the research objectives. The study was conducted in six (6) regions and twelve (12) districts with forays into neighbouring communities to achieve the total number of 505 households who consented to take part in the survey and had the questionnaire administered.

The study's sequential explanatory design ensured that each step of the design (multistage sampling, production function estimates before surveys, interviews and FGD), added a dimension or characteristic of the epidemic to the explanatory framework and thus contributed to corroborate the story which was being constructed in line with the structural corroboration approach (Morse et al., 2002). Twenty-three (23) in-depth interviews and three FGD were culled from the 505 survey participants. FGD were held separately for different regions and sought to explore community level agreement on expenditure patterns, the nature of the burden as well as PLHIV coping mechanisms.

Chapter sequencing in this thesis was driven by the objectives of the study and therefore resulted in 4 empirical chapters which illustrated the following key findings:

8.2.1 Effect of HIV and AIDS on the Ghanaian Economy

The effect of HIV and AIDS on Ghana's economy was the focus of the first empirical chapter. Using the classical Cobb-Douglas double log production function which is reputed for its effectiveness in predicting output growth given various representations of labour and capital a deleterious effect of HIV prevalence and morbidity on economic output was found. Although these losses appear trite at per capita GDP level (almost two thirds of a percentage point for every 1 percent increase in PLHIV case load and about a quarter of a percentage point in the case of every 1 percentage point increase in the number of AIDS deaths), the adverse effect of HIV for economic

output is undeniable. The growth declines account for about a fifth of medium-term growth rates for the period ending in the year 2022.

Additionally, when the per capita effects are scaled to an aggregate level (total GDP or population level) the losses become significant enough from an opportunity cost perspective, easily off-setting total current annual HIV and AIDS investments in Ghana multiple times

8.2.2 Welfare and Productivity Effects of HIV on Households in Ghana

The household survey illustrated a significant level of structural corroboration with the production function models. The cost of illness study implemented in the chapter examined the welfare and productivity effects of households in Ghana and found that an overwhelming majority of PLHIV households report varying levels of adverse effects and that the phenomenon is regressive, affecting households of lower socio-economic status (SES) much more than the more well off.

Using logistic regression, frequency tables and other measures of central tendency, PLHIV households were found to be worse off than the general population. They experienced more food insecurity, were about a fifth less wealthy by median expenditure and recorded about a tenth less time available to work than the general population because of the number of days spent each year either unwell or hospitalised. However, productivity was insensitive to disease intensity.

SES much more than geography and other demographics such as gender, formal education and NHIS accounted for resilience to HIV as reflected by welfare, productivity and longevity.

A quarter of PLHIV households report that they cope very well and do not experience challenges. For the half of respondents who experienced catastrophic health expenditure, corrosive coping strategies abounded, including transactional sex and begging, particularly proximate to diagnosis. Otherwise, coping strategies are driven by savings and family support.

8.2.3 Unit Costs of HIV in Ghana

The third empirical chapter focused on identifying comprehensive or societal unit costs of HIV interventions in Ghana, to apprehend production efficiency in terms of achieving one whole year of life as a PLHIV in Ghana.

Direct and indirect HIV and AIDS expenditure per PLHIV in Ghana (US\$1,380⁹⁹) is borne principally by households (US\$1,064 - 77 percent) and by the public (international development partners, all levels of national and local government, as well as public and private institutions). Annual household HIV costs, contrary to institutional costs are rising. Costs inclines are driven by indirect costs (US\$964 – 91 percent of household HIV costs). The costs of nutrition (40 percent of household direct costs), non-ARV medicines (21 percent) and transportation (12 percent) make up about 73 percent of the direct costs borne by households (US\$100).

Annual institutional expenditure per PLHIV (US\$316) is driven by ART (about one half), human resources (about a fifth), community mobilisation (about a fifth) and coordination. The findings of this study suggest an overwhelming opportunity for optimising the cost-of-service delivery or the business processes related to producing one year of ART service in Ghana.

8.2.4 Experiences and Coping Strategies of PLHIV Households in Ghana

The fourth empirical chapter centred on the experiences and coping strategies of HIV affected households in Ghana. The narrative method employed by the study leveraged Bury's (1982) biographical disruption model to find the meaning which PLHIV make of their lived experience.

PLHIV verbalised a narrative of loss throughout the study and only sparingly manifested resilience.

The running theme of an increasing household burden contrasting with the general decline in cost

⁹⁹ This is more than half of Ghana's 2020 per capita GDP (World Bank, 2020)

of ARV was also identifiable in this chapter. The theme of the failure of NHIS and gender to provide protection from HIV related health shocks remains.

Body and performance failures leading to feelings of fear, sadness and anger retained respondents in an extended period of biographical disruption. At best, a flux between the problem onset phase and emerging disability was noted. This suspended phase contained a vicious cycle of disruptive events and multiple shocks which delayed and in some cases stalled recovery from the individual level through the community level to the level of society in general. The flux was coterminous with an extended period of “not knowing”.

A gender difference was evident with females experiencing greater abandonment and a significant presence of indirect cost mentions, corroborated by the survey findings while the men appeared more concerned about intangible costs. Those who experienced greater resilience typically had greater access to resources, income, opportunity, supportive relationships, and trust. A centripetal force was evident through which cultural and government policies and practices influenced community and family relationships, diminished stigma and fostered PLHIV resilience.

8.3 Conclusions

The study found significant growth inhibiting as well as welfare, freedom and productivity depleting effects of HIV and AIDS in Ghana. It was further noted that whereas standardisation and international partnerships may have prompted declines in institutional cost components, over the years, household borne costs of HIV have remained excessive, occasionally increasing, among many households even in the more opulent parts of Ghanaian society.

Coping mechanisms such as support from the extended family, engaged religious leaders and communities of faith were noteworthy. There was also high demand for social protection such as

livelihood support and other income protection measures. Household savings and ART coverage (proximity and access) were the mainstay of PLHIV resilience.

The study noted several gaps between policy and practice, ventilated across different domains which exacerbated the economic burden of HIV for affected families. These include the spread between ARV unit costs and the unit cost of ART as well as the chasm between the target and current rates of viral suppression. A further rift was identified between the 3 percent investment in economic mitigation targets and the need expressed by PLHIV households for succour¹⁰⁰ and reflects an opportunity to further optimise ART service delivery. To deal with the afore mentioned gaps between policy and practice, PLHIV sometimes adopt negative coping strategies which exacerbate their depressive feelings and promote risky behaviour, contrasting vividly with the guidance of the national treatment programme. This deviant circumstance is illustrated in the failure to meet the commitment to end short term poverty among PLHIV by 2020 (GAC, 2016b). These tensions if left unattended, are expected to militate against viral suppression, treatment adherence and promote HIV incidence, drug resistance and mortality with untold economic and social consequences for the nation. Corrective action in this regard is long overdue.

The burden of HIV in Ghana is regressive, with the poor experiencing a greater burden than the wealthy. There is sufficient room for improvement in compliance with existing ART guidelines and the national strategic plan in terms of economic mitigation and universal health coverage.

The voicelessness of PLHIV with lower socio-economic status is not gender sensitive and has implications for the national response to HIV in Ghana beyond its effects on affected families.

¹⁰⁰ The NSP 2016-2020 targets 3.3 percent of all HIV expenditure to support economic mitigation interventions for PLHIV (GAC, 2020b). The study found that the need was much higher since PLHIV OOP account for about one third of annual unit costs of HIV treatment costs.

A majority of PLHIV households have exhausted their traditional and informal social support systems while existing private and public social protection structures do not target PLHIV due to stigma and discrimination concerns. In comparison to other jurisdictions, Ghanaian households bear an excessive burden of HIV and AIDS costs even though policy and international development partnership frameworks exist to promote economic mitigation interventions for households. PLHIV disregard the LEAP¹⁰¹ and find it unfit for the economic mitigation of the effects of HIV. Under such circumstances epidemic control is not achievable and duty bearers must promptly redress course.

The growth consequences estimated in the current study are projected at around fifteen percent of growth estimates for the five years to 2022. Given the multiplicity of economic headwinds and the global supply chain challenges created by the COVID-19 pandemic, Ghana cannot afford any additional constraints to growth. The multi sectoral approach to confronting HIV is needed more than ever before.

8.4 Recommendations

The discourse on the economic burden of HIV and AIDS in Ghana brings to the fore some basic issues surrounding the value which Ghana as a country, places on the lives of its citizenry and whether the commitments made by the government and people of Ghana should be taken seriously by partners and the public in general. The obvious gains which investments in the HIV and AIDS response are likely to cause begs the question why policy action has been limited in scope and time. The conclusions identified in this study enabled the following recommendations for policy and practice:

¹⁰¹ This was notable when the author engaged the NAP+ president as well as some managers of ART clinics.

1. The establishment of an economic impact sentinel surveillance system to gauge the effect of HIV and AIDS on the welfare of PLHIV households. This is necessary given the place of economic vulnerability in the aetiology of HIV infection. It is recommended that the Ghana AIDS Commission lead this process preferably through an annual out-of-pocket survey that will be conducted as part of the annual National AIDS Spending Assessment (NASA) exercise.

Small declines in institutional costs of ART have been noted over the years. It has been found that these laudable changes are not the result of efficiency gains but are mostly due to economies of scale resulting from increased ART coverage and plateauing ARV costs. In a deplorable reversal of circumstances, PLHIV households have borne an increasing proportion of the burden of HIV care over the same period with dire effects for their savings and other coping structures. As has been well documented, the depletion of these protective sheaths against future shocks results in riskier behaviour with tenuous consequences for HIV transmission and prevalence in general, particularly for adolescent girls and young women. This phenomenon has already been noted in recent estimates of PLHIV in the country. In the 10-19 and 15-24 age groups for example, females accounted for 92 and 83 percent of all new infections, a near 50 percent spike in terms of gender distribution (GAC, 2021a). An economic impact sentinel mechanism might identify trends in the economic triggers before the changes are clinically noted in the escalation of HIV incidence.

2. Scale up advocacy and interventions to enforce existing policies which promote the enabling environment required for effective treatment, care, and mitigation of the socio-economic effects of HIV and AIDS in Ghana.

It is noteworthy that Ghana has a robust policy framework which provides for universal health coverage. Unfortunately, the persistence of CHE and stigma point to gaps in practice which need

to be closed to comply with policy. In this regard, increased investments and monitored execution of the NSP 2021-2025 should be advocated for. An emphasis should be placed on the fact that HIV investments in Ghana pay for themselves through GDP growth. Key performance indicators for therapeutic protocol compliance should be rigorously monitored to increase PLHIV confidence in the treatment program, reduce fear and sadness as well as improve treatment adherence. Advocacy led by the Ghana AIDS Commission and directed at the Ministry of Finance should ensure that routine surveys such as the stigma index and social protection measures such as the Livelihood Empowerment Against Poverty (LEAP) are adequately financed and implemented annually and that the relevant reports are published and disseminated in a timely manner and through radio, television, and other online platforms each year.

Additionally, the 3.3 percent benchmark (GAC, 2020a) for economic mitigation investments in support of PLHIV households should be enforced by the Ghana AIDS Commission and perhaps increased to alleviate the burden of HIV for households in line with the standards set by nations of similar economic might and epidemiology. As noted in this study, less than half of PLHIV households experience CHE and this could be one of many criteria applicable within the means testing protocol which would be necessarily required for the implementation of any enhanced cash transfer programs. It is also noteworthy that if this relief were applied only to the fees, medicines (ARV and non ARV) and transport portion of direct unit costs of HIV which are borne by households, only US\$37¹⁰² would be required per PLHIV each year, to eliminate a significant portion of CHE without requiring any additional resources from government beyond the commitments already made in the NSP 2016-2020 (GAC, 2016b). It is recommended that enhancements to the cash grants provided under LEAP specifically target HIV orphans and

¹⁰² From Table 31- with aggregate scenario as denominator (199+365+207)/1725

vulnerable children for support. The Ghana AIDS Commission, The Ministry of Health and the Ministry of Gender Children and Social Protection should find innovative ways to enhance the cash grants without exposing beneficiaries to stigma. One approach might be to develop a simplified questionnaire to be implemented once a year at ART centres during the routine PLHIV refill visits. The simplified questionnaire could reflect the household asset, nutrition, transportation, and health expenditure domains of the present out-of-pocket study. PLHIV beneath the first quartile would then be eligible to remain on the register for enhanced LEAP payments and food vouchers or assistance. To manage stigma, cash advances could be transmitted to the Ghana AIDS Commission for onward transfer to the PLHIV who fall beneath the first quartile as reported by ART centres across the nation.

3. Promote an integrative health care model for HIV to improve ART coverage, adherence, and viral suppression to facilitate the attainment of the SDG targets for elimination of AIDS by 2030.

Ghana already implements differentiated ARV service delivery in which customised care plans are issued and used to deliver care to PLHIV. This has useful implications for efficiency and quality of care rendered at the health facility level (GAC, 2021b). Although this approach has increased uptake in ART, it remains biological or clinical in its approach and does not deliver the holistic view of treatment proposed by Saad and Prochaska (2020) to properly integrate the social determinants of health. A further step in optimising the delivery of care would be to directly address travel and transportation costs, non-ARV medicines, nutrition and stigma.

Three specific recommendations to address the above are proposed here and they include enhancing the varied abilities of PLHIV to maintain health through improved and quality nutrition which

equals and exceeds, if possible, the palette available to non PLHIV households. The improved wellness achieved from this would shore up labour participation. This may be done through the reintroduction of food aid for qualifying PLHIV households in partnership with the World Food Program and others as stridently requested by PLHIV. The National AIDS Control Program could partner the Ghana AIDS Commission and the World Food Program to reintroduce food pantry services to support PLHIV who report the need for food assistance. These support items could be provided to them during their clinic days at the ART centres.

The second policy action under the integrative health care recommendation involves identifying the non-ARV medicines which are most consumed by PLHIV and ensuring that these are included within the drug list of the national health insurance program. The Ghana AIDS Commission should lead advocacy efforts directed at the Ministry of Finance and the National Health Insurance Authority to ensure that the National Health Insurance Scheme's medicine list is updated to include the major non-ARV medicines consumed by PLHIV for prophylactic purposes.

The third policy action under the integrative health care recommendation consists of an optional home care delivery or off ART site delivery of care including ARV refills to address the transportation challenge identified by respondents. PLHIV would have to visit the ART centre for services requiring equipment or greater skill but not for ARV refills as this could be done through ambulatory care services at locations much closer to a place of their choice in keeping with the stigma and discrimination landscape of the PLHIV host communities. This optional ambulatory service should be the preserve of ART centres and should be determined by the results of the abridged out of pocket questionnaire responses in each ART centre or through an opt-in mechanism.

These varied options if implemented would diversify the differentiated care options which are already available within ART centres and promote PLHIV resilience at all levels. It goes without saying that an effective monitoring and evaluation system with enough computerised power must be implemented to track performance at a very granular level.

Alternatively, a disability insurance program could be introduced to cover additional direct and productivity losses to alleviate the burden of HIV on households. This would require updates to the package of services currently offered by the National Health Insurance Scheme. In countries with greater fiscal space such as the US¹⁰³, public health insurance system already provides access to many wrap-around services including transportation, nutrition, and housing through myriad social protection measures. The Ghana AIDS Commission, The Ministry of Health, The National Health Insurance Authority, and the Ministry of Finance could work on a version of comprehensive health care delivery which can be sustainably financed in the Ghanaian setting. A Technical Working Group (TWG) should be set up to progressively introduce and pilot NHIS add-on services which address the social determinants of health as has been done in many countries¹⁰⁴. An annual report would be prepared by this group to report progress made.

¹⁰³ <https://www.cms.gov/medicare-medicaid-coordination/fraud-prevention/medicaid-integrity-education/downloads/nemt-factsheet.pdf>

<https://healthy.kaiserpermanente.org/maryland-virginia-washington-dc/shop-plans/medicaid/md/additional-resources#:~:text=The%20Food%20Supplement%20Program%2C%20Maryland's,to%20help%20you%20stay%20healthy.>

¹⁰⁴

<https://www.cdc.gov/nchhstp/socialdeterminants/faq.html#:~:text=Social%20determinants%20of%20health%20such,lives%20by%20reducing%20health%20inequities.>

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APPENDICES



APPENDIX 1: QUESTIONNAIRE

ECONOMIC BURDEN OF HIV AND AIDS ON PRODUCTIVITY AND HOUSEHOLD WELFARE IN GHANA (HOUSEHOLD LEVEL QUESTIONNAIRE)

Consent statement

Dear participant,

The purpose of this study is to interrogate the Socio-economic impact of HIV and AIDS in Ghana. I would like to ask you a few questions regarding your economic, educational and health status. The same questions are being asked to a number of households in twelve sites across the country.

Participation in this survey is voluntary and you are free to refuse to answer any question which you find uncomfortable or objectionable. Even if you agree to participate or respond to these questions, you can decide to stop answering and/or quit at any point during the study.

I wish to assure you that your name and identity or any other personal information will not be revealed to anyone either in the final report or in any other way. Your participation in this study will support attempts to improve the strategies which may be implemented to mitigate the economic impact of HIV and AIDS in Ghana.

Do you agree to participate? Yes-1/ No-0

Name of the interviewer:

Signature of the interviewer:.....

Date:..... Time of interview:.....

Place of interview:----NAP+-----Hospital/Clinic Facility-----Telephone-----



Economic Burden of HIV & AIDS on Productivity and Household Welfare Ghana

Study number Region

Interview number District

Type of settlement
 1. Urban 2. Rural

Name of the village/city (Please write name).....

Note: Unless otherwise stated “before” and “after” questions are labelled as follows: Question#.i for “before” and Question#.ii for “after”. For example Before value on question 1.4 is labelled 1.4.i and the after value is labelled 1.4.ii

Part 1: Household Characteristics

Section 1: Household Characteristics

1.1 Place of interview: VCT Centre – 01 Community care centre – 04 Antenatal clinic – 07 ARV collection centre – 10 NGO office – 12	TB Clinic/Unit – 02 Hospital (inpatient) – 05 Maternity ward – 08 Network of positive Peoples Office – 11 Residence - 13	Care & support home - 03 Hospital (outpatient) – 06 Drop in centres - 09 Others (Specify) – 99	<input type="text"/> <input type="text"/>
1.2 Address (excluding the door number):			
1.3 Religion of the head of the household Muslim1 Catholic.....2 Anglican.....3 Presbyterian.....4 Methodist.....5 Pentecost.....6 Spiritualist.....7 Charismatic.....8 Traditional9 No religion... 10 Other (specify).....11			<input type="text"/>
1.4 Household size	Before HIV Diagnosis <input type="text"/> <input type="text"/>	After HIV Diagnosis <input type="text"/> <input type="text"/>	
1.5 Type of house	Before HIV Diagnosis <input type="text"/>	After HIV Diagnosis <input type="text"/>	
Several Huts/Buildings (same cmpds).....1 Room(s) (Compound house).....3 Apartment/Flat.....5	Several Huts/Buildings (diff. cpds).....2 Single family house.....4 Others (specify).....6		



1.6 Is there electricity in the house? Yes – 1 No – 0	Before <input type="checkbox"/>	After <input type="checkbox"/>	HIV Diagnosis
1.7 What is the main source of drinking water? River, lake, spring, pond.....1 Rain water.....2 Well with pump.....3 Well without pump.....4 Public stand pipe.....5 Indoor plumbing.....6 Inside standing pipe.....7 Water vendor.....8 Water truck/tanker service....9 Neighbouring household...10 Other (specify)11	Before <input type="checkbox"/>	After <input type="checkbox"/>	HIV Diagnosis
1.8 Is there a separate space for cooking? Yes – 1 No - 0	Before <input type="checkbox"/>	After <input type="checkbox"/>	HIV Diagnosis
1.9 Type of fuel mostly used for cooking: Firewood – 1 Coal – 2 Kerosene – 3 LPG (Gas) – 4 Cow dung – 5 Electricity – 6 Bio-gas – 7 Other (specify) - 8	Before <input type="checkbox"/>	After <input type="checkbox"/>	HIV Diagnosis
1.10 Household have a toilet? Yes – 1 No – 0	Before <input type="checkbox"/>	After <input type="checkbox"/>	HIV Diagnosis
1.11 If yes, type of toilet: Service latrine (Public) – 1 KVIP (In-house) – 2 Flush system – 3 Any other – 9	Before <input type="checkbox"/>	After <input type="checkbox"/>	HIV Diagnosis
1.12a Does your household own any agricultural land? Yes – 1 No – 0	Before <input type="checkbox"/>	After <input type="checkbox"/>	HIV Diagnosis
1.12b If yes, how much land does the household own (Acres)? (9 poles=1 acre)	Before <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	After <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	HIV Diagnosis
1.13 Does the household own any livestock? (eg cow, etc.) Yes – 1 No – 0 How Many? a-Cow ----- b-Sheep ----- c-Goat ----- g-Chicken ----- e-Other livestock -----	Before <input type="checkbox"/>	After <input type="checkbox"/>	HIV Diagnosis
1.14 How many household members have been tested HIV-positive?			<input type="checkbox"/>



1.15a	Did your household change the place of residence after one of your family Members was detected HIV-positive?	Yes-1 No-0	<input type="checkbox"/>
1.15b	If yes, where did you move?		<input type="checkbox"/>
a)	Within the same city/village -----	1	
b)	From city to village (within the region/district) -----	2	
c)	From village to city (within the region/district) -----	3	
d)	From one city to another city (within the region/district) --	4	
e)	From one village to another village (within the region/district) ---	5	
1.16	What were the reasons for changing residence? (Multiple answers possible)		<input type="checkbox"/>
a)	Search of employment/transfer -----	1	
b)	Could not afford earlier place of residence -----	2	
c)	To seek medical treatment-----	3	
d)	Loss of agricultural land/property-----	4	
e)	Reasons of anonymity --	5	
f)	Asked to vacate by the house owner because of HIV status -----	6	
g)	Any other (specify)-----	7	



Section 3: Household income and expenditure

3A. Total household income during the last one year

[Compare to the year prior to HIV diagnosis]

Source of Income	Amount (GH¢) Year Before HIV (3.x.x.i)	Amount (GH¢) Year after HIV (3.x.x.ii)																														
<i>Numbering scheme 3.x.x.i (before) & 3.x.x.ii (after) e.g. farm income before 3.1.a.i and farm income after HIV diagnosis is 3.1.a.ii</i>																																
3.1 Income from agriculture and allied activities																																
(a) Income from farm, orchards etc. (Income is derived by deducting the expenses from production)																																
(b) Income from livestock, poultry, sericulture etc.																																
(c) Income from renting of tractors/pump sets & other implements																																
Total Income from agriculture and allied activities (3.1)																																
3.2 Income from trade/business/petty shops etc.																																
3.3 Income from self-employment like artisan																																
3.4 Salary income (of all the household members who have salaried income)																																
3.5 Wage income earned by the household members (Calculate the wage income earned during the year by all the members by Asking the wage rate and the number of days worked in a normal month)																																
<table border="1"> <thead> <tr> <th>I.D.</th> <th>Annual income</th> <th>No. of days worked in a month</th> <th>Average daily wage</th> <th>Monthly income</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3.</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="5">Total wage income</td> </tr> </tbody> </table>	I.D.	Annual income	No. of days worked in a month	Average daily wage	Monthly income	1.					2.					3.					3.					Total wage income						
I.D.	Annual income	No. of days worked in a month	Average daily wage	Monthly income																												
1.																																
2.																																
3.																																
3.																																
Total wage income																																
3.6 Income from rent, interest, dividends, etc.																																
3.7 Transfer income (remittances from household members living in other places)																																
3.8 Any other income (e.g. pension)																																
Total income from all sources (3.1 to 3.8)																																

3.9 Did the household liquidate any assets or borrow any money after one of the family members tested positive in order to cope with the financial burden/loss of income etc?

Yes-1 No-0



If yes, what did they sell? (Multiple answers possible)

- (a) Agricultural land-1 (b) House property-2 (c) Jewellery, Clothing & apparel-3
 (d) Liquidation of Savings¹, Sale of bonds, shares & Other financial assets- 4
 (e) Vehicles-5 (f) Households goods-6 (g) Livestock-7 (h) Borrowings-8
 (i) Other (specify)-9

How much money was raised in total? GH¢

3B Household savings, borrowings and lending during the last one year
[Compare to the year prior to HIV diagnosis]

Note: Unless otherwise stated "before" and "after" questions are labelled as follows: Question#,i for "before" and Question#,ii for "after". For example Before value on question 3.10 is labelled 3.1.i and the 'after' value is labelled 3.1.ii

3.10 Did the household save in the following forms during the last one year [from date of interview]? Yes-1/No-0 <input type="checkbox"/>		
If yes, how much did the Household save?		
Type of savings	Amount in GH¢ pre HIV	Amount in GH¢ post HIV
3.10a Cash/bank deposit		
3.10b Purchase of Jewellery		
3.10c Purchase of agricultural land		
3.10d Purchase of house/flat/plot		
3.10e Shares, bonds, chit fund etc.		
3.10f Total (¢)		
3.11 Did the household dissave in any form during the last one year [from date of interview]? Yes-1/No-0 <input type="checkbox"/>		
If yes, how much did the HH dissave from the following?		
Type of dissaving	Amount pre	Amount post
3.11a Cash		
3.11b Sale of jewellery		
3.11c Sale of house/flat/plot		
3.11d Sale of shares, bonds, chit fund etc.		
3.11e Total dissaving		
3.12a Did the household borrow any money in the last one year [from date of interview]? <input type="checkbox"/>		
Yes-1/No-0		
3.12b If yes, how much	GH¢	<input type="text"/>

¹ Only Forfeited interest using Annual Percentage rate should be added here. Liquidated savings themselves are documented in section 3B



3.13a Did the household lend/make remittance to outsiders?
Yes-1/N0-2

3.13b Yes, lent money-1 Yes, made remittance-2 both-3 No-4

3.13c If yes, how much? GH¢

3.14 Does the household own any of the following items? [only those functioning in the last 6 months from the date of interview] (Yes - 1 No - 0)

Before HIV/ After HIV		Before HIV/ After HIV	
a-Fan	<input type="checkbox"/> <input type="checkbox"/>	m-Moped/Motor. cycle/Scooter	<input type="checkbox"/> <input type="checkbox"/>
b-Bicycle	<input type="checkbox"/> <input type="checkbox"/>	n-House/Flat/Plot	<input type="checkbox"/> <input type="checkbox"/>
c-Radio/Transistor	<input type="checkbox"/> <input type="checkbox"/>	o-Car/Jeep/Van	<input type="checkbox"/> <input type="checkbox"/>
d-Tape recorder	<input type="checkbox"/> <input type="checkbox"/>	p-Bullock cart	<input type="checkbox"/> <input type="checkbox"/>
e-Television B/W	<input type="checkbox"/> <input type="checkbox"/>	q-Tractor	<input type="checkbox"/> <input type="checkbox"/>
f-Television colour	<input type="checkbox"/> <input type="checkbox"/>	r-Thresher	<input type="checkbox"/> <input type="checkbox"/>
g-Refrigerator/Freezer	<input type="checkbox"/> <input type="checkbox"/>	s-Tube Well	<input type="checkbox"/> <input type="checkbox"/>
h-Telephone	<input type="checkbox"/> <input type="checkbox"/>	t-Sewing Machine	<input type="checkbox"/> <input type="checkbox"/>
i-Washing Machine	<input type="checkbox"/> <input type="checkbox"/>	u-Mattress	<input type="checkbox"/> <input type="checkbox"/>
j-Mobile Phone	<input type="checkbox"/> <input type="checkbox"/>	v-Furniture (Bed, Chairs, Tables)	<input type="checkbox"/> <input type="checkbox"/>
k-Computer	<input type="checkbox"/> <input type="checkbox"/>	w-Cutlass/Hoe	<input type="checkbox"/> <input type="checkbox"/>
l-Pressure Cooker/blender	<input type="checkbox"/> <input type="checkbox"/>	x-Spraying machine/generator	<input type="checkbox"/> <input type="checkbox"/>
		y-Any other (specify) _____	<input type="checkbox"/> <input type="checkbox"/>

3C. Total household consumption expenditure

I. Expenditure on food items during last month [Compare with 1 month pre-diagnosis]

	Unit of measurement	Quantity Consumed	Approx. price per unit	Total Value GH¢ (Before HIV)	Total Value GH¢ (Now)
3.15 Cereals					



III. Other annual consumption expenditure during the last one year [from date of interview]

	Total value (GH¢) Before HIV	Total value (GH¢) After HIV
3.40 Clothing		
3.41 Footwear		
3.42 Durable goods		
a) Automobiles		
b) Electronic appliances		
c) Other durable goods (e.g. furniture, pressure cooker, utensil etc.)		
3.43 Education of children		
3.44 Medical (OPD)		
3.45 Medical (Hospitalisation)		
3.46 Travel		
3.47 Repairs and maintenance of house, vehicles etc.		
3.48 House tax, vehicle insurance etc.		
3.49 NHIS or Other Private insurance		
3.50 Total III (Other annual exp.)		

Section 4: Stigma and discrimination in the family and community

4.1 When was your HIV status detected? _____ (No. of years since diagnosis)
 For less than or equal to one year from interview date, code 01)

4.2a What was cost of testing in GH¢

4.2b Who paid for the test? [Multiple answers possible]

- a) National HIV Program-1
- b) Health Facility itself-2
- c) NHIS-3
- d) Self (PLHIV)-4
- e) Other [please specify]-_____5

4.2c If you had gone for voluntary testing, why did you choose to obtain an HIV test?

- a) Sickness-1
- b) Health provider suggestion-2
- c) Knew others with HIV-3
- d) Partner infected-4



e) Any other (specify)-9

4.3 What was your initial reaction to your HIV-positive status? (Multiple answers possible)
 (Interviewer-write the reply in his own words)
 a) Shocked-1
 b) Embarrassed-2
 c) Could not believe-3
 d) Didn't want to face the family-4
 e) Decided to stay away from the family & spouse-5
 f) Decided to keep HIV status a secret-6
 g) Immediately felt like I would die-7
 h) I wanted to commit suicide-8
 i) Other (Please specify)

4.4 You said that you were _____
 then how did you cope with the situation?

4.5 What was the initial reaction of your spouse and other family members
 to your HIV status? (Multiple answers)
 a) Shocked-1
 b) Denied/Disappointed-2
 c) Emphathised-3
 d) Embarrassed-4
 e) Supportive-5
 f) Was thrown out of the house/disowned by the family-6
 g) Spouse deserted-7
 h) Not informed anybody-8
 i) Any other (specify)-9
 (If 8, skip to Q.4.20)

4.6 Now, what is the attitude of spouse/family members towards you?
 (Multiple answers possible)
 a) Neglected, isolated, avoided-1
 b) Verbally.physically teased and/or abused-2
 c) Deprived of using basic amenities at home-3
 d) Property taken away-4
 e) Asked to leave home-5
 f) All are supportive-6
 g) Family is not but spouse is supportive-7
 h) Initial hesitation, but then supportive-8
 i) Others (specify) -9

At the community level in the neighbourhood

4.7 Are you or your children being treated badly or differently by others in the



community/neighbourhood because of having HIV positive person in the family? Yes-1 No-0 Status not known to others -2 (If 0, skip to 5.1 & if 2, skip to 4.12)		
4.8	If yes, how do they treat you or your children differently? (Multiple answers possible)	<input type="checkbox"/>
	a) Neglected, isolated, avoided-1	
	b) Verbally abused, teased-2	
	c) Your children are not allowed to play with their children-3	<input type="checkbox"/>
	d) Socially boycotted/not invited for social functions-4	
	e) Debarred from using public well/tap-5	<input type="checkbox"/>
	f) Children not allowed in community centre-6	
	g) Not allowed to participate in unit committee/district assembly-7	
	h) Refused house for renting-8	
	i) Any other (specify)-9	
4.9	Have you joined any support group? Yes-1 No-0 (if no, skip to section 5)	<input type="checkbox"/>
4.10	If yes, name of the organisation	<input type="checkbox"/>
	Name _____	
4.11	What kind of support are you getting	
	1. _____	
	2. _____	
	3. _____	
4.12a	Do you know that a law has been passed which protects the rights of PLHIV? Yes-1 No-0	<input type="checkbox"/>
4.12b	Section 38 of Act 938, 2016 enforces your rights and encourages you to report any acts of stigma and/or discrimination against you and/or your relations. Would you be willing to report?	<input type="checkbox"/>
4.12c	If yes, how would you be willing to report? (Multiple answers possible)	
	a) An NGO-1	<input type="checkbox"/>
	b) The Police-2	<input type="checkbox"/>
	c) A Public Institution such as GAC, CHRAJ or the District Assembly-3	<input type="checkbox"/>
	d) A Priest, Pastor, Imam or other authority figure in the community-4	<input type="checkbox"/>
	e) Other – Please specify-5 _____	<input type="checkbox"/>
	f) All of the above-6	<input type="checkbox"/>
4.13a	When reporting as in 4.12b above is anonymity important to you? Yes-1 No-0	<input type="checkbox"/>
4.13b	If yes, to what extent do you agree that anonymous reporting should be available to you before you report?	<input type="checkbox"/>



<p>a) Strongly Disagree-1 b) Disagree-2 c) Indifferent-3 d) Agree-4 e) Strongly Agree-5</p> <p>4.13c If yes under 4.13a, why is anonymity important to you? Please specify</p>

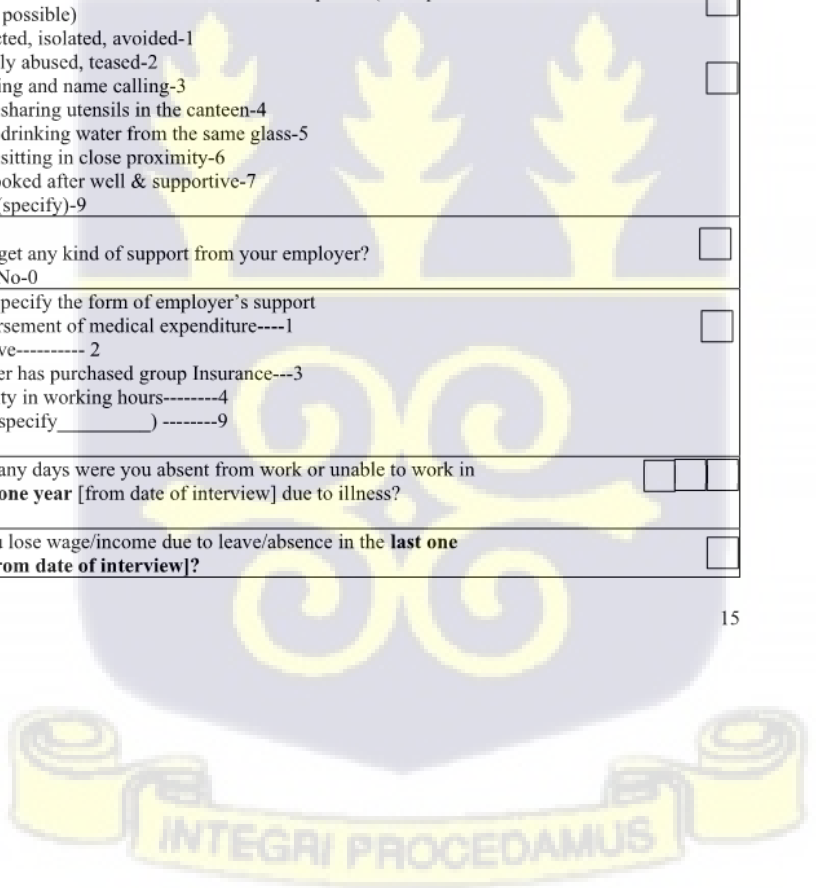


Section 5: Impact of HIV/AIDS on employment

After HIV Status was Discovered		
5.1	Did you change your job after you were tested HIV Yes-1 No-0 If No, skip to 5.9	<input type="checkbox"/>
5.2	If yes what was the nature of your occupation at that time (see codes)	<input type="checkbox"/>
5.3	Sector (see codes)	<input type="checkbox"/> <input type="checkbox"/>
5.4	What was your monthly income at that time? GH¢	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
5.5	Reason for leaving the job? (Multiple answers possible)	<input type="checkbox"/>
a)	Too ill to work-1	<input type="checkbox"/>
b)	Dismissed from work-2	<input type="checkbox"/>
c)	Factory/office closed-3	<input type="checkbox"/>
d)	Took voluntary retirement-4	<input type="checkbox"/>
e)	Wish for anonymity-5	<input type="checkbox"/>
f)	Discriminated at workplace-6	<input type="checkbox"/>
g)	I was discouraged-7	<input type="checkbox"/>
h)	Any other (specify)-9	<input type="checkbox"/>
5.6	Did you receive any benefit at the time of leaving the job Yes-1 No-0	<input type="checkbox"/>
a)	Gratuity-1	<input type="checkbox"/>
b)	Compensation-2	<input type="checkbox"/>
c)	Full Pension-3	<input type="checkbox"/>
d)	Partial pension-4	<input type="checkbox"/>
e)	Other (specify)-9	<input type="checkbox"/>
5.7a	Total amount received at the time of leaving the job GH¢	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
5.7b	State the year	
5.8	How many times did you change your job after being tested HIV Positive? No of times _____	<input type="checkbox"/>
5.9	Are you currently working/engaged in an income earning activity? Yes-1 No-0 [If No, skip to 5.26]	<input type="checkbox"/>



If Currently Working		
5.10 If currently employed, what is the nature of your occupation? (see codes)		<input type="checkbox"/> <input type="checkbox"/>
5.11 Sector (see codes)		<input type="checkbox"/> <input type="checkbox"/>
5.12 If yes, are you facing any discrimination at the workplace? Yes-1 No-0		<input type="checkbox"/>
5.13 If yes, how are you discriminated (Multiple answers possible)		<input type="checkbox"/>
a) Promotion denied-1		
b) Being forced to take-up voluntary retirement or resign-2		<input type="checkbox"/>
c) Benefits are not given-3		
d) Refused loan facilities -4		
e) Psychological, emotional and/or verbal abuse-5		
f) Withdrawal of health/insurance/medical benefits-6		
g) Isolated within office, denied access to shared facilities, like canteen, toilet etc.-7		
h) Shifted from one dept. to another-8		
i) Any other (specify)-9		
5.14 What is the attitude of co-workers at the workplace? (Multiple answers possible)		<input type="checkbox"/>
a) Neglected, isolated, avoided-1		
b) Verbally abused, teased-2		<input type="checkbox"/>
c) Labelling and name calling-3		
d) Avoid sharing utensils in the canteen-4		
e) Avoid drinking water from the same glass-5		
f) Avoid sitting in close proximity-6		
g) Was looked after well & supportive-7		
h) Other (specify)-9		
5.15 Do you get any kind of support from your employer? Yes-1 No-0		<input type="checkbox"/>
5.16 If yes, specify the form of employer's support		<input type="checkbox"/>
a) Reimbursement of medical expenditure----1		
b) Paid leave----- 2		
c) Employer has purchased group Insurance---3		
d) Flexibility in working hours-----4		
e) Others (specify _____) -----9		
5.17 How many days were you absent from work or unable to work in the last one year [from date of interview] due to illness?		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
5.18 Did you lose wage/income due to leave/absence in the last one Year [from date of interview]?		<input type="checkbox"/>



(b)	If you were a wage earner, what was your average wage rate per day? GH ¢	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
(c)	Average no. of days you were working in a year?	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
5.29	If agricultural household, who is compensating for your not going to the farm? a) Other family members-1 b) Hired labourers-2 c) Both-3 d) None-4	<input type="checkbox"/>
5.30	If you have hired labourers in lieu of your not going to work, how much are you spending on hired labourer(s) in a year?[Use year to date]	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
5.31	How many hours per day do you spend caring for yourself as a result of HIV?	<input type="checkbox"/>
5.32	How many hours of leisure per week do you lose because you have to collect drugs or cater to some other demand necessitated by your HIV status?	<input type="checkbox"/>
5.33	Is your cohabiting partner or spouse gainfully employed? a) Yes - 1 b) No - 0	<input type="checkbox"/>



Section 6: Impact of HIV/AIDS on health status and expenditure

I-Non-hospitalised illness episodes

6.1	How many times did you fall ill in the last one year [from date of interview] for which you were not hospitalized? (No. of illness episodes)	[Frequently ill-98] [Continuously ill-99]	<input type="checkbox"/>	<input type="checkbox"/>
6.2	How many times did you fall ill in the last one month for which you were not hospitalized?	[Frequently ill-98] [Continuously Ill-99]	<input type="checkbox"/>	<input type="checkbox"/>

Ask details of last two episodes during last one month

	Episode 1	Episode 2
6.3	Nature of illness (Describe) if possible (see codes)	
6.4	No. of days ill [Frequently ill-98] [Continuously ill-99]	
6.5	Did you seek treatment? Yes-1 No-0	
6.6	If no, reasons for no treatment? (see codes) If treatment was sought, give details	
	Episode 1	Episode 2
6.7	Source of treatment (see codes)	
6.8	Duration of treatment (No. of days)	
6.9	No. of days bedridden	
6.10	No. of days not going to work (Not applicable-99)	
6.11	Expenditure incurred during last month (GH¢)	
	a) Fees and medicine	
	b) Clinical tests	
	c) Transport cost (in & out + caregiver)	
	d) Bribes and tips	
	e) Nutritional supplement due to ARV	
6.12	Total Expenditure (¢)	

II. Hospitalised illness episodes

6.13	Were you ever hospitalized after you were detected HIV-positive? Yes-1 No-0, If no, skip to 6.26	<input type="checkbox"/>
6.14	If yes, number of times	<input type="checkbox"/>
6.15	Were you hospitalized in the last one-year [from date of interview]? Yes-1 No-0, If no, skip to 6.23	<input type="checkbox"/>
6.16	If yes, number of times hospitalized in the last one year [from date of interview]?	<input type="checkbox"/>

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Ask details about all the episodes of hospitalization during last one year[from date of interview]

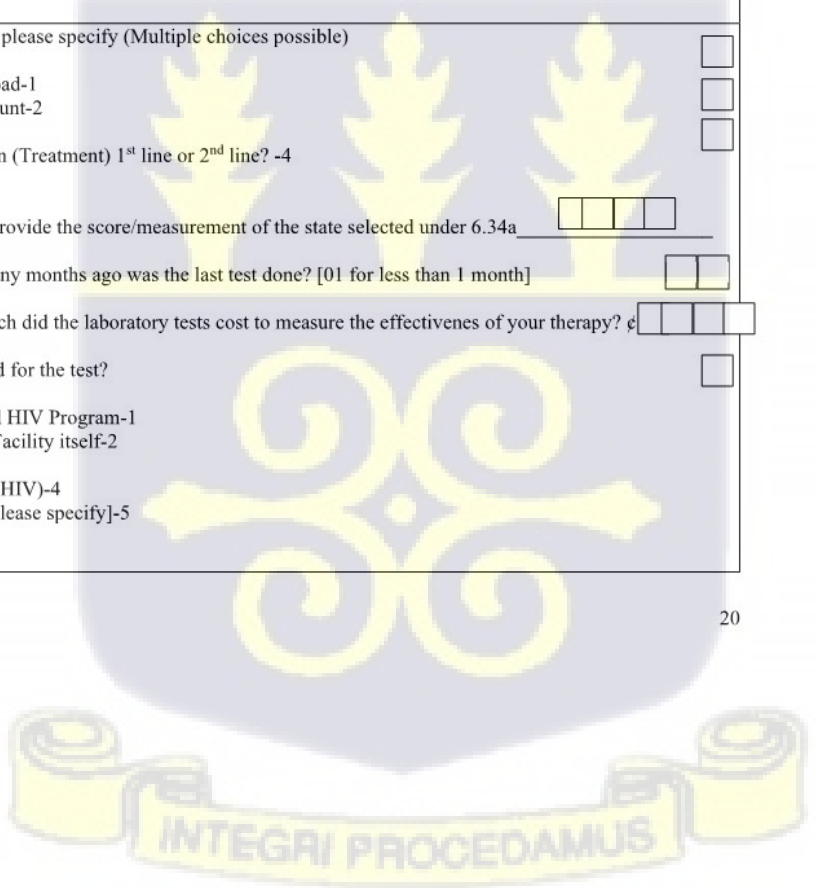
	Episodes 1	Episode 2	Episode 3
6.17 Nature of illness (see codes)			
6.18 No. of days hospitalised (Code 99 if currently hospitalised)			
6.19 Source of treatment (see codes)			
6.20 Expenditure incurred (¢)			
a) Bed			
b) Medical expenditure			
c) Clinical tests			
d) Transport cost			
f) Bribes and tips			
g) Diet/lodging expenses for caregivers			
f) Other (Specify)			
6.21 Total Expenditure (¢)			

6.22 Source of financing hospitalisation (see codes)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.23 Did you undergo any surgery after you were diagnosed HIV-positive? Yes-1 No-0 If No, Skip to 6.26			<input type="checkbox"/>
6.24 If yes, were you charged extra for AIDS kits and fumigating Operating Theatre O.T. used for your surgery? Yes-1 No-0			<input type="checkbox"/>
6.25 If yes, how much did you pay?			<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
6.26 Are you taking ARV on a regular basis? Yes-1 No-0 [If no, Skip to 6.29]			<input type="checkbox"/>
6.27a If yes, source of obtaining ARV (see codes for source of treatment)			<input type="checkbox"/>
6.27b If yes, do you know the type of ARV you are given periodically? Yes-1 No-0			<input type="checkbox"/>

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6.27c	If yes under 6.27b please list the ARV you take periodically. _____ _____	
6.28	Total amount spent per month on ARV (€)	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
6.29	Are you taking any other medicine regular/traditional/prayer on a regular basis since you tested HIV positive? Yes-1 No-0	<input type="checkbox"/>
6.30	If yes, how much are you spending per month (GH¢)	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
6.31	Have you been advised to take nutritious diet to improve Your health condition? Yes-1 No-0	<input type="checkbox"/>
6.32	If yes, how much do you spend on these additional food items per month?GH ¢	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
6.33a	Do you know the stage of progression of your HIV condition? Yes-1 No-0	<input type="checkbox"/>
6.33b	Do you have any symptoms yet? Yes-1 No-0 Please mention any 2 or 3 symptoms which you can remember _____ _____	<input type="checkbox"/>
6.34a	If yes, please specify (Multiple choices possible)	<input type="checkbox"/>
	a) Viral Load-1	<input type="checkbox"/>
	b) CD4 Count-2	<input type="checkbox"/>
	c) Stage-3	<input type="checkbox"/>
	d) Regimen (Treatment) 1 st line or 2 nd line? -4	
	e) Other-5	
6.34b	Please provide the score/measurement of the state selected under 6.34a	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
6.34c	How many months ago was the last test done? [01 for less than 1 month]	<input type="text"/> <input type="text"/>
6.34d	How much did the laboratory tests cost to measure the effectiveness of your therapy? ¢	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
6.34e	Who paid for the test?	<input type="checkbox"/>
	a) National HIV Program-1	
	b) Health Facility itself-2	
	c) NHIS-3	
	d) Self (PLHIV)-4	
	e) Other [please specify]-5	



III-Discrimination at health facilities	
6.35	Have you ever been discriminated at a health facility? Yes-1 No.2 (If No, skip to 6.36) <input type="checkbox"/>
6.36	If yes, where? <input type="checkbox"/>
a)	PHC/CHC-1
b)	Government hospital-2
c)	Private doctor-3
d)	Private hospital-4
e)	Mission/NGO facility - 5
f)	Any other (specify)-9
6.37	In what way were you discriminated? (Multiple answers possible) <input type="checkbox"/>
a)	Neglected/isolated-01
b)	Verbally abused, teased-02
c)	Physically abused-03
d)	Refused medical treatment-04
e)	Referred to another health facility-05
f)	Refused access to facilities like toilets and common eating and drinking utensils-06
g)	Unnecessary use of protective gear (gown, masks etc.) by healthcare staff-07
h)	Excuses given for non-admission-08
i)	Shunting between wards/doctors/hospitals-09
j)	Doctor did not touch-10
k)	Doctor/paramedical gave wrong information about HIV-11
l)	Any other (specify)-99
6.38	What was the attitude of other patients towards you? (Multiple answers possible) <input type="checkbox"/>
a)	Isolated/avoided-1
b)	Verbally abused, teased-2
c)	Physically abused-3
d)	Refused to seek treatment along with HIV-positive person-4
e)	Restrictions on movement in ground, ward or room-5 <input type="checkbox"/>
f)	Status not known to others-6
g)	Not discriminated-7
h)	Others (specify)-9
6.39a	Were you ever denied admission in a health facility? <input type="checkbox"/>
a)	Yes-1
b)	No-0
6.39b	If yes, please state why _____

Section 7A: : Coping mechanism and Social Security

7.1a	What additional responsibilities are taken up by other family members of the infected to cope up with the additional expenditure/loss of income/burden of work? _____ _____
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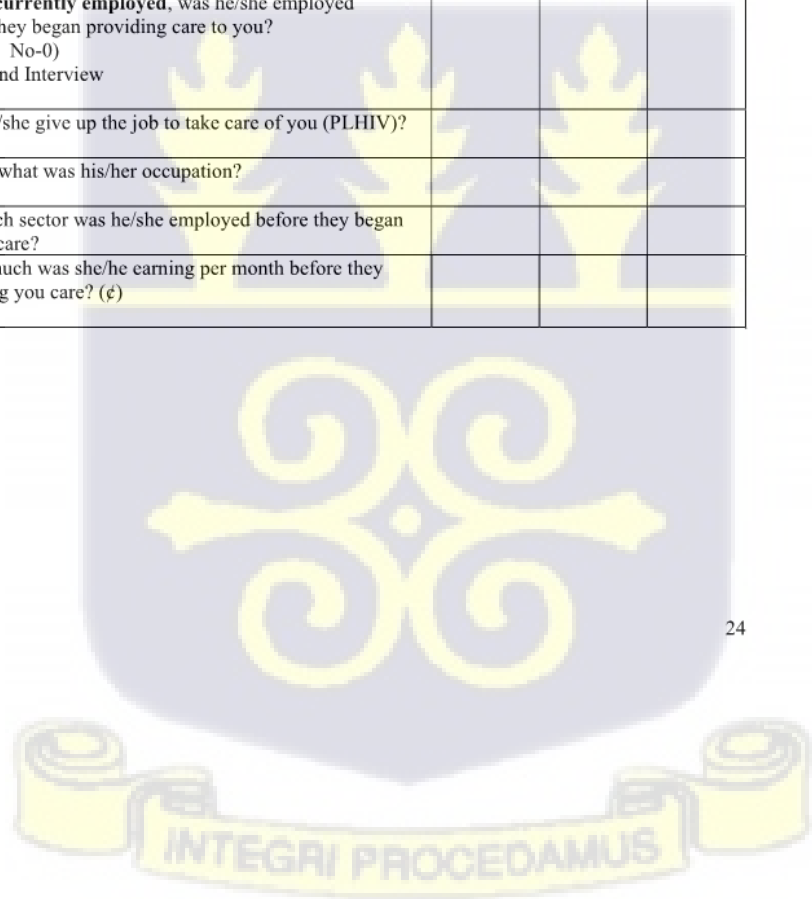


7.1b How are you coping with the additional expenditure/loss of income? (Multiple answers possible)	
a) Use past savings ----- 01	<input type="checkbox"/>
b) Employer reimburses ----- 02	<input type="checkbox"/>
c) Medical insurance ----- 03	<input type="checkbox"/>
d) Mortgage assets ----- 04	<input type="checkbox"/>
e) Liquidation of assets/durable goods/livestock ----- 05	<input type="checkbox"/>
f) Loan from employer or other family members ----- 06	<input type="checkbox"/>
g) Borrow from friends and relatives ----- 07	<input type="checkbox"/>
h) Borrow from moneylender and other financial institutions ----- 08	<input type="checkbox"/>
i) NGO support ----- 09	<input type="checkbox"/>
j) Support from extended family ----- 10	<input type="checkbox"/>
k) Wife had to take up job in order to support the family ----- 11	<input type="checkbox"/>
l) Children had to take up job in order to support the family ----- 12	<input type="checkbox"/>
m) I had to take up additional job to meet the increasing expenditure ----- 13	<input type="checkbox"/>
n) Gifts from sex partners ----- 14	<input type="checkbox"/>
o) Not applicable ----- 15	<input type="checkbox"/>
p) Any other (specify) ----- 99	<input type="checkbox"/>
7.1c How much money on average is made monthly from the above sources?	
Loans/Liquidation GH¢ <input type="text"/>	Gifts/Additional or Child work GH¢ <input type="text"/>
7.2 Do you/did you have any medical insurance cover? Yes - 1 No - 2	<input type="checkbox"/>
7.3 If yes, what is the insurance cover?	<input type="checkbox"/>
7.4 Are you holding any life insurance policy? Yes-1 No-0 Discontinued-3	<input type="checkbox"/>
7.5 Are you entitled to the employees state insurance scheme (SSNIT)? Yes-1 No-0	<input type="checkbox"/>
7.6 Are you receiving any pension? Yes-1 No-0	<input type="checkbox"/>
7.7 If yes, what type of pension? Widow pension-1 Family pension-2 From the previous employment-3	<input type="checkbox"/>
7.8 Have you ever been denied any loan facility? Yes = 1, No = 2 Never applied = 3	<input type="checkbox"/>
7.9 If yes, what type of loan?	<input type="checkbox"/>
a) Housing loan from banks-1	<input type="checkbox"/>
b) Loan from employer-2	<input type="checkbox"/>
c) Education loan for children-3	<input type="checkbox"/>
d) Agricultural loan from rural banks/cooperative societies-4	<input type="checkbox"/>
e) Car/scooter loan [Vehicle loan] -6	<input type="checkbox"/>
f) Any other (specify)-9	<input type="checkbox"/>



If the Caregiver is a household member, then ask about him/her (if caregiver not a household member, END INTERVIEW)

	Person 1	Person 2	Person 3
PID No. of household member			
7.15 Is the primary caregiver employed anywhere else beyond providing HIV related care to you? (Yes-1 No-0) If no, skip to 7.20			
7.16 If yes, write the occupation code from Section 2.			
7.17 Write the sector code from Section 2.			
7.18 Did the caregiver lose any income due to absence from Work because he/she had to provide HIV care to you? (Yes-1 No-0)			
7.19 If yes, how much income lost? (€.)			
7.20 If not currently employed , was he/she employed before they began providing care to you? (Yes-1 No-0) If no, End Interview			
7.21 Did he/she give up the job to take care of you (PLHIV)?			
7.22 If yes, what was his/her occupation?			
7.23 In which sector was he/she employed before they began providing you care?			
7.24 How much was she/he earning per month before they began providing you care? (€)			



APPENDIX 2: INTERVIEW GUIDE

ECONOMIC BURDEN OF HIV AND AIDS ON PRODUCTIVITY AND HOUSEHOLD WELFARE IN GHANA (Interview Guide)

Consent statement

Dear participant,

The purpose of this study is to interrogate the Socio-economic impact of HIV and AIDS in Ghana. You have been selected for this in-depth interview as part of the explanatory segment of a multistage explanatory sequential design. I would like to ask you a few questions regarding your economic, health and psychosocial coping mechanisms as someone who lives with HIV. The same questions are being asked to several households in twelve sites across the country as part of the requirements for a PhD research at the Institute of Statistical Social and Economic Research (ISSER), University of Ghana, Legon.

Participation in this in-depth interview is voluntary and you are free to refuse to answer any question which you find uncomfortable or objectionable. Even if you agree to participate or respond to these questions, you can decide to stop answering and/or quit at any point during the study and there will be no penalty to you for doing so.

Your responses may be recorded, transcribed and analysed but will never be published in any academic outlet or any other channel without it first being anonymized so that you cannot be directly identified or associated with it. I wish to assure you that your name and identity or any other personal information will not be revealed to anyone either in the final report or in any other way. Your participation in this study will support attempts to improve the strategies which may be implemented to mitigate the economic impact of HIV and AIDS in Ghana.

Also note that you have the right to refuse to be recorded, even if you agree to be recorded after transcription and analysis the recordings will all be safely destroyed.

Do you agree to participate? Yes-1/ No- 0

Name of the interviewer: -----

Signature of the interviewer:-----

Date:----- Time of interview:-----

Place of interview:-----

How are you?

Since you got the disease, have things improved financially for you or they have become worse? [Probe – Please tell me more, are the circumstances you report valid for you only or they also apply to your household?

Costs of care for HIV/AIDS have increased [2.44 times], Direct costs have about doubled [2.1 times] versus Indirect costs[2.9 times] do you agree?

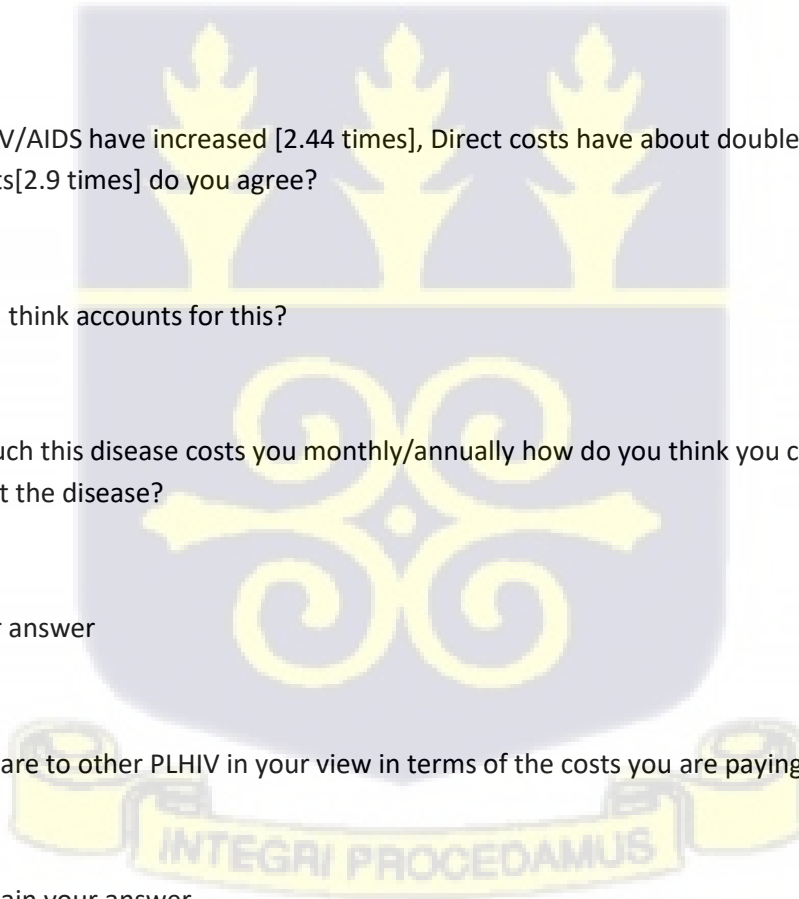
If yes, What do you think accounts for this?

In terms of how much this disease costs you monthly/annually how do you think you compare to the time before you got the disease?

Please explain your answer

How do you compare to other PLHIV in your view in terms of the costs you are paying

Please explain your answer



How do you compare to your neighbours who maybe do not have HIV in terms of your economic status as a result of the disease?

Please explain your answer

PLHIV household incomes have almost doubled in the past 10 years whereas household incomes for the average Ghanaian household have grown almost 9 times. Does this appear plausible to you?

Please explain your answer

What do you think could be done to correct this anomaly?

Tell me about any income or benefits including leisure which you might have lost because you are either incapacitated by the disease or stigmatized and discriminated against. [Probe: Any more effects of HIV not listed here?]

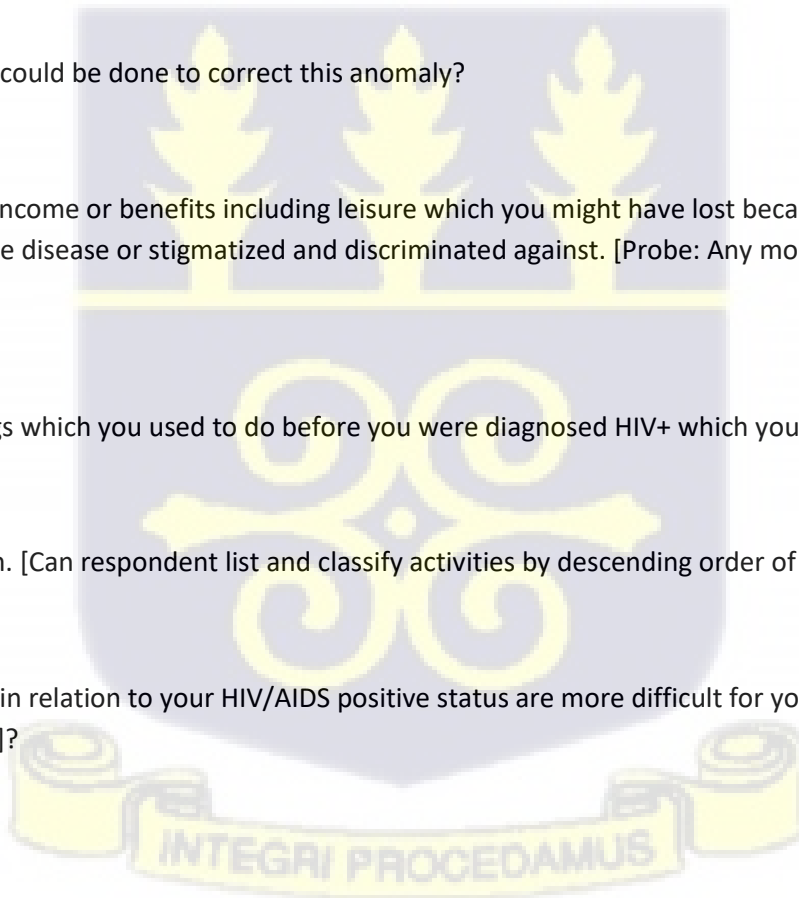
Are there any things which you used to do before you were diagnosed HIV+ which you can no longer do?

Tell me about them. [Can respondent list and classify activities by descending order of importance?]

Which of the costs in relation to your HIV/AIDS positive status are more difficult for you to bear [Direct, indirect, intangible]?

Why?

If you could get help to meet some of the costs of HIV (Direct, Indirect and Intangible) , which one would you need support for?



Why?

How has HIV affected your identity? **[Individual]**

Do you feel like you are still the person you were before HIV in terms of self-worth and prestige? [probe – what, why, how, when, whom – related parties]

Have you experienced any change in relationships since you were diagnosed HIV+ compared with the time before your diagnosis, with your partner? **[Social Networks]**

Have you experienced any change in relationships since you were diagnosed HIV+ compared with the time before your diagnosis, with your relatives? **[Social Networks]**

How involved are you currently within your community, church/mosque or other social gathering? **[Community]**

Please explain and indicate why you think this is the case?

Do you feel empowered/social capital? **[Community]**

Why?



How would you rate national leadership as far as our ability to manage HIV as a country is concerned?

Why?

Do you feel disadvantaged in terms of income and equality as a PLHIV?

Why?

Are our health policies good/supportive of PLHIV?

Are our systems good/supportive of PLHIV?

Why?

Is our Health Infrastructure good/supportive of PLHIV? Please explain your answer

How would you rate our cultural norms and values in terms of how they support PLHIV ?

Why?

How would you rate our cultural norms and values in terms of how they promote HIV related prevention messaging and practices?

Why?

Are you on treatment?

Tell me about your treatment costs since you began treatment. Have they gone up or down and why? [Can respondent classify?]

Tell me about your living costs since you began treatment. Have they gone up or down and why? [Can respondent classify?]



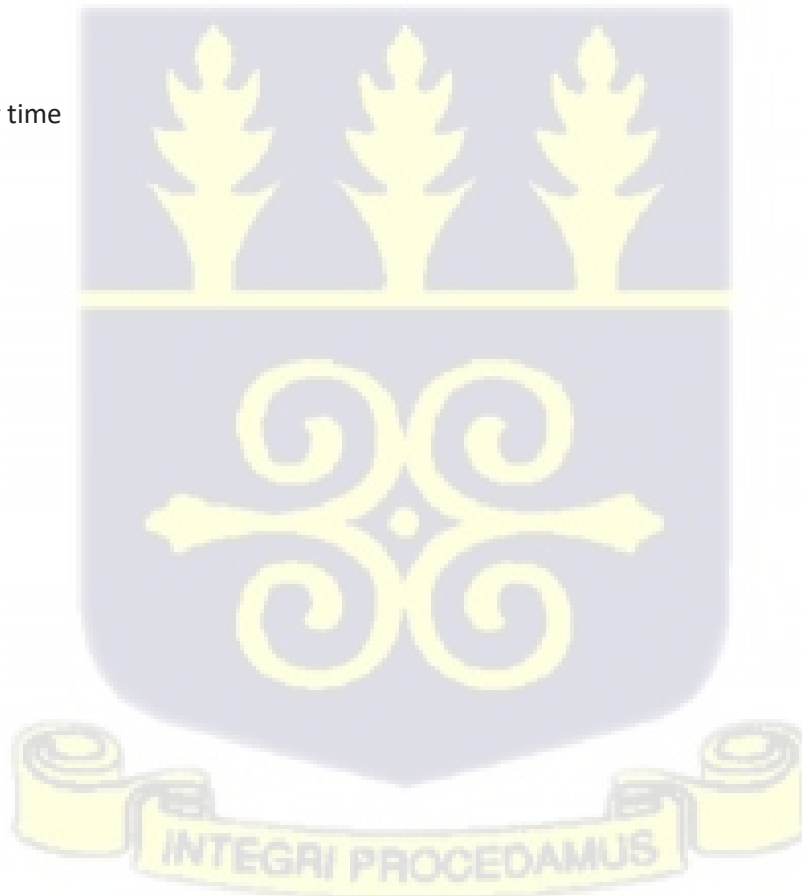
Are some treatment costs more difficult for you to bear than others? [If the respondent does not volunteer information probe for :- Laboratories, Opportunistic infections, CT Scan, caregiver, hospital bills and Indirect costs such as job/income losses, rent, food and other family dysfunctions.

How do you get support to address the challenges above?

Do you or are you aware of anyone else who has to engage in sex or other risky sexual behaviour just to be able to cope?

[Probe: Please Tell me more:]

Thank you for your time



APPENDIX 3: FOCUS GROUP DISCUSSION GUIDE

ECONOMIC BURDEN OF HIV AND AIDS ON PRODUCTIVITY AND HOUSEHOLD WELFARE IN GHANA

(Focus Group Discussion Guide)

Consent statement

Dear participants,

The purpose of this study is to interrogate the Socio-economic impact of HIV and AIDS in Ghana. You have been selected for this focus group discussion as part of the explanatory segment of a multistage explanatory sequential design. I would like to have a discussion with you to firm up some of the information we have received from your community thus far about your economic, health and psychosocial coping mechanisms as people live with HIV. Similar FGD are being held in different locations across the country as part of a PhD research work at the Institute of Statistical Social and Economic Research (ISSER) at the university of Ghana - Legon.

Participation in this FGD is voluntary and you are free to refuse to answer any question which you find uncomfortable or objectionable. Even if you agree to participate or respond to these questions, you can decide to stop answering and/or quit at any point during the study.

Your responses may be recorded, transcribed and analysed but will never be published in any academic outlet or any other channel without it first being anonymized so that you cannot be directly identified or associated with it. I wish to assure you that your name and identity or any other personal information will not be revealed to anyone either in the final report or in any other way. Your participation in this study will support attempts to improve the strategies which may be implemented to mitigate the economic impact of HIV and AIDS in Ghana.

Also note that you have the right to refuse to be recorded, even if you agree to be recorded after transcription and analysis the recordings will all be safely destroyed.

Do you all agree to participate? Yes-1/ No- 0

Name of the FG Lead:-----

Signature of the Lead:-----



Date:----- Time of interview:-----

Place of interview:-----



Expenditure Trends¹⁰⁵

Since you got the disease, have things improved financially or they have become worse? [Probe – Please tell me by how many times? Are the changes the same for direct and indirect costs? What about intangible costs?

What do you think accounts for this?

How do PLHIV households compare to their neighbours in terms of cost of living, welfare? Are there differences?

Please explain

How do PLHIV households compare to their neighbours in terms of cost of living, welfare? Are there differences?

Please explain

Which of the costs are more difficult for you to bear [Direct, indirect, intangible]?—you will need to probe with examples of these, or words that explain the direct, indirect, etc.

If you could get help to meet some of the costs, which one would you need support for? Direct? By how much? Indirect? By how much? Intangible? By how much?

Are some treatment costs more difficult for you to bear than others? [If the respondent does not volunteer information probe for :- Laboratories, Opportunistic infections, CT Scan, caregiver, hospital bills and Indirect costs such as job/income losses, rent, food and other family dysfunctions. Are there any other costs which we might have missed?

How do you get support to address the challenges above? Can you also talk about who provides this support and the circumstances under which the support is given?

¹⁰⁵ Ask questions to the group and share findings of study as part of FGD for validation and member checking purposes

Household Incomes and National Leadership

Have your household incomes grown since you were diagnosed with HIV?

How have your incomes fared in your view compared to the incomes of your neighbours who might not be HIV positive?

What do you think could be done to correct any anomalies with regards to the growth of your incomes if any?

How would you rate national leadership as far as our ability to manage HIV as a country is concerned?

Do you feel disadvantaged in terms of income as PLHIV?

Please Explain

Do you feel disadvantaged in terms of equal opportunities in society as a PLHIV?

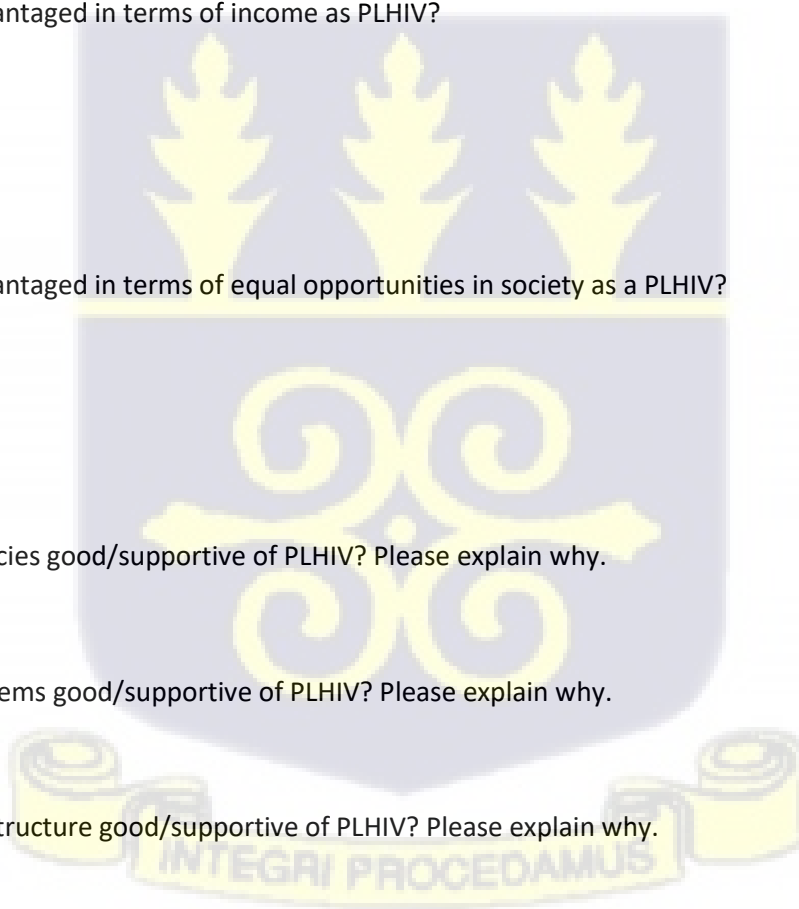
Please Explain

Are our health policies good/supportive of PLHIV? Please explain why.

Are our health systems good/supportive of PLHIV? Please explain why.

Is our health infrastructure good/supportive of PLHIV? Please explain why.

Thank you all very much for your time.



APPENDIX 4: OPPORTUNITY COST OF HIV ON GHANAIAN GDP

Given that Ghana's 2019 GDP is estimated at US\$68.3 Billion (GSS, 2019b) the HIV morbidity related reduction in output at the scale of the total GDP can be said to be US\$ 389,603,151.00 (-0.0057x US\$68,351,430,000.00) using the approach of Orem et al. (2012) which assesses lost output against a counterfactual of total disease elimination. The per PLHIV loss which may be apportioned using the 2019 estimated PLHIV case load (342,207) amounts to US\$1,138.50 per year.

A more conservative approach might use the average GDP for the period 1990-2019. This could be obtained by multiplying the real GDP per capita by the average annual population for the period 1990-2019 as detailed in Table 7¹⁰⁶. A total output of US\$ 28,617,485,336 is obtained from which 0.57 percent (US\$ 163,119,666.42) is extracted as the annual growth constraining effect of HIV morbidity. The per PLHIV loss which may be apportioned using the 2019 estimated PLHIV case load (342,207) in this case would amount to US\$476.67 per year.

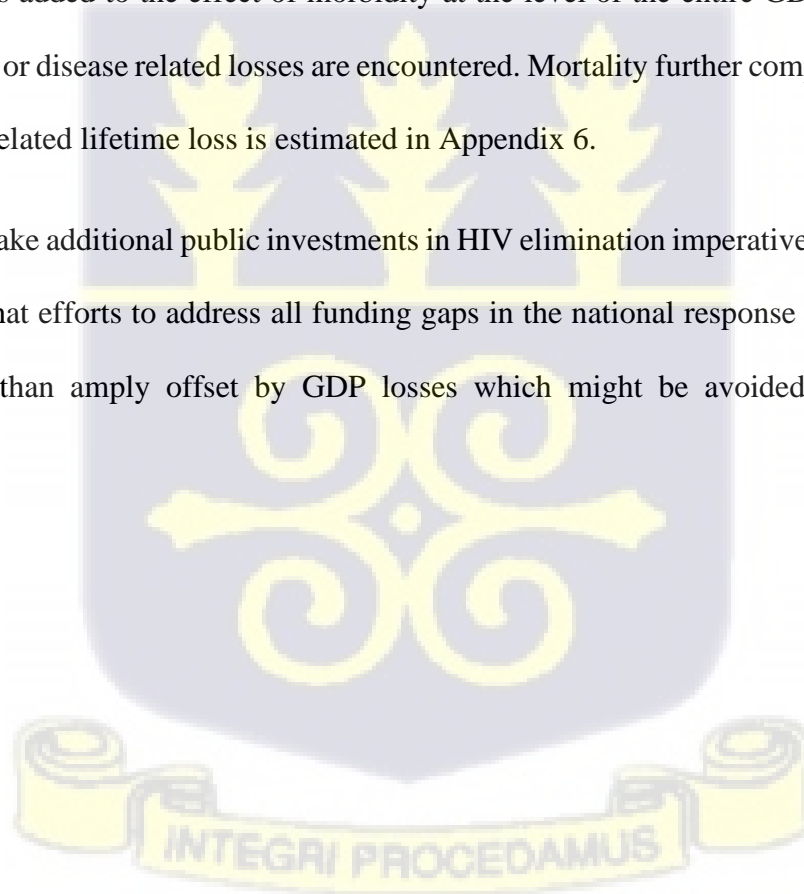
In both cases, the estimated amount of forfeited growth is very significant as an opportunity cost for a lower middle-income country such as Ghana. In comparative terms, even the more conservative value hereafter referred to as “the loss” represents more than two and a half times the average annual all-source expenditure on HIV and AIDS in Ghana (GAC, 2020a). The loss is almost 60 percent (using a 2017 median exchange rate of GHS4.35202 to 1US\$) of Ghana's entire 2017 (January to September) upstream petroleum sector receipts (Ghana Government, 2017) or 11 percent of the entire 2019 oil revenue envelope (Ghana Government, 2019). Alternatively, spread

¹⁰⁶ US\$1301 x 21,989,600 = 28,617,485,336

over a total Ghanaian population of 30,417,900 people in 2019, each person makes a loss of US\$5.36 (GHS31) in the year 2019.

The economic impact of HIV on the Ghanaian economy cannot be minimised even though it may appear minute or negligible given that it amounts to less than 0.57 percent of per capita GDP. GDP in 2019 for Ghana is estimated at US\$2,247.08 (World Bank, 2020). Similar muted findings were made for several countries in Africa by Kirigia et al. (2002) who attribute such negligible effects to high unemployment and to the preponderance of low wages, unskilled work and other informal sector occupations which many of the PLHIV might be engaged in. However, when the effect of AIDS mortality is added to the effect of morbidity at the level of the entire GDP, very important opportunity costs or disease related losses are encountered. Mortality further compounds the burden of HIV, and the related lifetime loss is estimated in Appendix 6.

These findings make additional public investments in HIV elimination imperative for policy makers as it is obvious that efforts to address all funding gaps in the national response to HIV and AIDS would be more than amply offset by GDP losses which might be avoided because of HIV eradication.



APPENDIX 5: ACCOUNTING FOR STATIONARITY

IN THE IMPACT OF HIV ON THE GHANAIAN ECONOMY

A debate over autocorrelation is not unusual whenever time series data are analysed. This is for good reason as there might be a residual effect of past values of the dependent variable on future values. The self-fulfilling “prophecy” of sorts which occurs then obscures the nature of the relationship between the explanatory variables and the dependent variable.

In this study, the dependent variable, GDP per capita, illustrated decaying effects when the autocorrelation function was graphed. This suggested some influence from prior states of the dependent variable and therefore the need to introduce dynamics into the analysis for purposes of clarifying autocorrelative issues. Consequently, an Augmented Dickey Fuller (ADF) test was performed even though the Durbin Watson d-statistic was found to be much higher than the R^2 , a characteristic rule of thumb which already suggested stationarity (Adeleye, 2018b).

The ADF test found first difference stationarity¹⁰⁷ (Obs = 27, MacKinnon approximate p-value for $Z(t) = 0.0018$, $\alpha = 0.05$, ADF test statistic = -3.939, critical values: 1% = -3.736, 5% = -2.994, 10% = -2.628) for the dependent variable (lgdpdolk) and other explanatory variables except for lprev (HIV morbidity) (Obs = 30, MacKinnon approximate p-value for $Z(t) = 0.047$, $\alpha = 0.05$, ADF test statistic = -1.73, critical values: 1% = -2.47, 5% = -1.70, 10% = -1.3) and lmn (HIV mortality) (Obs = 28, MacKinnon approximate p-value for $Z(t) = 0.03$, $\alpha = 0.05$, ADF test statistic = -1.9, critical values: 1% = -2.5, 5% = -1.7, 10% = -1.3) for which stationarity was found at level. Since stationarity was confirmed at different levels for different series in both the morbidity and the mortality models¹⁰⁸

¹⁰⁷ 1st Order integration or stationarity at first difference leads to Johansen cointegration test

¹⁰⁸ I(0) or I(1) or I(0) and I(1)

autoregressive distributed lag (ARDL) models (model 3 – morbidity and model 4 - mortality) were fashioned to explore the explanatory power of latent variables (lags) (Akhtar, 2021).

A generalised ARDL model was specified for the purpose as follows:

$$Y_t = \gamma_0 + \sum_{j=1}^p \delta_j Y_{t-j} + \sum_{j=0}^q \beta'_j X_{t-j} + \varepsilon_{jt}$$

Where:

Y'_t is a vector and the variables in (X'_t) are purely I (0), I (1) or cointegrated while δ and β are coefficients and γ the constant; $j=1 \dots k$. The optimal lag orders p and q are such that p lags are used for the dependent variable and q lags for the independent variables. The vector of the error terms ε_{jt} is serially uncorrelated or independent such that it reflects an unobservable zero mean white noise vector process. The dependent variable is a function of its lagged values as well as the current and lagged values of other exogenous variables (Adeleye, 2018a).

A Johansen cointegration test to establish long run relationships (Dewan, 2021) was performed. This was preceded by a lag identification sequence based on different criteria (Akaike Information Criteria – AIC, etc) using the “varbasic” and “varsoc” Stata ® functions which identified the 1st and 2nd lags as ideal. At the 2nd lag, the presence of cointegration¹⁰⁹ (Trace Statistics > 5 % critical value in 5 cases, implying maximum rank = 4 cases and Max Eigen > 5% critical value in 4 cases, implying maximum rank = 3¹¹⁰) was found for the morbidity model (4 cointegrating equations) and the mortality model (2 cointegrating equations). At the 1st lag, only one cointegrating equation was found for both the mortality and the morbidity model. A confirmatory bounds test found no

¹⁰⁹ Using Stat’s vecrank function (Johansen’s cointegration test)

¹¹⁰ Null hypothesis of at most 3 co-integrating equations/vectors cannot be rejected, the variables “move together” in the long run.

cointegration for morbidity at I (0) and I (1) and was indeterminate for mortality at both levels. Given the cointegration uncertainty identified above¹¹¹, an error correction model was applied as well. The ADRL models were thus subjected to some error correction given the possible presence of cointegration (Adeleye, 2018a; Sayed, 2013). The error correction segment of the ADRL model deployed the differenced values of exogenous variables (Adeleye, 2018a; Nau, 2022). Other models highlighted the unique simple regression cases which used the 1st lag of GDP per capita (model 7 & 8 for morbidity & mortality) and the 1st difference of GDP per capita (model 9 & 10 for morbidity & mortality) as proxies for the initial income or initial wealth as an exogenous variable. Models 3, 4, 5, 6, 7, 8, 9 and 10 below show trite improvements on the earlier models (models 1 & 2) hence the decision to proceed with the non-dynamic models.

Using the adjusted R^2 (>0.96) and the standard error of the constant (<15.18) model 9 and 10 which introduced the 1st difference of the dependent variable as an explanatory variable for HIV morbidity and AIDS mortality were easily the models with the greatest fit.

Under models 3 & 4, HIV and AIDS morbidity and mortality were statistically insignificant in their relationship with per capita GDP although they denoted the right signs (negative) at first lag for morbidity and at level for mortality. Model 3 also displayed a significant negative relationship between labour I (2) and per capita GDP at 10 percent significance *ceteris paribus* in the short run while fixed capital at level signalled a positive relationship with per capita GDP in the short run at 5 percent of significance.

The counter-intuitive negative sign for the relationship between GDP per capita and the labour force transitioned to the secondary school variable I (1) under model 4, even though the relationship was

¹¹¹ Usually, failure to identify cointegration or a long run relationship would require the execution of an ARDL model without error correction.

not significant. Fixed capital and labour force were significant at level and at 10 percent significance level in their short run relationship *ceteris paribus* with per capita GDP.

The long run relationship documented under models 5 & 6 indicate cointegration for HIV morbidity as well as a 1st lag per capita GDP relationship at 5 percent significance level with per capita GDP under model 5. A 1 percent increase in capital formation was also associated with a 0.42 percent increase in per capita GDP holding all other variables constant in the long run.

Except for models 9 and 10 which introduced the 1st difference of GDP per capita as explanatory variables, no other model denoted any further statistically significant variables. These 2 models (9 & 10) as noted earlier demonstrated the best fit among all the dynamic models estimated due to their adjusted R^2 values and the standard errors of the constants which indicated greater proximity to the line of best fit. For model 9, the 1st difference of GDP per capita, labour force, secondary school enrolment as well as HIV prevalence and the model constant were all associated with per capita GDP at 1 percent level of significance with HIV prevalence and labour force reflecting a negative association. Arable land per capita and fixed capital were significant at 10 percent in their relationship with per capita GDP. Model 10 reflected similarly a counter-intuitive negative relationship between labour force and GDP per capita in which a 1 percent increase in the labour force was associated with a 2.35 percent decline in per capita GDP at 1 percent significance level, holding all other explanatory variables constant. Mortality in model 10 in line with expectation was negatively associated with per capita GDP such that a 1 percent increase in mortality was associated with 0.34 percent decline in per capita GDP at 1 percent significance level. A 1 percent increase in the 1st difference of GDP per capita and secondary school enrolment was associated with 4.26 and 5.25 percent respectively of GDP per capita at 1 percent significance level. The standard errors and coefficients for the HIV morbidity and mortality variables which were more

conservative for models 1 and 2 versus the metrics for models 9 & 10 finally constituted the decision factor.



Table 44: Dynamic modelling: Impact of HIV and AIDS on the Ghanaian Economy

Economic Impact of HIV and AIDS on the Ghanaian Economy, GDP per capita as dependent variable [1990-2019]

Explanatory Variables	Model 3 ¹¹²		Model 4		Model 5		Model 6		Model 7		Model 8		Model 9		Model 10	
	β	t	β	t	β	t	β	t	β	t	β	t	β	t	β	t
1 st Lag pc GDP	-0.03	-0.09	0.32	0.7	-1	-3**	-0.67	-1.4	0.17	0.74	0.33	1.33				
1 st diff pc GDP													0.54	4.26***	0.61	4.26***
Land (A) - Pal	2 (1.53)	1.31 ¹	2.1 (1.3)	1.6 ¹	0.70 (1.46)	0.48	-0.67 (4.25)	-0.2	0.36 (0.62)	0.59	-0.07 (0.65)	-0.10	0.83 (0.43)	1.94*	0.77 (0.46)	1.65
Capital (F)-Pfcf	0.33	2.31 ^{0**}	0.43	2.01 ^{0*}	0.42	2.19*	1.06	1.6	0.10	0.10	0.06	0.59	0.14	1.94*	0.08	1.06
Human Capital Labour Force- lemps	-6.3 (2.92)	-2.17 ^{2*}	12.8 (6.08)	2.1 ^{0*}	0.05 (2.49)	0.02	2.36 (3.79)	0.6	-1.58 (1.38)	-1.14	-1.07 (1.40)	-0.76	-2.59 (0.89)	-	-2.35 (0.96)	-
Human Capital (HK) Sec. Schl Enrl - Sec	2.16 (1.43)	1.5 ⁰	-1.85 (1.4)	-1.31 ¹	0.61 (1.5)	0.4	-3.84 (5.36)	-0.7	2.05 (1.05)	1.94*	1.43 (1.06)	1.36	2.94 (0.56)	5.25***	2.72 (0.60)	4.56***
HIV (H) Prevalence	-19.93 (24.44)	-0.82 ¹			-0.04 (1.43)	-0.03			-0.43 (0.29)	-1.47			-0.74 (0.16)	-	4.62***	
HIV (H) Mortality			-5.15 (3.0)	-1.74 ⁰			-1.0 (0.59)	-1.7			-0.07 (0.15)	-0.47			-0.34 (0.09)	-
Trade (X) =>I/X	0.54	1.66 ²	-0.45	-1.5 ¹	0.46	0.74	-0.79	-0.5	0.31	1.44	0.41	1.76*	0.17	1.01		2.61***
Constant	5.01 (50.09)	0.10	-17.58 (33.92)	-0.52	5.01 (50.09)	0.10	-17.58 (33.92)	-	35.63 (24.39)	1.46	21.51 (23.64)	0.91	57.22 (14.32)	3.99***	47.60 (15.17)	3.14***
Durbin Watson	Stat	2.2		1.75		2.2		1.75		1.61		1.61		1.64		1.63
Adjusted R ²		0.96		0.97		0.49		0.70		0.95		0.93		0.97		0.96
Root MSE		0.10		0.08		0.10		0.08		0.12		0.13		0.09		0.10
Heteroskedasticity	p-val	0.41		0.41		0.41		0.41		0.41		0.41		0.41		0.14
Skewness	p-val	0.39		0.63		0.39		0.63		0.36		0.30		0.10		0.14
Kurtosis	p-val	0.40		0.16		0.40		0.16		0.08		0.14		0.47		0.93
Observations	#	28		26		28		26		29		29		29		29

Standard errors in parentheses () *** P<0.01, ** P<0.05, * P<0.1 β =Coefficient, t= t-statistic Levels: ⁰ Level or I (0), ¹ I(1), ² I(2)

¹¹² Models 3 & 4: Simple ARDL for morbidity & mortality. Models 5&6: ARDL error correction morbidity & mortality. Models (7 & 8: 1st Lag morbidity & mortality) & Models (9 & 10: 1st difference morbidity & mortality) as initial wealth/income proxies. ARDL models 3 to 6 report optimal variables only.

APPENDIX 6: UNDISCOUNTED LIFETIME LOSS

Mortality creates an undiscounted Lifetime GDP Loss (LGL) which may be added to morbidity loss and is derived in line with Kirigia et al. (2002) as follows:

$$\text{LGL} = (\text{Age}_r - \text{Age}_d) \times (\text{AIDS Deaths}_i \times \text{GDP}_d)$$

Where: Age_r = Age at retirement assumed in this study to be 60 years.

Age_d = Average age at AIDS death. Assumed to be 45 years for adults and 14 for children¹¹³

GDP_d = Effect of AIDS mortality on per capita GDP

AIDS Deaths_i = AIDS deaths for different age groups (adult – 85% & children – 15%)

$$\text{LGL}_a = (60-45) \times (16,707 \times 85\%^{114}) \times .26\% \times \$1301.41 \text{ (1) – Adults}$$

$$\text{LGL}_c = (60-14) \times (16,707 \times 15\%) \times .26\% \times \$1301.41 \text{ (2) - Children}$$

Equations (3) and (4) simplify the age disaggregated lifetime costs of mortality:

$$\text{LGL}_a = (60-45) \times (16,707 \times 85\%) \times (0.26\% \times \$1301.41) = \$720 \text{ thousand (3)}$$

$$\text{LGL}_c = (60-14) \times (16,707 \times 15\%) \times (0.26\% \times \$1301.41) = \$390 \text{ thousand (4)}$$

The notations above illustrate the LGL totalling \$1.1 Million for the 2019 mortality cohort with a net present value¹¹⁵ of US\$52,849.45. This represents a discounted mortality loss of US\$3.16 per AIDS death.

¹¹³ Average length of time since diagnosis of respondents enrolled on ART in household survey implemented as part of this study is 7.3 years, a figure like the 10-year findings of Poorolajal et al. (2016). With Average age of PLHIV in the household survey being 42.78, average age at infection is (42.78 – 7.3 = 35.46 years). This means that the average age at death is (35.46+10 = 45.46 years, rounded down to 45).

¹¹⁴ Weight of adult AIDS deaths (GAC, 2020c)

¹¹⁵ Average exchange rate from Bank of Ghana for the period is 1.3767 GHS to 1 USD. Bank of Ghana Interest Rate is also averaged at 21 percent APR.

This annual discounted figure of the lifetime loss due to AIDS mortality appears negligible at first sight. However, it may represent a significant opportunity cost for a country such as Ghana which already experiences significant fiscal constraints and spends only US\$2.24 per capita on HIV (Halasa-Rappel et al., 2021). This suggests that it costs Ghana 41 percent more to allow PLHIV to perish than it would cost to keep them alive. The burden of this loss is also significant because it is additional to all the earlier morbidity costs.

The average per capita GDP loss computed above utilises the conservative average for the period 1990 to 2019. If the 2019 per capita GDP rather than the average is used to compute the lifetime GDP loss as of 2019, the loss escalates from \$1.1 Million to \$1.91 Million and a net present value of US\$91,252.48 representing a discounted lifetime loss per AIDS death of US\$5.46. This potential loss is more than double the per capita expenditure on HIV and should inform the relevant policy actions.

